

NO. ISSN 2987-4564



PROCEEDINGS OF

INTERNATIONAL CONFERENCE ON EDUCATION
(PICE)

ISSN NO. 2987-4564

THE 3rd FKIP-USM INTERNATIONAL CONFERENCE ON EDUCATION

DIGITALIZATION OF EDUCATION:
ENVISIONING ITS IMPACT ON
THE DYNAMICS OF CULTURAL
ORDER

Banda Aceh, MARCH 7-8th 2024

TEACHER TRAINING & EDUCATION FACULTY
UNIVERSITAS SERAMBI MEKKAH
INDONESIA

A Welcome Speech from Rector of Universitas Serambi Mekkah

Bismillahirrahmanirahim,
Assalamualaikum Wr. Wb.
Greetings From Aceh

Good morning ladies and gentlemen,

Honorable the Head of LLDIKTI, Dr. Ir. Rizal Munadi, M.M., M.T
Honorable The Head of Yayasan Pembangunan Serambi Mekkah, Ir. Teuku Iskandar Shah
Honourable all structural leaders, distinguished guests, and keynote speakers.

On behalf of Universitas Serambi Mekkah, I would like to express my great pleasure to welcome all of you to the hybrid 3rd International Conference on Education of FKIP USM. We are truly honoured and humbled by your attendance and enthusiasm to participate in this international event. This activity is one of the routine agenda organized by FKIP Universitas Serambi Mekkah aiming to provide an intellectual platform for everyone – researchers, students, and general public – to find updated information and ideas sharing on important issues in education.

Dear ladies and gentlemen,

In this digital era, educators need to adjust themselves in order to keep updated in providing good education for students all over the world. However, we cannot avoid the impact from digitalization of education which may influence changes in our cultural order, including the way of delivering the education and of facing the students' characters. Therefore, knowledge sharing platform like what we conduct today is one of the important step to cope with that issue. Hence, this year's theme is related to it, which is *"Digitalization of Education: Envisioning its Impact on the Dynamics of Cultural Order"*.

In this moment, I would also like to express thanks to all of our keynote speakers from five different countries:

1. Assoc. Prof. Dr. Mahendran Maniam from UPSI Malaysia,
2. Dr. Sophia Manning from Kean University, USA,
3. Prof. Dr. H. Didi Suryadi, M.Ed from UPI, Bandung Indonesia and Associate Prof. Dr. Viyanti, M.Pd from UNILA Lampung, Indonesia
4. Associate Professor Mitchell O'Toole from University of NewCastle, Australia, and
5. Associate Prof. Dr. J. Karthikeyen from National College, India

I would also like to thanks the organizing committee, presenters and participants for making this event happen. I officially open up this event, hoping the event will run successfully until the end and everyone is benefitted as much as possible from the event.

Thank you very much.
Banda Aceh, 7 March 2024

Dr. Teuku Abdurrahman, S.H., SpN
Rector of Universitas Serambi Mekkah

A Welcome Speech from Dean of Teacher Training and Education Faculty of Universitas Serambi Mekkah

Bismillahirrahmanirrahim, *Assalamu 'alaikum Warahmatullahi Wabarakatuh*,
Alhamdulillahirrabil'alaminn wassalatu wassalamu 'ala asyrafil anbiyai walmursalin wa'ala
alihi wasahbihi ajma'in

Ladies and Gentlemen

First of all, I would like to thank the Almighty God for all His Blessings and Mercies that
have made us possible to attend the event in excellent health.

Honorable the Head of LLDIKTI, Dr. Ir. Rizal Munadi, M.M., M.T
Honorable The Head of Yayasan Pembangunan Serambi Mekkah, Ir. Teuku Iskandar Shah
Honorable Rector of Universitas Serambi Mekkah, Dr. Teuku Abdurrahman, S.H., SpN and
Vice Rector I, Muslem Daud, Ph.D.
Vice Rector II, Ir. T. Makmur, M.Si.
Vice Rector III, Dr. Hambali, M.A.
Vice Rector IV, Dr. Jalaluddin, M.Pd.
The Head of Assurance Quality Institute, Muhammad Zulfajri, S.Pd., M.Sc., Ph.D
The Head of Research and Community Service Institute, Dr. Abubakar, M.Si
Deans, Vice-Deans, and all structural leaders that I cannot mention one by one. We are very
delighted to have guests including deans from different universities in Aceh.

Ladies and Gentlemen

I would also like to warmly welcome keynote speakers, distinguished guests, presenters and
participants of the 3rd International Conference on Education of FKIP USM with the theme
“*Digitalization of Education: Envisioning its Impact on the Dynamics of Cultural Order*”.
Welcome to the event.

My deepest appreciation to our keynote speakers from 5 different countries:

1. Assoc. Prof. Dr. Mahendran Maniam from UPSI Malaysia,
2. Dr. Sophia Manning from Kean University, USA,
3. Prof. Dr. H. Didi Suryadi, M.Ed from UPI, Bandung Indonesia and Associate Prof.
Dr. Viyanti, M.Pd from UNILA Lampung, Indonesia
4. Associate Professor Mitchell O'Toole from University of NewCastle, Australia, and
5. Associate Prof. Dr. J. Karthikeyan from National College, India

We are very honoured to have people with expertise like yours at our conference.

I would like to say that we are very pleased to host the annual conference on education this
year in Arabia Hotel in Banda Aceh. Thanks to the committee who have worked so hard to
make this event successful. Thanks to the presenters and participants who have participated
in this event onsite and online

Ladies and gentlemen, it is unquestionable that the world of education is in the digitalized era
now. This may impact the dynamics of cultural order in the world, including the way the
education is prepared, delivered, and assessed. Therefore, through innovative research and

knowledge sharing platform like this one, we hope to find effective solution in order for successful education in this digitalized era.

Again, thanks to our distinguished keynote speakers, guests, presenters, and participants. Welcome and enjoy the conference!
Wassalamualaikum Wr. Wb.

Dr. Jalaluddin, M.Pd
The Dean of FKIP USM

A Welcome Speech from the Chair of the Committee

Bismillahirrahmanirrahim, Assalamualaikum, Wr. Wb.

Honorable the Head of LLDIKTI, the Head of Yayasan Pembangunan Serambi Mekkah, Rector of Universitas Serambi Mekkah, Vice rectors of Universitas Serambi Mekkah, Deans and vice deans of all faculties of Universitas Serambi Mekkah, all structural leaders, as well as distinguished guests, keynote speakers, presenters and participants

On behalf of the organizing committee, I would like to warmly welcome you all to the 3rd International Conference on Education of FKIP USM.

I am very pleased that this year, we can organize this annual international conference on education again. Alhamdulillah, Even though there were some obstacles, Thanks to Allah because of His blessings and mercies, we can attend this event together in an excellent condition and health.

I am also glad to announce that we have a total around 150 submitters coming from different provinces in Indonesia, such as Aceh, Medan, Jakarta, Bandung, and many more. And also from overseas, such as Malaysia, India, Australia, and USA

The theme of this year conference is “*Digitalization of Education: Envisioning its Impact on the Dynamics of Cultural Order*”. We hope that from discussion around this theme, a better understanding can be raised in the future educational research and practices regarding the digitalization of education and its’ impact on the cultural order.

For this objective, we have invited distinguished speakers from five countries.

We have Assoc. Prof. Dr. Mahendran Maniam from UPSI Malaysia, Dr. Sophia Manning from Kean University, USA, Prof. Dr. H. Didi Suryadi, M.Ed from UPI, Bandung Indonesia, Associate Prof. Dr. Viyanti, M.Pd from Unila Lampung, Indonesia, Associate Professor Mitchell O'Toole from University of NewCastle, Australia, and Associate Prof. Dr. J. Karthikeyen from National College, India

Ladies and gentlemen, I would also like to take this opportunity to immensely thank all of the committee members for their hard work, commitment, and dedication in organizing this conference. Last but not least, we also want to thank the keynote speakers, distinguished guests, all presenters, as well as participants both onsite and online.

Thank you for being here with us. We highly value your presence at this conference.
Wassalamualaikum Wr. Wb.

Marisa Yoestara, S.Pd., M.A (TESL)
Chair of the Committee

Committees

Advisory Board

1. Dr. Teuku Abdurahman, SH, SpN
2. Dr. Jalaluddin, S.Pd., M.Pd
3. Dr. Ibrahim, M.Pd
4. Azwir, S.Pd., M.Pd
5. Zakaria, S.Pd., M.Si
6. Khairul Asri, M.Pd.

Directory Board

1. Muslem Daud, M.Ed., PhD
2. Dr. Abubakar, M.Si
3. Muhammad Zulfajri, S.Pd., M.Sc., Ph.D
4. Septhia Irnanda, S.Pd., M.TESOL, Ph.D
5. Dr. Evi Apriana, M.Pd
6. Drs. Muhammad Isa, M.Si

Organizing Committees

Chair : Marisa Yoestara, S.Pd., M.A (TESL)
Secretary : Dr. Rini Sulastri, S.Pd., M.Pd
Treasurer : Nurul Akmal, S.Pd., M.Pd

Secretarial Section : Sabrina, S.Pd., M.AppLing., M. Tran
Members : Cut Mulia Zuhra, S.Pd., M.Pd
Nyak Mutia Ismail, S.Pd., M.Pd
Nurul Azmi S.Pd. M.Pd
Dedi Sufriadi, SE., M.Si
Jumarsa, S.Pd
Septian Fatianda, M.Hum

Digital, Publication, & Documentation Section : Drs. M. Ridhwan, M.Pd
Members : Muhammad Azzarkasyi, S.Pd., M.Pd
Syamsul Rizal, S.Pd., M.Pd
Almukarramah, S.Pd., M.Pd
Muhammad Mukhlis, S.Pd
Badratun Nafis S.Pd., M.Pd

Program Section : Putry Julia, S.Pd., M.Pd
Members : Nur Ainun, S.Pd., M.Pd
Anita Noviyanti, S.Pd., M.Pd
Fadhillah, S.Pd.I., M.Pd

Dr. Deviyani Rusdiyanti Putri, S. Si
Maulidar, S.Pd., M.Pd
Monadia Liiman, M.Pd

Guest Section : Dr. Dian Aswita, S.Pd., M.Pd
Members : Muhammad Zulfajri, S.Pd., M.Sc., Ph.D
Dr. Asriani, S.Pd., M.Pd
Dra. Sri Ismulyati, M.Pd
Faisal Anwar, S.Pd.I, M.Pd
Dessi Nur Adiska, M.Pd

Catering Section : Dr. Nurlena Andalia, S.Pd., M.Pd
Members : Dr. Ratna Mutia, M.Si
Riska, SE., M.Si. Ak
Rauzatur Rahmi, M.Pd
Santi Sartika, SE. Ak
Ummiyah, S.Sos
Nurjannah, S.E

Venue, Equipment & Cleaning Section : Edi Azwar, S.Pd., M.Pd
Members : Yenni Agustina, S.Pd., M.Pd
Erdi Surya, S.Pd., M.Pd
Mahyuna, S.Pd., M.Pd
Yusrizal Hasja S.Pd., M.Pd
Insan Nuhari, S.Pd., M.Si
Deni Satria

Security Section : Irwan, S. Hum., M.A
Members : Mahlil Fajri, S.Pd., M.Pd
All securities

Editorial Board

- Editor in Chief** : Dr. Jalaluddin, S.Pd., M.Pd.
- Managing Editor** : 1. Marisa Yoestara, S.Pd., M.A (TESL)
2. Dr. Rini Sulastri, S.Pd., M.Pd.
- Editorial Board** : 1. Faisal Anwar, S.Pd.I, M.Pd
2. Drs. M. Ridhwan, M.Pd
3. Dedi Sufriadi, SE., M.Si
4. Syamsul Rizal, S.Pd., M.Pd
6. Dr. Nurlena Andalia, S.Pd., M.Pd
5. Azwir, S.Pd., M.Pd
- IT Support Team** : 1. Almukarramah, S.Pd., M.Pd
2. Muhammad Mukhlis, S.Pd
3. Jumarsa, S.Pd

Internal, National & International Reviewers

Internal Reviewers

Septhia Irnanda, S.Pd., M.TESOL, Ph.D
Muhammad Zulfajri, S.Pd., M.Sc., Ph.D
Sabrina, S.Pd., M.AppLing., M. Tran
Cut Mulia Zuhra, S.Pd., M.Pd
Nyak Mutia Ismail, S.Pd., M.Pd
Nora Fitria, S.Pd., M.Pd
Dr. Deviyani Rusdiyanti Putri, S. Si., M.Si

National and International Reviewers

Prof. Dr Hj. Aan Komariah, M.Pd (Universitas Pendidikan Indonesia, Indonesia)
Prof. Dr. Mohd. Mahzan Awang (Universiti Kebangsaan Malaysia, Malaysia)
Prof. Dr. Yusnadi, M.S (Universitas Negeri Medan, Indonesia)
Assoc. Prof. Zawawi bin Ismail (Universiti Malaya, Malaysia)
Assoc. Prof. Risa Nofiani (Universitas Tanjungpura, Indonesia)
Assoc.Prof. Sri Rahmi (UIN Ar-Raniry, Indonesia)
Dr. Mohd Nazri bin Abdul Rahman (Universiti Malaya, Malaysia)
Dr Jeanette Sakel (University of the West of England, United Kingdom)
Dr Marwan, M.Pd (Universitas Al Muslim, Indonesia)
Dr. Tuti Marjan Fuadi, M.Pd (UNiversitas Abulyatama)
Dr Nurul Fadhillah, M.Hum (IAIN Lhokseumawe, Indonesia)Phan
Thanh Huyen, M.A (USSH, Vietnam)

KEYNOTE SPEAKERS



Dr. Sophia Melanie Manning- Kean University, USA and Bergen Community College, USA

Dr. Sophia Melanie Manning is a broad-based and accomplished student-centered educator—facilitator, instructor, tutor, and business professional who grasps and successfully implements the learning process in various capacities, such as a scholar, on the job or with individuals. She graduated her bachelor study in Bachelor of Science Business Administration, Herzing University, Atlanta (2001), graduated her Master in Liberal Arts at Houston Baptist University, Houston (2009), and awarded Doctor of Arts & Letters, Interdisciplinary Humanities, The Caspersen School of Graduate Studies, Drew University, Madison (2014). She has facilitated many different courses, including Academic Written Discourse/Reading for Academic Purposes and Research Methods and Technology in Literature for English majors. She has also presented a number of research papers in different international events. Her Primary research interest includes general education in a global context thru interdisciplinary humanities; Philosophy of Soren Kierkegaard's Existentialism; and Comparative/World Literature.



Associate Professor Mitchell O'Toole- University of Newcastle, Australia

Mitch O'Toole has worked in science education at all levels since 1978. This has included fifteen years in universities in Australia and the People's Republic of China and thirteen years as science co-ordinator in various schools. These schools ranged across the age (K-12, 7-10 and 7-12) and system spectra (catholic systemic, catholic independent and independent systems). He has also worked as language across the curriculum co-ordinator in a state high school. Mitch's major research interest, communication in science contexts, has arisen directly from this diverse background and continues to inform his practice as he prepares science teachers at this university.

KEYNOTE SPEAKERS



Associate Professor Dr Mahendran Maniam- Sultan Idris Education University, Malaysia

Mahendran Maniam, obtained his Diploma in Teaching (TESL) from Penang Teachers Training College Malaysia in 1989, Bac. Ed. (TESL) Hons. from Putra University Malaysia in 2001, M.Ed. (TESL) Malaya University, Malaysia in 2004 and Ph. D. (TESL) from the International Islamic University of Malaysia in 2009. Formerly English Language teacher, he taught in government and independent schools in many parts of Malaysia. He is currently attached to Sultan Idris Education University, Malaysia in the Faculty of Languages and Communication as an Associate Professor. He is also a visiting professor in Bharath University (BIHER), Chennai, India and Infrastructure University Kuala Lumpur (IUKL), Malaysia. His research areas are mainly in Applied Linguistics, Teacher Education and Doctoral Supervision. He has done extensive research in the field of second language acquisition and language learning strategies. He currently conducts research and supervises doctoral and masters students who are majoring in applied linguistics. He has also published many picture books meant for young learners. He has been a Panelist in many public media fora discussing issues on education, human resources development, and societal change. Dr. Mahendran Maniam has provided services as consultant in policy-making governmental Committees, private sector and Non-Governmental Organizations (NGOs) Dr. Mahendran Maniam is a member of the Malaysian English Language Teaching Association (MELTA), International Society for Teacher Education (ISfTE), Higher Education Research and Development Society of Australasia (HERDSA), Malaysian Association of Applied Linguistics (MAAL), Singapore Association of Applied Linguistics (SAAL) and Asia TEFL. He has also received numerous awards for teaching excellence. He is also a certified HRDF trainer. He has graduated more than 50 master and PhD students, adjudicated more than 100 PhD theses and played the role of convener in more than 50 viva-voce sessions.



Prof. Dr. H. Didi Suryadi, M.Ed- UPI, Indonesia

Prof H. Didi Suryadi graduated his bachelor study from IKIP Bandung, master from La Trobe University, and Ph.D from Universitas Pendidikan Indonesia (UPI). He has been a mathematics lecturer since 1984 and awarded as professor in Mathematics education since 2007. He has many leadership experiences from being the department secretary, department leader, vice dean, vice director, and chairman of the senate in UPI until now. He focuses his study on DDR (Didactical Design Research) that he has developed since 2000 and that he introduced to general audience since 2019 in the international conference in Malang. He has published 84 Scopus-indexed articles in international journal and conferences, and his total of articles in Google Scholar reaches 248 articles. He actively became keynote speakers in many international conferences, one of which WALS Conference in 2014. He also achieves many awards, including the Best International Collaborative Researcher in UPI in 2019, the Best Academic Educational Leader in National level from Kemenristekdikti in 2019, as well as an honored member from Sakura Science Association, Japan. He has established (PUSBANG-DDR-INDO) to develop his DDR study and other researchers with the same interests. PUSBANG-DDR-INDO itself has managed an international journal called Journal of Didactics

KEYNOTE SPEAKERS



Associate Prof. Dr. J. Karthikeyen, Ph.D. - National College, Tiruchirappali- Tamilnadu, India

Dr. J. Karthikeyen is head of Department of English (UAP) in National College, Tiruchirappali and Head of Career Guidance and Placement Cell. He finished his bachelor study in English Language and Literature from St. Joseph's College, Trichy (1999) and in special English from Sri Ramakrishna Mission Vidyalayam, Coimbatore (2002). He graduated his master study in English Language and Literature from St. Joseph's College, Trichy (2001) and in ELT from Bharathidasan University, Trichy (2006). He gained his Ph.D in English from VIT University, Vellore (2014). He has worked in different educational institution, both local, such as in Alpha Public School, SRM University, and Vellore Institute of Technology and International, such as in Wuhan University. He has published 43 Scopus-indexed papers, 3 Web of Science indexed paper, and 28 Journal paper, and many other book publications. He also has received many research awards and has been invited as keynote speakers in many national and international events.



Associate Prof. Dr. Viyanti, M.Pd.- Universitas Lampung, Indonesia

Dr. Viyanti, M.Pd. is a lecturer of the physics education study program at Lampung University. She earned her bachelor's degree at Lampung University in the field of physics education in 2002, then earned a master's degree at the University of Education Indonesia in the field of science research with a concentration in physics education in 2009 and completed her doctorate at Sebelas Maret University in the field of science education in 2019 and currently holds the position of head of the physics education study program at Lampung University.

She has authored 9 books and published around 40 scientific articles in the last five years and created 5 IPR works in the last five years. She conducts research Jeanette was awarded the highly esteemed National Teaching Fellowship in 2015. She conducted 9 community service experiences from 2019 to 2023

Titles of Keynotes Presentation

Dr. Sophia Melanie Manning	Exploring the Humanities through Digital Lens: Educating the 21st Century Learner
Associate Professor Mitchell O'Toole	ICT, Values, and Digital Citizenship
Associate Prof. Dr. Mahendran Maniam	The Role of Artificial Intelligence in Education
Prof. Dr. H. Didi Suryadi, M.Ed	Epistemic Pathways to Knowledge Generation through Didactical Design Research (DDR)
Associate Prof. Dr. J. Karthikeyen, Ph.D.	Impact of Digitalization in Indian Higher Education- A Review
Associate Prof. Dr. Viyanti, M.Pd	Digital-Based Science Learning: Virtual Vs. Hands-On

Table of Content

	WELCOME SPEECH FROM RECTOR OF USM	i
	WELCOME SPEECH OF THE DEAN OF USM	ii
	WELCOME SPEECH OF THE CHAIR OF COMMITTEE	iv
	ADVISORY, DIRECTORY & ORGANIZING COMMITTEE	v
	EDITORIAL BOARD	vii
	REVIEWERS	vii
	KEYNOTE SPEAKERS & THE PRESENTATION TITLES	viii
	TABLE OF CONTENT	xii
NO	ARTICLE	PAGE
1	PUPPET MAGIC: TRANSFORMING STORYTELLING INTO ENGLISH EXCELLENCE FOR ENGLISH YOUNG LEARNERS Cut Mawar Helmanda, Rahmatun Nisa, Meutia Zahara	1-9
2	DEVELOPING INDICATORS FOR SCIENCE TEACHER COMPETENCY IN STEM-ESD LEARNING Anggun Zuhaida, Ari Widodo, Eka Cahya Prima, Rini Solihat	10-17
3	IS THERE A RELATIONSHIP BETWEEN KNOWLEDGE, ATTITUDES, AND EATING BEHAVIOR AMONG ADOLESCENTS IN EDUCATION? Tantri Liana, Parlindungan Sinaga, Lilit Rusyati	18-24
4	ENHANCING TEACHER PROFESSIONALISM THROUGH TRAINING OF LIVEWORKSHEETS TO SUPPORT IMPLEMENTATION OF MERDEKA CURRICULUM. Nur Triani, Nur Triana	25-33
5	APPLICATION OF THE VALUE CLARIFICATION TECHNIQUE (VCT) MODEL BASED ON CONTROVERSIAL ISSUES TO IMPROVE STUDENTS' CIVIC DISPOSITION IN LEARNING CIVIC EDUCATION Pipid Mupidin	34-41
6	DIGITAL PEDAGOGY AND CULTURAL EVOLUTION: INSIGHTS FROM THE DIGITAL BOOK SERIES IN EARLY CHILDHOOD EDUCATION AND SPEECH Dinda Putri Anugrah, Nurbiana Dhieni, Elindra Yetti	42-45
7	THE EFFECT OF DIGITALIZATION EDUCATION USING ELECTRONIC LEARNING MEDIA ON STUDENT LEARNING PATTERNS Aldea Yanuariski	46-50
8	DESIGNS OF DEVELOPING TEACHING MATERIALS BASED ON PROJECT-BASED LEARNING: A SYSTEMATIC LITERATURE REVIEW Ivana Fauziah Sesfa'o, Sjaeful Anwar, Ijang Rohman	51-58
9	MADRASAH ACCREDITATION MANAGEMENT AT MTs. SWASTA NURUL IMAM TANJUNG MORAWA Dian Ratna Puri	59-67
10	APPLICATION OF ENVIRONMENTALLY BASED EXPERIMENTAL METHODS TO IMPROVE LEARNING OUTCOMES IN ACID-BASE SOLUTION Sri Ismulyati, Rauzatur Rahmi, Dessi Nur Adiska, Syarifah Yanti Astryna	68-69
11	COMPARISON OF PHYSICS CONCEPT UNDERSTANDING ABILITY OF STUDENTS USING PHET SOFTWARE WITH NI MULTISIM SOFTWARE Nurulwati, A. Halim, Mailizar, Muhammad Syukri, Mawarni Saputri	70-74

12	ARTIFICIAL INTELEGENCE TRENDS IN EDUCATION AMONG SCHOOL ADMINISTRATORS IN MALAYSIA Shanti Ramalingam, Mahendran Maniam	75-81
13	ENHANCING STUDENT PERFORMANCE IN STEAM THROUGH GAMIFICATION: A SWOT ANALYSIS Rizqiya Windy Saputra, Yusrizal Hasja, Khairul Ismi	82-91
14	TRANSFORMATION OF THE VALUE OF LOCAL WISDOM OF AMARASI IKAT WEAVING IN TECHNOLOGY-BASED SOCIAL STUDIES LEARNING Maria Magdalena Beatrice Sogen, Sapriya, Nana Supriatna, Kokom Komalasari	92-101
15	DYNAMICS OF EDUCATIONAL DIGITALIZATION IN INDONESIA: THE INFLUENCE OF KOREAN CULTURE IN INDONESIA Isnaini Riska Pratiwi	102-106
16	DEVELOPMENT OF CREATIVE THINKING SKILL INSTRUMENTS IN HIGHER EDUCATION Nuraini Sirajudin, Ismail Tolla, Muharram	107-112
17	A COLLECTION OF JAMBI TRADITIONAL GAMES AS A PROJECT-BASED LEARNING IN PLAYWRITING Ady Santoso	113-128
18	PHYSICS TEACHER COMPETENCIES TO DEVELOP EDUCATIONAL LEADERSHIP ROLES Sabrilla Almas Azzahra, Alma Dias Rahmawati	129-136
19	RESEARCH ON TEACHING MATERIALS IN SCIENCE EDUCATION: A BIBLIOMETRIC ANALYSIS FROM 2013 TO 2023 Putri Angjelina, Sjaeful Anwar	137-143
20	USING PHET SIMULATIONS TO IMPROVE STUDENTS' REPRESENTATION ABILITY ON THE TOPIC OF CHEMICAL REACTIONS Fitri Meliniasari, M. Setyarini	144-152
21	ANALYSIS OF THE ROLE OF GAMIFICATION IN EDUCATION: ITS IMPACT ON STUDENT MOTIVATION Loly Suwandani, Sunyono	153-159
22	SYSTEMATIC LITERATURE REVIEW: CULTURAL INTEGRATION IN LEARNING CONCEPTS WITH AN ETHNOMATHEMATICS APPROACH Rahmi Hayati, Edi Syahputra, Edy Surya	160-168
23	APPLYING DUOLINGO IN IMPROVING STUDENTS' SPEAKING SKILL Rahmi Fhonna, Fitriah Fitriah, Muharral Muharral, Suryani	169-174
24	STEM IN INDONESIAN MATHEMATICS EDUCATION Tika Dwi Nopriyanti, Zulkardi, Ratu Ilma Indra Putri, Nyimas Aisyah	175-183
25	DIGITAL LITERACY COMPETENCE OF PRE-SERVICE TEACHERS: EXAMINING THEIR READINESS TO USE TECHNOLOGY Cut Intan Meutia, Kartina Ramadani	184-190
26	THE ROLE OF INDONESIAN LANGUAGE TEACHERS IN CREATIVE INDUSTRY-LED LEARNING Keken Wulansari, Isah Cahyani, Andoyo Sastromiharjo	191-195

27	THE ABILITY TO UTILISE TECHNOLOGY ON CERTIFIED TEACHERS IN THE LESSON IMPLEMENTATION PROCESS IN SDN SAMAHANI ACEH BESAR Atika, Putry Julia, Hafidh Maksum	196-200
28	DIGITALIZATION OF ENGLISH LANGUAGE LEARNING: GLOBALIZING INDONESIAN MADRASSAS Lutfiana Hikmawati	201-205
29	CULTURAL HERITAGE IN THE CLASSROOM (Interactive Learning Media Based on the Sragen Cultural Heritage Catalog) Atik Dwi Kurniasih, Sunardi, Sariyatun	206-209
30	TRENDS OF DIGITAL ASSESSMENT IN EDUCATION: A BIBLIOMETRICS ANALYSIS OF THE RECENT DECADE OF RESEARCH Wandi Wandu, Irma Rahma Suwarma, Winny Liliawati, Fani Mardianti	210-218
31	ANALYSIS OF MERCURY (HG) CONTENT IN URINE AND ITS IMPACT ON HEALTH DISORDERS OF ILLEGAL GOLD MINING WORKERS IN MALOMBA VILLAGE, DONDO SUB-DISTRICT, TOLITOLI DISTRICT Sakinah, Tri Santoso, Sitti Aminah, Sri Hastuti Virgianti P	219-227
32	DETERMINATION OF FLAVONOID CONTENT IN TAPAK DARA ROOT DECOCTION (CATHARANTHUS ROSEUS) Nurmasita G. Labolo, Baharuddin Hamzah, Purnama Ningsih, Irwan Said	228-234
33	PROMOTING FAMILY LITERACY THROUGH THE FIVE PILLARS OF FAMILY AND COMMUNITY ENGAGEMENT (FACE) ON EARLY CHILDHOOD AT KLAMBIR V KEBUN VILLAGE Nurbaiti Ali, Eka Surya Fitriani, Sisi Rosida, Izzmi Aulia	235-238
34	EFFECTIVENESS OF CHILDREN'S LANGUAGE AND COGNITIVE DEVELOPMENT THROUGH SINGING METHOD IN EARLY CHILDREN AT AT-TAQWA ISLAMIC KINDERGARTEN Maya Oktaviani, Citra Setya Rahmansyah, Rika Fitria Utami, Elsa Nur Fidelia, Restu Dyah Sulistyningrum, Syuhada Lathifah, Tegar Fabiantoro Nistelrooy	239-245
35	THE APPLICATION OF SCHOOL-BASED MANAGEMENT IN EMPOWERING THE COMPETENCY OF MAHYAL ULUM ACEH VOCATIONAL SCHOOL TEACHERS Jalaluddin, Insan Nuhari, Marwan, Khairiati Umami	246-253
36	THE ROLE OF WOMEN INDIGENOUS COMMUNITIES IN EDUCATION (An Overview Of Women's Roles In Kasepuhan Sinar Resmi) Titi Nurhayati, Uyu Wahyudin, Iip Saripah, Jony Rahmat Pramudia	254-258
37	DIFFERENCES CAPABILITY OF STUDENTS IN COLLABORATIVE ONLINE LEARNING Ratu Amilia Avianti, Zulfiati Syahril, Mahdiyah Mahdiyah, C. Rudy Prihantoro, Rany Anggrainy, Diah Armeliza	259-269
38	DESIGN WORKSHEETS MATH TRAIL TO OUTDOOR LEARNING MATHEMATICS Ainun Mardiah, Zulkardi, Ratu Ilma Indra Putri, Kamid	270-274
39	DECIPHERING THE CULTURAL DIMENSIONS OF MATHEMATICS PROFICIENCY AMONG EDUCATORS Christiyanti Aprinastuti	275-279

40	UTILIZING ARTIFICIAL INTELLIGENCE IN EDUCATION TO ENHANCE TEACHING EFFECTIVENESS M. Nasir, M. Hasan, Adlim Adlim, Muhammad Syukri	280-285
41	FACTORS THAT HINDER ENGLISH SPEAKING DEVELOPMENT IN MIA ISLAMIC BOARDING SCHOOL Maulida, Septhia Irnanda, Faudi, Sarair, Lina Farsia, Nurul Inayah	286-292
42	TECHNOLOGY EDUCATION AND INNOVATION OF CHAT GPT AND AI AT SMPS RK DELI MURNI BANDAR BARU MIDDLE SCHOOL STUDENTS Benediktus Sipandi Ginggar, Yohanes Kefi	293-296
43	NEED ANALYSIS OF MOBILE LEARNING AT JUNIOR HIGH SCHOOL IN INDONESIA: A BLIOMETRIC STUDY Bekti Aprilia, Muhammad Japar, Maria Paristiwati	297-308
44	APPLICATION OF ROLE-PLAYING METHOD TO OVERCOME STUDENTS' LEARNING DIFFICULTIES IN LEARNING MATH STORY PROBLEMS IN SANGUWATANG 1 STATE ELEMENTARY SCHOOL KARANGJAMBU SUBDISTRICT Murwanto	309-315
45	ANALYZING THE UTILIZATION OF LEARNING MANAGEMENT SYSTEMS TO SUPPORT STUDENT LEARNING IN AN ONLINE LEARNING ENVIRONMENT Dina Zhafira, Ita Pratiwi Simangunsong, Shahnaz Shafitri Harahap	316-324
46	AUGMENTED REALITY IN EDUCATION: A BIBLIOMETRIC ANALYSIS Besse Nirmala, Etin Solihatin, Moch. Sukardjo	325-340
47	IMPROVING THE ABILITY TO UNDERSTAND AND SOLVE MIXED AUTOMATION OPERATIONS THROUGH LEARNING MODELS STUDENT TEAMS-ACHIEVEMENT DIVISIONS (STAD) FOR CLASS VI PRIMARY SCHOOL STUDENTS Andika Mardiansah	341-347
48	EXPLORING MULTI-REPRESENTATION LEARNING APPROACH IN MATHEMATICS ELEMENTARY SCHOOL STUDENTS Evi Faujiah, Yurniwati, Gusti Yarmi	348-358
49	DIGITAL EMPOWERMENT IN ENGLISH LANGUAGE TEACHING (PERSPECTIVE OF JEAN PIAGET-LEARNING THEORY) Ni Putu Ratni	359-369
50	MOBILE LEARNING: FUTURE LEARNING TECHNOLOGIES FOR ISLAMIC FORMAL EDUCATION (A LITERATURE STUDY) Miftah Hur Rahman Zh, Zahid Zufar At Thaariq, Arief Ardiansyah	370-377
51	THE IMPLEMENTATION OF TEACHER RESOURCE MANAGEMENT TO IMPROVE THE COMPETENCE OF TEACHERS AT PRIVATE JUNIOR HIGH SCHOOL OF NAHDLATUL ULAMA MEDAN Zon Saroha Ritonga	378-384
52	ICT TRENDS IN EDUCATION: A BIBLIOMETRICS STUDY OF THE PAST TWENTY YEARS OF STUDIES Fani Mardianti, Winny Liliawati, Parlindungan Sinaga, Wandu Wandu	385-393
53	COMMUNICATION SKILL ENHANCEMENT AND MATHEMATICAL REASONING MADRASAH ALIYAH STUDENTS BY MODEL TYPE COOPERATIVE LEARNING GAMES TEAMS TOURNAMENT	394-403

54	UNVEILING THE POTENTIAL OF ONLINE PROFESSIONAL DEVELOPMENT: A SELF-STUDY APPROACH FOR EDUCATOR GROWTH Hery Yanto The	404-416
55	ANALYSIS OF BIOACCUMULATION OF BIOMERCURY (Hg) IN HAIR AND ITS IMPACT ON THE HEALTH OF MINING WORKERS IN MALOMBA VILLAGE, DONDO SUB-DISTRICT, TOLITOLI DISTRICT Nurhayati, Tri Santoso, Sitti Aminah, Sri Hastuti Virgianti P	417-424
56	DEVELOPMENT ANDROID LEARNING MEDIA FOR ARABIC LANGUAGE LEARNING IN GRADE VII ISLAMIC STATE JUNIOR HIGH SCHOOL 25 JAKARTA Muhammad Syamsuri Siddiq, Ahmad Marzuq, Andri Ilham	425-429
57	ANALYSIS OF THE NEED FOR VIRTUAL REALITY LEARNING MEDIA IN ANIMAL DEVELOPMENTAL STRUCTURE COURSES Zulkifli Ahmad, Hamsu Abd. Gani, Abdul Haling	430-436
58	HOW LEARNERS PERCEIVE THE KAMPUNG INGGRIS LC INSTAGRAM ACCOUNT FOR ONLINE ENGLISH LEARNING Kukuh Handi Handoko, Rahmatun Nisa, Siti Safura	437-442
59	INPUT EVALUATION IN THE IMPLEMENTATION OF THE IN-SERVICE TEACHER PROFESSIONAL EDUCATION CURRICULUM Risa Zakiatul Hasanah	443-450
60	THE DEVELOPMENT OF THE MATHEMATICAL LOGIC INTELLIGENCE ASSESSMENT INSTRUMENT Siti Sarah, Latief Al Alhmasi, Dian Aswita, Maulidar	451-459
61	ZERO WASTE REVOLUTION: TRANSFORMING SCHOOLS TOWARDS SUSTAINABLE ENVIRONMENTAL LITERACY Anisa O. S Pratama, Ella Hayati, Akbar Handoko, Dzulhi Maulana Yusup, Nukhbatul Bidayati Haka, Meita Dwi Solviana	460-465
62	ENHANCING STUDENTS' ENGLISH PRONUNCIATION THROUGH PHONETIC METHODOLOGY AT MTSN 3 BANDA ACEH Lina Farsia, Sarair, Fadhlullah Romi, Siti Al-Mukarrama, Septhia Irnanda	466-472
63	INNOVATION WITHIN LIMITATION: BATIK CREATION BY DISABILITIES STUDENTS Farid Abdullah, Aneeza Mohd Adnan, Tri Wardoyo, Harris Effendi, Mohammed Iqbal Badaruddin	473-478
64	ICT TRENDS IN EDUCATION: A BIBLIOMETRICS STUDY OF THE PAST TWENTY YEARS OF STUDIES Fani Mardianti, Winny Liliawati, Parlindungan Sinaga, Wandu Wandu	479-487
65	IMPROVING SCIENCE PROCESS SKILLS USING GUIDED INQUIRY-BASED STUDENT WORKSHEET Mahyuna, Deviyani Rusdiyanti Putri, Yusrizal Hasja, Insan Nuhari, Muhammad Azzarkasyi	488-493

66	THE UTILIZATION OF BANANA BLOSSOMS ANTHOCYANIN EXTRACT (MUSA SPP) TO IDENTIFY BORAX AND FORMALIN IN DRIED ANCHOVY (STOLEPHORUS SP) FROM THE TRADITIONAL MARKET OF PALU Iren Anatasya Montolu, Sri Mulyani Sabang, Ijirana, Supriadi, Arwansyah	494-499
67	FACILITATING ENGLISH LANGUAGE ACQUISITION PROCESS THROUGH TECHNOLOGY CLUBS Sharon Samson, Karthiga S.V.	500-502
68	DEVELOPMENT OF A DESKTOP-BASED INFORMATION SYSTEM FOR REPORTING STUDENT LEARNING RESULTS AT SMK NEGERI 1 TINAMBUNG Noer Ekafitri Sam, Purnamawati, Abdul Muis Mappalotteng	503-510
69	THE UTILIZATION OF CODE-SWITCHING AMONG STUDENTS IN THE ENGLISH DEPARTMENT Rizky Syaputra, Rahmatun Nisa, Cut Mawar Helmanda	511-518
70	NEEDS ANALYSIS FOR DEVELOPMENT OF THE CONTENT LANGUAGE INTEGRATED LEARNING (CLIL) MODEL ON LITERARY APPRECIATION Asrul, Hamsu Abdul Gani, Mustafa	519-527
71	THE DIFFICULTIES OF SPEAKING ENCOUNTERED BY THE STUDENTS AT ENGLISH COURSE Naniek Jusnita, Arismunandar, H. Ansar	528-535
72	THE MEANING OF LEARNING IN VIRTUAL CLASSROOMS: STUDY OF THE UTILIZATION OF DRILL MODELS AND PRACTICES IN SDIK NURUL QURAN Badratun Nafis, Septian Fatianda, Fitriani, Monadia Liiman, Syarifah Yanti Astryna	536-542
73	DEVELOPMENT STRATEGY FOR THE USE OF "GEO EXPLORER BLOGSPOT" BASED ON LOCAL WISDOM IN HIGH SCHOOL GEOGRAPHY LEARNING IN TOBA DISTRICT TO ENHANCE TEACHERS' TEACHING IMPROVISATION SKILLS TOWARDS SOCIETY 5.0 ERA Weni Ayu Sunita Zandroto, Yuniarto Mudjisusaty, Arif Rahman	543-551
74	THE IMPORTANCE OF ETHNOMATHEMATICS IN EDUCATION: A SYSTEMATIC LITERATURE REVIEW Muhammad Iqbal Nst, Nanda Khairani Batubara	552-557
75	LITERATURE STUDY DESIGN AND TESTING OF TEACHING MATERIALS THROUGH INTEGRATED INQUIRY TRAINING ON THE LOCAL POTENTIAL MOLOKU KIE RAHA TO INCREASE STUDENTS' CHEMICAL LITERACY Nur Asbirayani Limatahu, Arismunandar, Darman Manda, Chumidach Roini, Iqbal Limatahu	558-561
76	INTEGRATING COLLABORATIVE MOBILE LEARNING INTO THE MATHEMATICS CLASSROOM: AN EXPLORATION OF STUDENT' MEANINGFUL LEARNING ACTIVITIES USING TECHNOLOGY Hera Deswita, Muhammad Japar, Etn Solihatin	562-571
77	THE RELATIONSHIP BETWEEN SELF-CONFIDENCE AND MATHEMATICAL PROBLEM-SOLVING ABILITIES OF FIFTH GRADE STUDENTS AT SD NEGERI 3 BANDA ACEH Maulida, Faisal Anwar, M. Isa	572-576
78	UNDERSTANDING EDUCATIONAL LEADERSHIP THROUGH THE LENS OF ANTHROPOLOGICAL PERSPECTIVES Agus Danugroho, Firza Azzam Fadilla	577-583

79	TRANSFORMING EDUCATIONAL PRACTICES WITH DIGITAL TECHNOLOGIES USE THE ROLE OF E-BOOK IN THE ERA OF EDUCATIONAL DISRUPTION Laksmita Wahyu Chandra Utami, R Sri Martini Meilanie, Hapidin	584-588
80	THE INFLUENCE OF DISCIPLINE, TRAINING, AND WORK ENVIRONMENT ON TEACHER PERFORMANCE Ervin Nora Susanti, Lukmanul Hakim, Yuniarti, Alpino Susanto, Caesar Putri Widodo	589-600
81	THE INFLUENCE OF KI HAJAR DEWANTARA's EDUCATIONAL LEADERSHIP IN CIVIC EDUCATION LEARNING Ahsyabila Fazira, Dasim Budimansyah, Sapriya	601-613
82	EDUCATION FOR YOUNG CITIZENS TO STRENGTHEN CITIZEN CHARACTER Teki Prasetyo Sulaksono, Kokom Komalasari, Prayoga Bestari, Susan Fitriaasri	614-618
83	FACTORS AFFECTING TEACHER PERFORMANCE Sri Langgeng Ratnasari, Rahman Hasibuan, Catur Fatchu Ukhriyawati, Velya Tri Desi, Mutiarra Fadila, Gandhi Sutjahjo, Widyo Winarso	619-630
84	EMBRACING DIGITALIZATION: TRANSFORMING EDUCATION FOR THE 5.0 ERA Erna Yupeni	631-638
85	THE INFLUENCE OF LEADERSHIP STYLE, COMMUNICATION AND INDIVIDUAL CHARACTERISTICS ON TEACHER PERFORMANCE AT SMK NEGERI 1 SINABANG Febyolla Presilawati, Mirza Murni, Kiky Agusriady, Fudja Devany Balqis	639-649
86	BENEFITS OF AN INCLUSIVE EDUCATION PROGRAMS ON EARLY CHILDHOOD SOCIAL DEVELOPMENT Syarifatul Luthfia	650-656
87	ISLAMIC BOARDING SCHOOL MANAGEMENT IN DEVELOPING ENTREPRENEURSHIP IN ACEH Muliana, Abdul Aziz, Fadhilah, Fathimah	657-662
88	MODEL TECHNOLOGY LEARNING CYCLE (TLC): SUCCESS IN LEARNING Bayu Saputra, Etn Solihatin, Suyitno Muslim	663-670
89	IDENTIFYING THE OBSTACLES FACED BY HEADMASTER AND TEACHER MOVER IN IMPLEMENTING THE INDEPENDENT CURRICULUM Rauzatul Jannah, Dian Aswita, Faisal Anwar, Syamsul Rizal	671-675
90	THE IMPACT OF GAME-BASED LEARNING ON COGNITIVE DEVELOPMENT IN EARLY CHILDHOOD: A REVIEW OF THE LITERATURE Haerul Annuar, Etn Solihatin, Khaerudin Khaerudin	676-686
91	ANALYSIS OF HIGH SCHOOL STUDENTS' LITERACY USING THE PISA FRAMEWORK Shofa Nabilah, Muslim, Lilit Rusyati	687-693
92	COMPARISON OF CONTINUOUS TIME MARKOV CHAIN (CTMC) SIRS AND SIQRS EPIDEMIC MODEL SIMULATION RESULTS ON THE SPREAD OF MONKEYPOX DISEASE Safitri Febriana Opsarini, Respatiwan, Muhammad Bayu Nirwana	694-705

93	UTILIZATION OF DIGITAL-BASED LEARNING MEDIA IN THE INDEPENDENT CURRICULUM IN ELEMENTARY SCHOOLS Ilham Ifliadi, Suhaidi, Imam Prasetyo, Lola Ineswenty Mendrofa, Elida Susianing Hendrawati	706-715
94	UNLOCKING NVDA: TEACHERS' VIEWS ON ENHANCING LISTENING SKILLS FOR VISUALLY IMPAIRED STUDENTS Diana Achmad, Syamsul Bahri YS, Muhammad Saidinas	716-719
95	EMPLOYABILITY SKILL "POSITIVE SELF CONCEPT" MODULE DEVELOPMENT FOR FINAL-YEAR STUDENTS AT FACULTY OF TEACHER TRAINING AND EDUCATION UNIVERSITAS LAMPUNG Ajeng Pratiwi, Ratna Widiastuti	720-724
96	QUESTIONING DIGITAL CITIZENSHIP IN DEVELOPING SCIENTIFIC CULTURE: PROBLEMS AND CHALLENGES IN INDONESIAN SCHOOLS Hastangka, Adison Sihombing, Iskandar Agung, Benny Widaryanto, Herlinawati, Ety Sisdiana, Heni Waluyo Siswanto, Ibnu Salman, Sulhi, Marga Surya Mudhari	725-729
97	OPTIMIZING ONLINE LEARNING CONTENT: PERSPECTIVES OF UNIVERSITAS TERBUKA POSTGRADUATE SCHOOL STUDENTS Sendi Ramdhani, Tita Rosita, Amalia Sapriati	730-740
98	HELLOTALK: AN APPLICATION TO IMPROVE UNIVERSITY STUDENTS' WRITING SKILLS Sendi Ramdhani, Tita Rosita, Amalia Sapriati	741-752
99	IMPROVING STUDENTS' DISCUSSION SKILLS AND LEARNING OUTCOMES THROUGH THE IMPLEMENTATION OF THE TSTS TYPE COOPERATIVE LEARNING MODEL IN SMA NEGERI 5 TERNATE CITY Patima La Peda Peda, Hernita Pasongli, Endang Purwati, Susana R. Bahara	753-760
100	TEACHER'S QUESTIONS IN ENGLISH CLASSROOM INTERACTION Faninsky Aryanti La Ajina Hasibuan, Desi Rahma Yuni Br.Sinulingga, Mursyid Mubarak	761-770
101	IMPLICIT AND EXPLICIT INFORMATION IN THE TRANSLATION OF "FLOWERS" LYRICS BY MILEY CYRUS Khairunnisa Tambunan, Fika Emylia Effendi, Miftahur Ridha	771-775
102	TEACHER STRATEGIES FOR IMPROVING STUDENT LITERACY THROUGH SCHOOL CULTURE AT SAMAHANI STATE ELEMENTARY SCHOOL Fadhillah, Hambali, Fany Ajriani	776-781
103	INNOVATION IN LEARNING DEVICE FOR COMMERCIAL GRAPHICS COURSE Menul Teguh Riyanti, Suhaila Bt. Basar, Farid Abdullah	782-786



PUPPET MAGIC: TRANSFORMING STORYTELLING INTO ENGLISH EXCELLENCE FOR ENGLISH YOUNG LEARNERS

Cut Mawar Helmanda¹, Rahmatun Nisa^{2*}, Meutia Zahara³
^{1,2,3} University of Muhammadiyah Aceh, Indonesia
*cut.mawar@unmuha.ac.id

ABSTRACT

The purpose of this project is to investigate how well puppetry works as a storytelling media for young learners, by focusing on *what opinions do the students have about using puppets to present stories. knowing how puppetry functions in language learning can lead to more interesting and successful teaching strategies. This study used a qualitative way to answer the question. This research was carried out in SD Negeri 1 Muhammadiyah Banda Aceh. The writers believed that an interview was the best instrument to utilize because this study involved first-grade elementary school students. Using puppets as a medium takes advantage of first-graders' receptiveness to multimodal experiences while acknowledging their developmental stage. The goal is to create a more dynamic and productive learning environment where the use of puppets stimulates students' attention and helps them comprehend the stories that are being told. The overall perception of the young learners who involved in this study is that they enjoyed actively listening to the narrative story and closely paying attention when it incorporated media- puppet - into the story. This finding implies that it is crucial for English teachers working with young students to vary their concrete media, and using puppets is just one way to do this.*

Keywords: *puppet, storytelling, english young learners*

1. INTRODUCTION

Children are also taught English in pre-primary settings, such as kindergarten and preschool, in several countries. Stated differently, the instruction and acquisition of English for young learners furnishes the pupils with their English language competencies during the golden period of age at which kids can pick up anything with ease. Anything may be taught to children as long as it is presented in an understandable manner. Teaching English also promotes motivation and enjoyment for language acquisition, particularly when it is done in an enjoyable manner (Cahyati, Parmawati, & Atmawidjaja, 2019).

Young learners' language development is a crucial component of their overall cognitive development, impacting their capacity for thought, communication, and academic success. Early childhood is a sensitive time for language learning, and acquiring the fundamentals of English at this age sets the stage for success in school later on. But developing these abilities can be difficult for young students for a variety of reasons, from a lack of exposure to the language to differences in their cognitive maturation.

It is impossible to exaggerate the importance of creative teaching strategies in overcoming these obstacles. It is possible that traditional methods do not always connect with young minds that are creative and dynamic. It is necessary to use teaching strategies that grab kids' interest and make learning fun in order to get them involved in the language-learning process. One tool that can be used to spread a message is the media. Bland (2019) mentioned that it is examined how teachers might accommodate young learners' language needs by using creative teacher talk and storytelling. It is a message container that the message's user wishes to convey to the message's recipient or destination.

In order for learning to be effective, tangible or first-hand experiences must provide the foundation for more abstract experiences. Learning will be more successful when teaching props are used instead of only teaching tools. For the teaching and learning process to be successful, students should be encouraged to use all of their senses. The stimulus can be absorbed through a number of senses, and the instructor tried to show it. The likelihood that the data will be understandable and remembered increases with the number of sensors used to collect and process the information.



Using instructional media is one of the most effective ways for teachers to impart knowledge to their pupils (Mahnun, 2012). Media can be defined as an instrument that supports students' learning by stimulating their thoughts, emotions, focus, and abilities. Teachers can more effectively present their courses and assist students in achieving their learning objectives by integrating media into the educational process.

Romiszowski (2008) has categorized the two roles of the media. Unlike in the preceding example, where they are used as teaching aids, here the media are only used to enhance or improve the teacher's presentation. When used in this way, as the first category, the media effectively function as one-way transmitters, totally incapable of decoding any messages that the learner might transmit. Second, media are used as instructional resources. They offer customized instruction in both traditional and nontraditional contexts.

As Supriyono (2018) pointed out, employing media is one of the finest strategies to get students' attention. It is crucial for primary kids to have real experiences during the teaching and learning process as well as to increase their enthusiasm in learning. Now introduce puppetry, an imaginative and participatory method that has demonstrated potential to improve language learning.

According to Lepley (2001), kids can utilize puppetry as a medium to express themselves and start learning about the many parts of the English language. A puppet, then, is an inanimate creature that is forced to move in front of an audience by human effort. Puppets can be used to bring stories to life and ignite children's imaginations through imaginative role play. You can use puppets to introduce a story, take on the role of the storyteller, or even become the characters you are narrating about. Beginning storytellers may find it easier to relax and have fun while narrating their story with the help of puppet storytelling.

Hammer also provides appropriate methods for using puppets as teaching media in Nur Insani (2017). These methods include: (1) choosing the lesson to teach; (2) choosing the puppet to use; (3) choosing the prop to use; (4) developing the puppets' characters; (5) practicing teaching the lesson with your puppets in front of no audiences; (6) setting up the stage for your puppet; and (7) actually teaching the lesson with your puppets. As stated here from the previous procedures, the teacher got ready before class. She uses puppets to establish the scene for what will happen to her during the session.

Furthermore, Hasanah (2019) explored the transforming power of puppetry on improving students' speaking skills in her study. By means of a thorough analysis, she emphasized the various benefits of this strategy. Hasanah highlighted that puppets are active tools that help with speaking skills development, vocabulary acquisition, and idea demonstration. Additionally, using puppets creates a learning environment that is palpably more enthusiastic and energetic, which facilitates communication. Crucially, when students interact with puppets, their confidence soars, allowing them to express themselves more freely. Hasanah's research provided instructors with important insights into cutting-edge pedagogical approaches while clarifying the strategic efficacy that comes with using puppets as instructional aids. Overall, Hasanah's research highlights the tremendous effectiveness of using puppets as a stimulus to improve kids' speaking ability, providing a comprehensive strategy that combines language development with self-expression and confidence building.

Especially for beginning, intermediate, and young learners, storytelling is a common teaching and learning technique. Telling stories to students is a great way for teachers to help them develop a wide vocabulary (Riyani, I. (2019). When English is introduced and stories are performed in English using puppets, children will find it fascinating and entertaining. Participants should be able to quickly understand the basics of English with the use of this practice, which will aid in their comprehension of everyday language. The teaching method is the lecture approach, and cards that have been colored and affixed to ice cream sticks are used to tell puppet stories. Alphabets, numbers, and colors comprise the provided basic English curriculum. The telling of stories is the next step. The participants' eagerness for the exercise and quick learning of the material were evident in their responses to questions based on the information provided.

One technique for introducing English to first-graders in primary schools is to use puppets. It is hoped that by using this interesting media, students would become more interested in English and be prepared to compete on a worldwide scale. The goal of this study is to ascertain whether first-graders in elementary schools would be interested in studying English with puppets as the teaching tool.



In order to create a comprehensive learning environment, puppetry combines touch, aural, and visual cues. Puppetry makes stories come to life, which enhances the educational and fun aspects of language learning. Young learners gain confidence, participate actively, and gain a deeper comprehension of linguistic nuances through the dynamic interaction with puppets.

The purpose of this project is to investigate how well puppetry works as a storytelling media for young learners, by focusing on what opinions do the students have about using puppets to present stories?. By examining the ways in which puppetry facilitates children's language learning, the writers want to make significant contributions to the field of early childhood education. This research has possible consequences for educators, curriculum creators, and policymakers. It provides evidence-based techniques to improve early learners' language development. In the end, knowing how puppetry functions in language learning can lead to more interesting and successful teaching strategies, ensuring that young learners not only pick up language skills but also grow to enjoy the English language for the rest of their lives.

Under the heading, "Puppet Magic: Transforming Storytelling into English Excellence for English Young Learners", the writers are thus interested in learning more about the use of puppets based on the explanation provided

2. METHODS

2.1. Research Design

This study used a qualitative way to answer the question. Qualitative research is described as "a form of systematic empirical inquiry into meaning" by Shank (2002) in Ospina (2004). Since case studies involve descriptions, explanations, and evaluations of actions conducted by people and organizations in society as well as attitudes, ideas, and perceptions, they are regarded as assessed studies.

2.2 Source of Data

This research was carried out in SD Negeri 1 Muhammadiyah Banda Aceh. The school selected for this study was done so for a few reasons. The first reason this study was approved to be conducted there is that this school and the organization where the writers work have a memorandum of understanding. The study session for the second, like the last, was perfectly aligned with the school's vacation time. This research did not interfere with the main class period because the students had just finished their exam. The study was conducted over the course of one month, with participants with the academic year 2022–2023. This length of time made it possible to thoroughly assess the effects of the puppetry intervention.

The writers selected a sample of first-grade elementary school pupils, comprising 20 students, since this particular teaching medium is one of the more visually appealing tools available for use in the classroom. The teaching strategy is a lecture approach utilizing colored cards that have been adhered to ice cream sticks to tell puppet stories. Alphabets, numbers, and colors are the forms of the fundamental English resources that are offered. The exercise continued with story telling utilizing additional puppet cards bearing the title "The bear and two friends" once the basic English content was presented.

2.3 Data Collection

The writers believed that an interview was the best instrument to utilize because this study involved first-grade elementary school students. As a result, questions regarding the role of puppets in tale recounting were posed directly to the pupils. In order to gather information through interviews with young language learners in the first grade, a kid-friendly and interesting methodology must be created. To start, the writers made sure the students were in a familiar and comfortable setting so they could relax, got permission from the teacher or legal guardians and clearly explained the reason for the interview, and asked simple and direct questions. These



interview questions used open-ended questions to elicit creative answers. To improve understanding, the writers used a combination of spoken and nonverbal cues, such as gestures and visual aids.

To make the interview process fun for the kids and encourage a more relaxed and honest dialogue, the interview structure is adaptable to young learners' attention spans and energy levels. Lastly, the ethical issues top priority was done by keeping the child's confidentiality, and comfort level under constant observation during the interview. The purpose of the interview was to get qualitative insights into the thoughts and feelings of the students regarding the puppetry sessions. In order to gauge participation, enjoyment, and the perceived efficacy of the puppetry technique, carefully considered questions were created. Students were invited to share their ideas, which produced insightful qualitative data for a more comprehensive understanding.

3. RESULTS & DISCUSSION

This study was selected to be implemented in the early elementary school grades in order to gauge the students' excitement about English subjects in general, and the use of puppet as the medium of storytelling to build up the students' basic English words.. Students in the first grade of elementary school are known to be particularly sensitive to the use of media, both audio and visual. Here, media is used in the form of puppets. The puppet serves as a supplemental media for the story being read in this session. English is used to read the stories. It is anticipated that the usage of puppets will pique students' interest in paying attention, paying close attention to the story, and comprehending the plot. The purpose of this study is to evaluate young learners' enthusiasm in the early years of primary school, with an emphasis on first-graders who are recognized for having an increased sensitivity to auditory and visual stimuli. Puppets are used in the study as an additional media in English narrative sessions. As vibrant visual aids, the puppets are used to improve the storytelling experience. The purpose of adding this interactive component is to grab students' attention and motivate them to actively participate in the story, which will improve their understanding of the plot. Using puppets as a medium takes advantage of first-graders' receptiveness to multimodal experiences while acknowledging their developmental stage. The goal is to create a more dynamic and productive learning environment where the use of puppets stimulates students' attention and helps them comprehend the stories that are being told.

When delivering stories, the storyteller reads aloud in English while manipulating puppets. They also stress the need for pupils to grasp vocabulary that they may not be familiar with, such as "forest" and other words. After repeating the words, the speakers asked the pupils if they understood what they meant to say. If not, the speaker initially jogged the students' recollections in order to allow them to apply prior information or word-related expertise. Observing the process of narrating stories using puppets, it appeared that the students were highly engaged in listening to stories and making an effort to comprehend the plot by focusing on the puppets being utilized. In addition, they were able to decipher key terms related to the plot, including the characters, their actions, and the events that transpired. Puppets can be utilized as an engaging learning tool in this study's application for a variety of subjects, including the introduction of basic English. Teachers can also constantly use and produce materials such as these to get pupils more excited in the classroom.

In addition, the writers had to understand how the puppet's use affected the teaching-learning process for the pupils. The writers posed a few questions for the students to respond to in order to gather data. Nineteen students responded positively to the first question on their interest in English, while the lone student said that he disliked the subject because it was one of the harder ones.

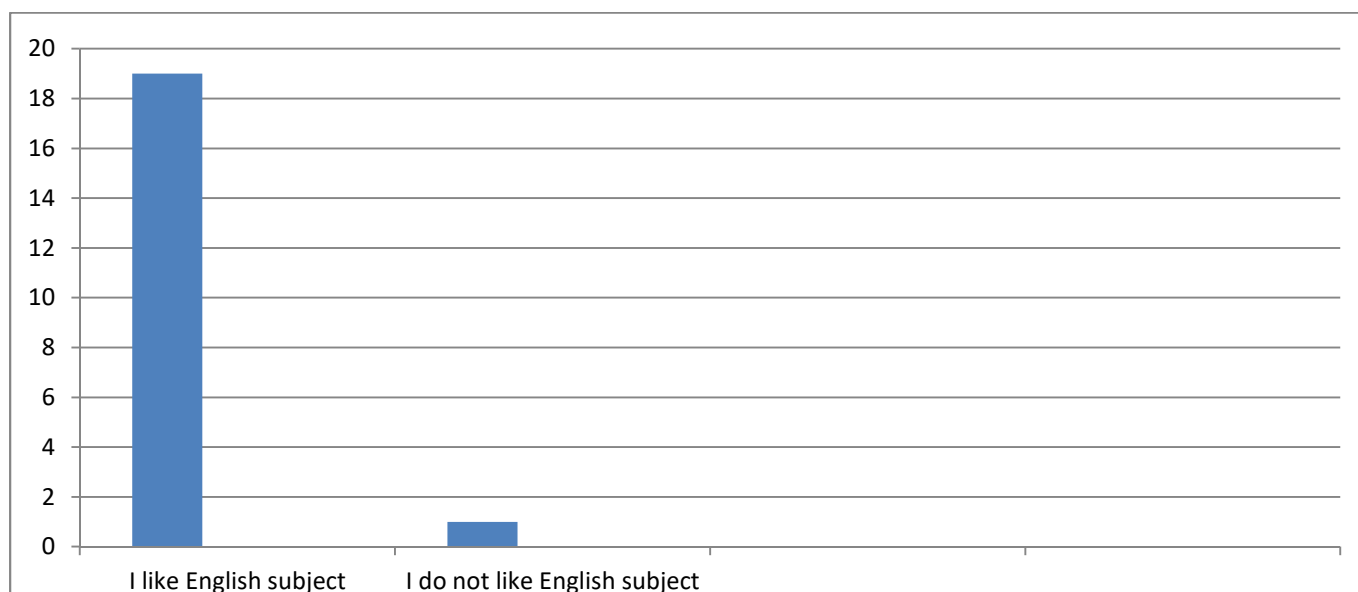


Figure 1. The Students' Perception Towards English Subject

Next, the second and third questions asked the students if they enjoyed hearing the teacher read a story to them and if they paid attention to the teacher's explanation or the story itself. To this, every single student responded positively, saying they truly enjoyed listening to the teacher read a story to them and paying attention to the teacher's explanation or the story if the teacher used the media.

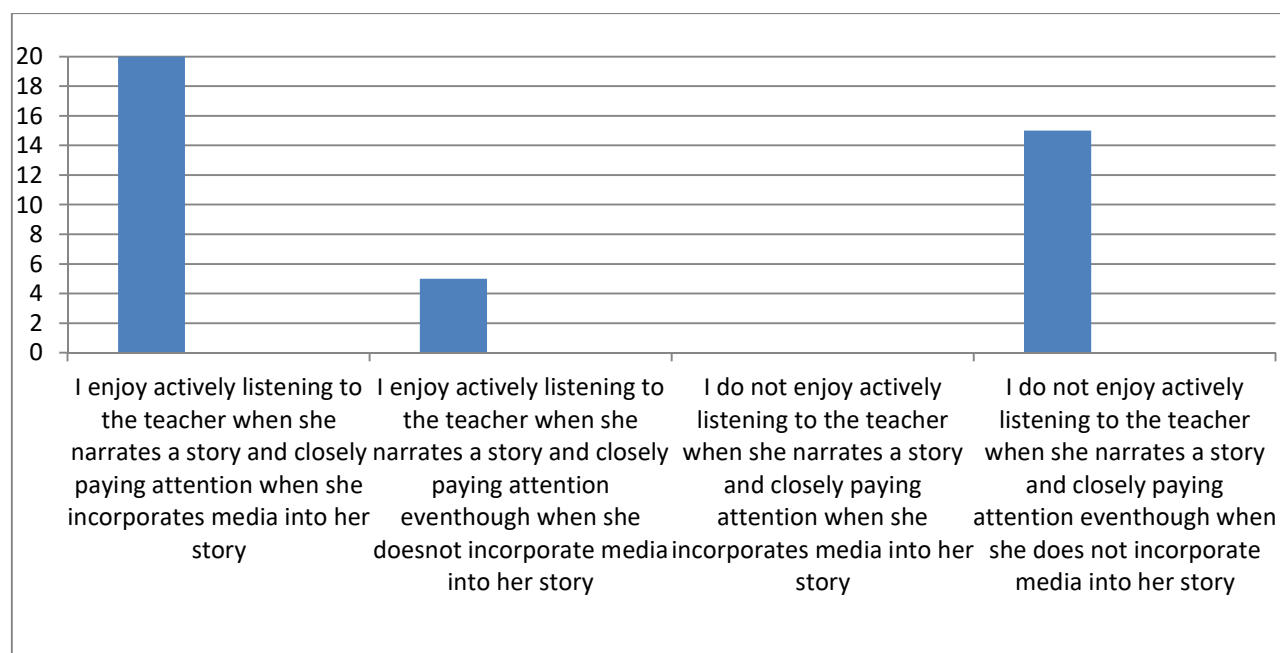


Figure 2. The Students' Perception Towards Their Enthusiasm Listening to The Teacher Telling The Story (Either Using Media or Not)



Furthermore, the students were questioned about whether or not they had heard of the use of puppet in telling stories and. In response, they claimed to have heard of puppet stories. When asked whether they had ever heard puppet stories before, most of the pupils who participated in the interviews also said that they had. The purpose of the inquiry was to assess their familiarity with and awareness of puppet storytelling. The students confirmed their past knowledge of puppet stories in response to the questions, suggesting that they were already familiar with this type of media of storytelling. This acknowledgement highlights the significance and resonance of puppet storytelling within the examined group and supports the idea that students recognize and acknowledge the use of puppet.

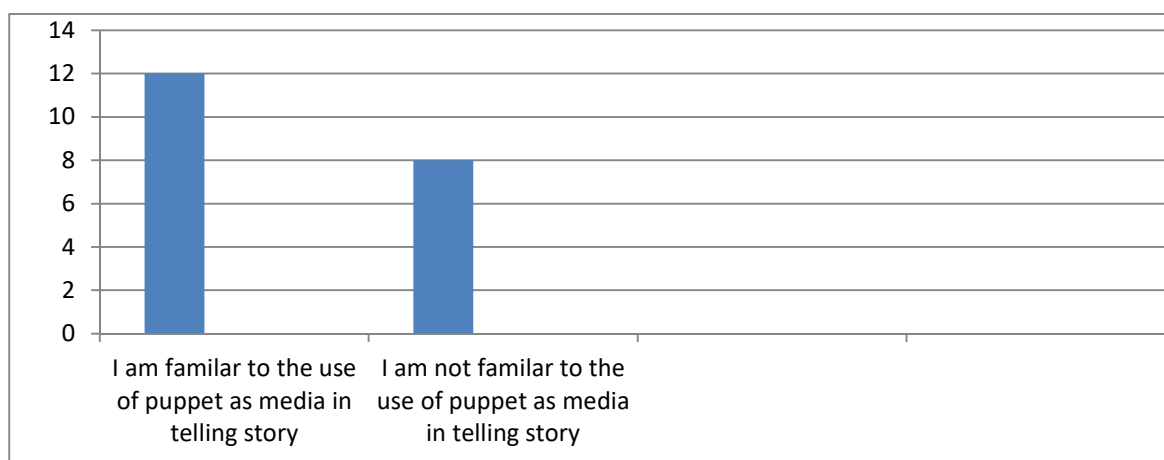


Figure 3. The Students' Perception Regarding Their Level Of Familiarity With The Utilization of Puppets In Retelling Stories.

In addition to the familiarity of the use of puppets in retelling the story, these young learners were questioned whether or not they preferred using puppets as a teaching and learning tool. Responding to this, all of them thought it would be interesting if they could have a puppet as media to help them understand the stories, which piqued their attention. Learning English with puppets is more engaging than listening to a story without any puppets. Therefore, they hope that this type of media can be used as often as possible in the teaching-learning process.

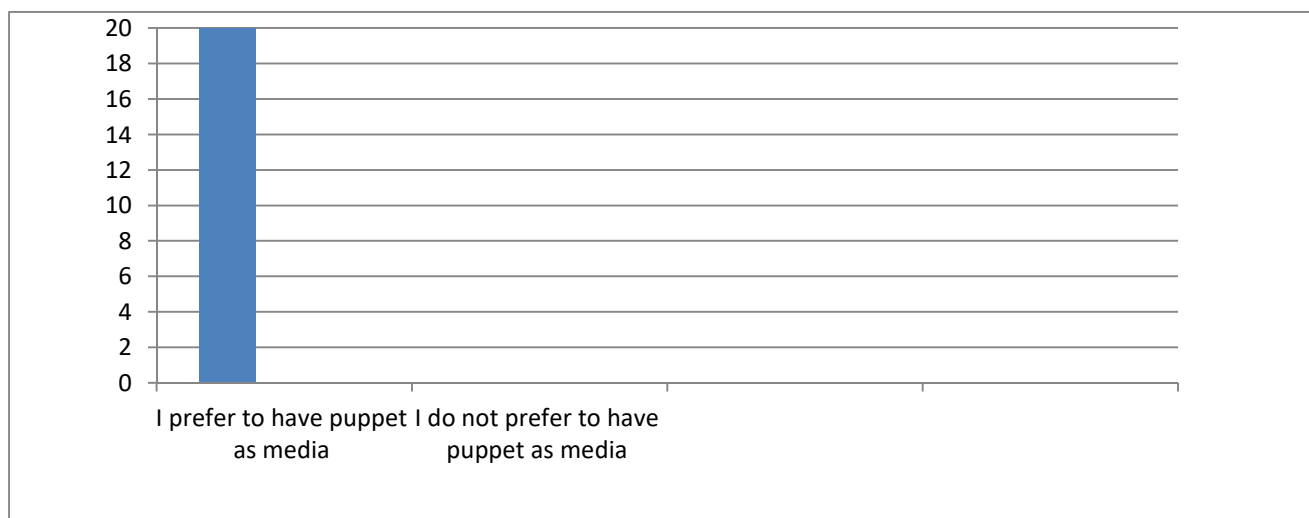




Figure 4. The Students' Perception Regarding Their Preference of Having Puppet As The Media In Teaching -Learning

In order to increase the students' openness to learning, they also advised writers to use diverse media, such as physical objects like toys and visuals like images. This suggestion highlights how important it is to use a range of multimedia materials in order to enhance the appeal and engagement of instructional content. The focus is on using both visual and tactile cues to capture students' attention, as suggested by the use of pictures and tangible objects. The main objective is to create a more conducive learning atmosphere that increases students' enthusiasm to actively engage in their studies while also piquing their curiosity. The concept essentially promotes a comprehensive approach to pedagogy, acknowledging the role that multisensory experiences have in cultivating a favorable attitude toward learning.

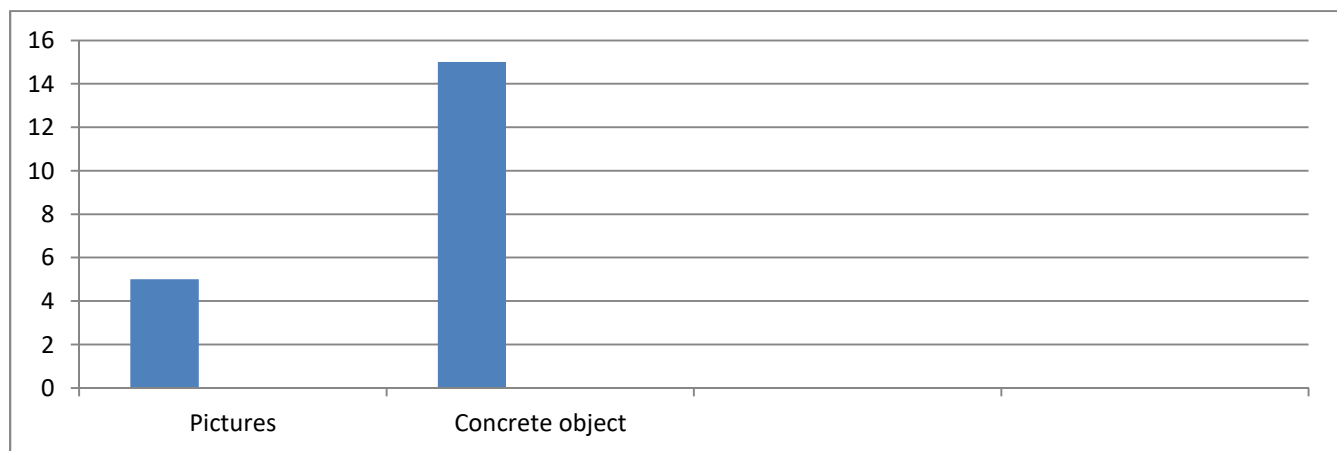


Figure 5. The Students' Perception Regarding Their Preference of Having Diverse Media To Be Used In Teaching-Learning

Every student in this study responded favorably to the teacher's storytelling technique. The students found it beneficial to listen intently to the teacher's explanations, particularly when the media (puppet) were included, in addition to enjoying the experience of hearing the teacher tell a story. Interestingly, a few children had prior experience with puppets as a storytelling tool, demonstrating an interest in a variety of teaching methods. Puppetry has been shown to have a favorable impact on classroom atmosphere, as noted by Kröger and Nupponen (2019). Puppetry is a dynamic and engaging medium that teachers may use to foster inclusivity, empathy, and teamwork in learning environments. Puppets are adaptable instruments that let children engage and communicate with each other, removing obstacles and promoting involvement. Teachers may approach delicate subjects, foster creativity, and improve social-emotional learning with puppetry. Puppets can also foster a sense of warmth and humor in the classroom, which helps create a friendly and encouraging atmosphere where children feel free to express themselves. The study by Kröger and Nupponen emphasizes the value of creative teaching strategies in creating a supportive learning environment where students flourish intellectually, emotionally, and socially.

The young learners' enthusiasm for using puppets as a storytelling tool ran throughout their comments. It piqued their interest in a novel and compelling way, and they thought it improved their comprehension of the stories. The students went one step further and recommended that instructors and authors think about using a range of media to enhance the educational process. In particular, they suggested using tangible items, like toys, and visual aides, like pictures, to speed up the learning of fundamental English.

This encouraging reaction emphasizes how crucial it is to use a variety of cutting-edge teaching strategies in the classroom. Using multimedia components not only makes learning more enjoyable, but it also helps



students grasp the material more thoroughly. The students' counsel to use a variety of media underscores the possibility of developing an engaging and welcoming learning environment that accommodates various learning preferences and styles. Using a variety of storytelling media can prove to be a potent tool in creating an engaging and productive learning environment for kids as educators keep developing with cutting-edge methods.

The study by Muhajidah et al., (2021), explores the critical function that hand puppet storytelling plays in fostering early language development. Their findings shed light on the many advantages this methodology has to offer and provide both parents and educators with insightful information. First and foremost, it becomes clear that using hand puppet storytelling is a powerful way to improve a young learner's speaking abilities. Children are encouraged to express their ideas and thoughts more clearly by interacting with puppet-driven storytelling, which helps them improve their spoken communication abilities. Additionally, this method piques the students' curiosity and encourages attentive listening. The students who participate in interactive storytelling sessions become more enthusiastic learners who enthusiastically take in and interact with the stories that are told to them. The study also emphasizes how important hand puppet storytelling is for boosting young learners' self-esteem (as also stated by Arts, 2020). Those who actively engage in storytelling activities strengthen their emotional and social skills overall and feel more confident and empowered to express themselves. The study also emphasizes how effective this approach is at fostering receptive language abilities in kids and enhancing their listening skills. Children who are immersed in story experiences aided by hand puppets become more adept at understanding and deciphering language cues. It is significant to note that hand puppet storytelling is essential for developing young readers. Children who are exposed to storytelling grow to love language and books, which provides a strong basis for their future literacy efforts. Furthermore, this practice facilitates young learners' retelling of stories they have read, which strengthens their comprehension and memory recall. Additionally, it helps kids recognize words and expand their vocabulary, which advances their language development. In the end, Muhajidah et al., (2021) study emphasizes how crucial it is to modify educational activities to fit each young learner's unique learning preferences. Teachers can spark students' interest in learning and support early language development by using a variety of media and captivating techniques like hand puppet storytelling.

4. CONCLUSION

According to the data above, every student found their puppet-based Basic English class to be enjoyable. One method of inspiring young learners learning Basic English is the use of puppets in storytelling. The overall perception of the young learners who were involved in this study is that they enjoyed actively listening to the narrative story and closely paying attention when it incorporated media- puppet - into the story.

Besides the findings, there are some limitations of this study. The first, given the small sample size of 20 students in the study, extrapolating the results to a larger population may be difficult. More thorough insights might be obtained from future studies using larger cohorts. Second, taking into account individual variances in learning preferences and previous experience with puppetry, the research examined the possible influence of extraneous variables on the results. It is important to remember, though, that these variables could cause variances in the outcomes. Third, although the study's duration was adequate to provide preliminary insights, it might not have allowed for a comprehensive assessment of the puppetry intervention's long-term impacts. Long-term effects on language development could be investigated in more detail in longer-term studies. The last, through the use of this comprehensive methodology, the study sought to provide a more nuanced investigation into the potential benefits of puppetry for first-grade students' language development. A well-rounded and rigorous research approach incorporates both quantitative and qualitative data, ethical considerations, and an understanding of limitations.



5. ACKNOWLEDGMENTS

Special acknowledgment goes to individuals who have made exceptional contributions, overcome obstacles with fortitude, and met deadlines with exceptional dedication. The team has shown a truly remarkable level of energy and dedication. Your combined efforts not only expedited the study's advancement but also promoted a happy workplace. I am appreciative of everyone on the team for their time and effort, without which this accomplishment would not have been possible.

REFERENCES

- Arts, A. (2020). If you can't say it, take a puppet. *Scenario: A journal for performative teaching, learning, research*, 14(1), 98-102.
- Bland, J. (2019). Teaching english to young learners: more teacher education and more children's literature! *Online Submission*, 7(2), 79-103.
- Cahyati, S. S., Parmawati, A., & Atmawidjaja, N. S. (2019). Optimizing english teaching and learning process to young learners (a Case Study in Cimahi). *Journal Of Educational Experts (JEE)*, 2(2), 107-114.
- Hasanah, Y. A. (2019). Implementasi strategi bermain peran dengan stik boneka untuk meningkatkan kreativitas dan kemampuan berbicara bahasa inggris. *Realita: Jurnal Penelitian dan Kebudayaan Islam*, 17(1).
- Kröger, T., & Nupponen, A. M. (2019). Puppet as a pedagogical tool: A literature review. *International Electronic Journal of Elementary Education*, 11(4), 393-401.
- Lepley, A. N. (2001). How puppetry helps the oral language development of language minority kindergartners. *A Research. Glen Forest Elementary. Fairfax County Public Schools*.
- Mahnun, N. (2012). Media pembelajaran (kajian terhadap langkah-langkah pemilihan media dan implementasinya dalam pembelajaran). *Jurnal pemikiran islam*, 37(1).
- Mujahidah, N., Damayanti, E., & Afiif, A. (2021). The role of storytelling methods using hand puppets in early children's language development. *Child Education Journal*, 3(2), 78-91.
- NurInsani, Hikmah. (2017). The use of puppet in teaching speaking to young learners. In *CONAPLIN and ICOLLITB-Tenth International Conference on Applied Linguistics and First International Conference on Language, Literature and Culture* (pp. 683-687).
- Ospina, S. (2004). *Qualitative research*. New Delhi: SAGE Publication.
- Riyani, I. (2019). Utilizing storytelling technique using finger puppet in teaching vocabulary mastery to young learner. *Jurnal JOEPALLT (Journal of English Pedagogy, Linguistics, Literature, and Teaching)*, 7(1).
- Romisowski, A. J. (2008). *The Selection and use of Instructional Media*. London: Kogan Page.
- Shank, G. (2002). *Qualitative Research. A Personal Skills Approach*. New Jersey: Merrill Prentice Hall.
- Supriyono. (2018). Pentingnya media pembelajaran untuk meningkatkan minat belajar siswa SD. *Edustream Jurnal Pendidikan Dasar*, 2(1), 43-48



DEVELOPING INDICATORS FOR SCIENCE TEACHER COMPETENCY IN STEM-ESD LEARNING

Anggun Zuhaida¹, Ari Widodo^{2*}, Eka Cahya Prima³, Rini Solihat⁴

^{1,2,3,4}Department of Science Education, Universitas Pendidikan Indonesia, Indonesia

¹Department of Science Education, Universitas Islam Negeri (UIN) Salatiga, Indonesia

*widodo@upi.edu

ABSTRACT

Science, Technology, Engineering, and Mathematics (STEM) education focused on Education for Sustainability Development (ESD) can help students improve STEM skills and science procedures. STEM-ESD teachers are needed to acquire these competencies. This study aims to develop and determine the validity and reliability of STEM-ESD competency indicators for science teachers with Technological Pedagogical Content Knowledge (TPACK) standards. Descriptive research includes competency indicator development, indicator testing, and validation. This study employed Rasch modelling to assess 51 questionnaire items. This study included 108 science teachers. The results showed that STEM-ESD competencies were developed into 3 domains: planning, implementing, and professional development. The planning domain includes Content Knowledge (CK), Pedagogical Knowledge (PK), Technological Knowledge (TK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and TPACK. Meanwhile, the implementation and professional development domain includes TPACK indicators. The results of testing with the Rasch model show that the competencies developed can measure what should be measured (with no other dimensions outside the construct) because the raw variance explained by measures is 69.7%, which is classified as a very good criterion. Then, the unexplained variance in the 1st-5th period shows results that are smaller than 15%. A total of 42 indicators were declared valid. Furthermore, the reliability results are shown by the Cronbach alpha result of 0.99 with a very good category. The development and validation of this indicator is expected to be a reference for teachers to know what competencies they must have in teaching STEM-ESD in science learning.

Keywords: science teacher competency, TPACK, STEM, ESD, STEM-ESD learning

1. INTRODUCTION

Teacher competency development is part of the key steps to encourage the development of students' core competencies and produce outstanding students who are able to adapt to global developments in the future (Byrd & Alexander, 2020; Cebrián et al., 2020). Thus, teacher competence has a positive influence on the formation of students' core competencies. In the field of science education, students have strived to achieve student literacy competencies, inquiry, and engineering using sustainable technology (Bellová et al., 2023; Lind et al., 2022). In the practice of science learning, competent science teachers are the main factor that determines student success in science learning and competency development. The main challenges for science teachers in teaching science in schools include understanding the discipline and its subject matter, understanding students, understanding teaching practices, understanding the learning environment, and subject specialization (Ye et al., 2021). To answer and overcome these challenges, it is necessary to develop science teacher competencies.

STEM-ESD learning seeks to integrate science learning by training students to do engineering using technology for sustainability in order to solve everyday problems. Science learning that integrates STEM-ESD has not been widely implemented in schools. Most teachers are not familiar with STEM-ESD learning, so they cannot optimally facilitate it in the classroom. Not many teachers have a background in STEM learning for sustainability, which is one of the factors that has not been widely implemented in the classroom (Hamad et al., 2022; Velázquez & Rivas, 2020). In order to develop these competencies, most can be obtained through training, workshops, seminars or other activities.

TPACK is one of the professional knowledges that teachers must develop. Teachers' professional knowledge is a determining factor in the development of students' knowledge. Teachers are expected to carry out an effective learning process by using their professional knowledge (Chai et al., 2020; Tondeur et al., 2020). Therefore, teachers must develop TPACK maximally in STEM-ESD integrated science learning. TPACK-based STEM-ESD



competency development is an important step that must be prepared and given to teachers to prepare their competence in the application of STEM-ESD in science subjects. In order to develop these competencies, the first step that needs to be done is to develop TPACK-based STEM-ESD competency indicators.

TPACK is seen as a highly qualified knowledge that teachers must possess. In STEM-ESD learning, teachers must have knowledge that includes the relationship between content, pedagogy and technology, which is TPACK (Chai et al., 2020; Irmata & Atun, 2018). TPACK describes the integrated relationship between knowledge of the subject matter to be learned and taught (content knowledge/CK), knowledge of teaching and learning processes and practices or strategies (pedagogical knowledge/PK), and knowledge of technological tools and the skills needed to operate a particular technology (technological knowledge/TK). In addition, the TPACK framework also combines these three types of knowledge into four other types of knowledge, namely knowledge about teaching practices that are appropriate to the subject content (pedagogical content knowledge/PCK), knowledge about technological tools and skills that are appropriate to learning practices and strategies (technological pedagogical knowledge/TPK), knowledge about the relationship between subject matter and the use of technology (technological content knowledge/TCK), and knowledge that has a relationship between knowledge about material content, pedagogy, and technology to create better learning (technological pedagogical content knowledge/TPACK).

Based on this, TPACK can be used as a new knowledge framework that can be useful for preparing and developing teacher competence in teaching STEM-ESD. This study aims to develop and determine the validity and reliability of indicators of STEM-ESD competence of science teachers using TPACK standards. In this study, science teachers' competence in teaching STEM-ESD will be developed, and this will be divided into the domains of planning, implementation, and professional development. Later, the domain will be classified into TPACK-based competency standards and developed into each indicator. These competencies are expected to be a reference for teachers to have awareness, desire, and action in developing their competencies, especially in science learning integrated with STEM for sustainability.

2. METHODS

2.1 Research design

This study used descriptive research. Indicators were developed through the following procedures: competency indicator development, indicators testing, and validation. Based on the pilot test, the collection of items was then validated to ensure that the indicators met the reliability and validity criteria. The development of domains, standards, and indicators of science teacher competencies in STEM-ESD learning is designed based on underlying theories, previous research results, and literature that is in accordance with these competency components. This resulted in a new competency framework.

The domain in the STEM-ESD competency indicator is divided into 3 domains, namely planning, implementing, and professional development. The domain becomes a reference in determining the standards and indicators of science teacher competence. The standards and indicators of science teacher competence in STEM-ESD learning consist of 7 standards, 9 indicators for the planning domain, 1 standard and indicator for the implementing domain, and 1 standard, which includes 2 indicators for the professional development domain. Subsequently, it was developed in the form of a questionnaire using a 1-4 Likert scale with scale descriptions ranging from 'very unsuitable' to 'very suitable'. The number of questionnaire items was 51 items, with 36 items in the planning domain, 7 items in the implementing domain, and 8 items in the professional development domain. Details of the development of domains, standards, and indicators of science teacher competencies in STEM-ESD learning can be seen in Table 1.



Table 1: Mapping of STEM-ESD Domains, Standards, and Competency Indicators

Domain	Standard	Indicator	Number of Statements
Planning	STEM-ESD Content knowledge (CK)	Teacher knowledge of content in STEM-ESD learning	5
	STEM-ESD Pedagogical knowledge (PK)	Teachers' knowledge of STEM-ESD learning management	3
	STEM-ESD Technology knowledge (TK)	Teachers' knowledge of technology that supports STEM-ESD learning	2
	STEM-ESD Pedagogical content knowledge (PCK)	Teacher knowledge in developing STEM-ESD lesson plans	8
		Teachers' skills in developing STEM-ESD lesson plans	5
	STEM-ESD Technological pedagogical knowledge (TPK)	Teachers' knowledge in utilizing technology in accordance with STEM-ESD learning strategies	3
	STEM-ESD Technological content knowledge (TCK)	Teachers' knowledge in utilizing technology related to STEM-ESD learning content	3
	STEM-ESD Technological Pedagogical Content Knowledge (TPACK)	Teachers' knowledge in integrating content, pedagogical and technological components in STEM-ESD learning	4
		Teachers' skills in designing STEM-ESD learning that integrates content, pedagogical, and technological components in STEM-ESD learning	3
Implementing	STEM-ESD Technological Pedagogical Content Knowledge (TPACK)	Teachers' skills in integrating content, pedagogical and technological components in STEM-ESD learning implementation	7
Professional Development	STEM-ESD Technological Pedagogical Content Knowledge (TPACK)	Engagement in professional development related to STEM-ESD learning	4
		Collaboration in STEM-ESD learning	4

The development of indicators, as shown in Table 1, is known to have been done using the TPACK standard. The planning domain includes CK, PK, TK, PCK, TPK, TCK, and TPACK. Furthermore, TPACK components were also developed for the implementation, and professional development domains.

2.2 Participant

A total of 108 science teachers who teach at the junior high school level in various schools in Indonesia participated in this study to provide us with perspectives on science teachers' competencies in STEM-ESD learning. They consisted of 83 (74.1%) females and 25 (25.9%) males and came from age groups ranging from under 25 years old to over 45 years old. Participation in the survey was voluntary, random, and anonymous.

2.3 Data Analysis

The Win steps 5.4.1 program used the Rasch model approach to conduct data analysis. Data analysis was conducted to determine the validity and reliability of the STEM-ESD competency instrument for science teachers. The validity test was carried out by testing the validity in the form of overall model fit and dimensionality, as well as the item and personal reliability of the research instruments developed.

3. RESULTS & DISCUSSION

3.1 Designing Science Teacher Competency Indicators for Teaching STEM-ESD

Science teacher competencies in teaching STEM-ESD were developed using TPACK competency standards. The incorporation of TPACK for STEM-ESD learning resulted in a new competency to measure the competency of science teachers in STEM-ESD learning. This competency is divided into three domains, namely,



planning, implementing, and professional development domains. The development of the three domains is based on the overall competence of teachers to teach a lesson. They must have the competence in planning, implementing, and developing professionalism to ensure the sustainability of a lesson.

The planning domain in this STEM-ESD competency is a domain that includes the knowledge and planning competencies that teachers have before and after designing tools and supporting STEM-ESD learning. This domain includes seven competency standards that combine TPACK with STEM-ESD learning. These competency standards consist of STEM-ESD Content knowledge (CK), STEM-ESD Pedagogical knowledge (PK), STEM-ESD Technology knowledge (TK), STEM-ESD Pedagogical content knowledge (PCK), STEM-ESD Technological pedagogical knowledge (TPK), STEM-ESD Technological content knowledge (TCK), and STEM-ESD Technological Pedagogical Content Knowledge (TPACK). Each standard is then developed into indicators and sub-indicators. The STEM-ESD CK, STEM-ESD PK, STEM-ESD TK, STEM-ESD TCK, and STEM-ESD TPK standards are divided into one indicator each to see teacher knowledge competencies. Meanwhile, the STEM-ESD PCK and STEM-ESD TPACK standards include teachers' knowledge and skills competencies in designing STEM-ESD learning.

The second domain is implementing, which shows teacher competence in implementing STEM-ESD learning in the classroom. This domain includes the STEM-ESD TPACK standard with its indicators, namely teacher skills in integrating concrete, pedagogic, and technological components in the implementation of STEM-ESD learning. The last domain is the professional development domain, which includes teacher competence in participating in professional development activities and collaborating with fellow teachers, experts, communities, or others related to STEM-ESD learning. This domain includes the STEM-ESD TPACK standard with its indicators, namely the involvement and collaboration carried out by teachers in developing STEM-ESD learning.

The total indicators developed from the STEM-ESD domain and competency standards consist of 9 indicators in the planning domain, 1 indicator in the implementing domain, and 2 indicators from the professional development domain. Planning is the most important part of the preparation and implementation of the learning process, which is an important part of the teacher's professional competence. Teachers are required to have the ability to think about what students should learn, what competencies need to be developed, and what values must be obtained in order to create quality teaching. Good planning is expected to create learning implementation with the right strategy and teacher readiness to master the appropriate material content. So, in STEM-ESD learning, teachers are expected to have good planning competencies.

Implementing learning in the classroom is one form of teacher pedagogic competence. This competency is not only related to how teachers implement learning in the classroom but teachers are expected to be able to improve the quality of learning in the classroom (Guillén-Gámez et al., 2021; König et al., 2021). In the context of STEM-ESD learning, teachers are expected to implement learning, create a learning environment, and conduct assessments that integrate content, pedagogic, and technological components into STEM-ESD learning.

In order to ensure the sustainability of a new learning program, teachers are expected to follow and conduct professional development (Ammonet et al., 2022; Byrd & Alexander, 2020). Professional development can be seen from teachers' involvement in self-development activities related to STEM-ESD learning. Self-development can be seen from teachers' involvement in attending various trainings, seminars, workshops, or other activities aimed at improving professionalism and being actively involved in teacher communities to improve competencies related to STEM-ESD learning (Acar & Büyüksahin, 2021; Surahman & Wang, 2023). In addition, teachers are also expected to collaborate with fellow teachers, experts, communities, and other parties and share ideas with fellow teachers to develop ideas and disseminate information and learning innovations (Baker-Doylea, 2011; Liou & Bjorklund Jr, 2023; Saat et al., 2021).

3.2 Testing STEM-ESD Competency Indicators with Rasch Modelling

The next step after developing indicators is to conduct a test and measure validity and reliability. The test was conducted with the help of Google Forms and the Likert scale. The pilot test was conducted to measure the quality of the TPACK instrument to measure the STEM-ESD competence of science teachers. The quality of the instrument was tested using Rasch modeling and Unidimensionality, validity, and reliability tests.



Unidimensionality can be shown if the raw variance explained by measures $\geq 20\%$ with a note on the general category of interpretation, which is sufficient if 20-40%, good if 40-60%, and very good if greater than 60%, and if the unexplained variance in 1st to 5th contrast of residuals is less than 15% each (W. Boone et al., 2014). The results of the Unidimensionality test are shown in Table 2.

Table 2: Unidimensionality Test Results

Criteria	Eigenvalue	Observed		Expected
Raw variance explained by measures	117.0403	69.7%		69.3%
Unexplained variance in 1st contrast	6.3408	3.8%	12.4%	
Unexplained variance in 2nd contrast	5.4840	3.3%	10.8%	
Unexplained variance in 3rd contrast	4.3625	2.6%	8.6%	
Unexplained variance in 4th contrast	3.8291	2.3%	7.5%	
Unexplained variance in 5th contrast	2.8036	1.7%	5.5%	

Based on Table 2, the result of raw variance explained by measures is 69.7%, which is classified as a very good criterion. Then the unexplained variance in 1st is 3.8%, unexplained variance in 2nd is 3.3%, unexplained variance in 3rd is 2.6%, unexplained variance in 4th contrast is 2.3%, and unexplained variance in 5th is 1.7%. It can be seen that all results are smaller than 15%. So, it can be concluded that as a unidimensional construct, the TPACK instrument can measure what it is supposed to measure (with no other dimensions outside the construct).

In addition to the unidimensionality test, the validity of each item is also tested to determine which indicators are not suitable (outliers or misfits). The criterion used to determine the validity of items is the mean of infit and outfit mean squares (MNSQ), which have an acceptable range of 0.5 to 1.5. However, 1.6 is still considered acceptable, and <0.5 is not acceptable. Furthermore, the ideal value of the fit criteria is close to 1.00 logits (Andrich, 2018; Bond, 2015). The relatively more stable mean square statistic (MNSQ) is used as the fit criterion for indicator quality assurance. The results of item validity testing can be seen in Table 3.

Table 3: Item Validity Results

Item Code	Outfit MNSQ	Item Code	Outfit MNSQ	Item Code	Outfit MNSQ
P-PCK-A7	0.92	PD-TPACK-A3	1.59	P-PK-1	1.13
P-PCK-A8	0.98	P-PK-2	0.81	P-TPACK-A1	0.72
P-PCK-A5	0.76	P-PCK-A1	0.72	I-TPACK-4	0.67
P-PCK-A3	0.76	P-TCK-2	0.59	I-TPACK-5	0.72
P-PCK-A6	1.00	P-TPACK-A3	0.55	P-TPK-1	0.84
P-PCK-B5	0.81	P-TPACK-B1	0.56	P-TCK-1	0.78
P-PCK-B4	0.87	P-TK-2	1.19	P-TPK-3	0.55
P-PCK-B3	0.94	P-PCK-B2	0.42	P-CK-3	1.43
P-TPACK-A2	0.55	P-TPACK-A4	0.69	P-CK-1	1.13
P-TPACK-B3	0.48	P-CK-4	1.12	PD-TPACK-A4	1.50
P-PCK-A2	0.79	P-TPK-2	0.67	PD-TPACK-B	1.57
P-TPACK-B2	0.47	P-TCK-3	0.49	P-TK-1	1.20
I-TPACK-3	0.71	I-TPACK-2	0.78	PD-TPACK-B1	1.81



Item Code	Outfit MNSQ	Item Code	Outfit MNSQ	Item Code	Outfit MNSQ
PD-TPACK-A1	0.94	I-TPACK-7	0.68	PD-TPACK-B4	1.76
P-CK-5	1.76	P-PCK-A4	1.14	P-CK-2	0.85
P-PK-3	0.83	P-PCK-B1	0.93	PD-TPACK-B3	1.88
I-TPACK-6	0.71	I-TPACK-1	0.56	PD-TPACK-A2	2.02

Note:
: misfit/not valid

Based on the results of Table 3, there are 9 indicators whose MNSQ outfit results are declared invalid. The indicator is then revised and retested to ensure its validity. The next test of STEM-ESD competency indicators is to test the reliability of the indicators. Reliability criteria were examined using various indicators, such as Rasch parameters (Bond, 2015; W. J. Boone, 2016) and Cronbach's alpha (α) (Taber, 2018). The Cronbach Alpha value, which shows the interaction between the person and the item, is 0.99, a very good level. Then, the person reliability value is 0.98 as an indicator of the consistency of the respondent's answer, which is acceptable at a very good level. Item reliability is worth 0.73 as an indicator of the quality of the items in the instrument, which is a good category. Based on the Person Table, the average value of INFIT MNSQ is 0.97, and the OUTFIT MNSQ value is 0.95.

Meanwhile, based on the Item Table, the average value of INFIT MNSQ is 0.98 and OUTFIT MNSQ is 0.95. If the provisions are close to 1, it is better because the ideal value is 1. In order for the average person and item to approach the ideal provisions. All reliability results are summarized in Table 4.

Table 4. The Result of the Reliability Test

	Mean MNSQ		Reliability	Alpha Cronbach
	Infit	Outfit		
Person	0.97	0.95	0.98	0.99
Item	0.98	0.95	0.73	

4. CONCLUSION

Based on the explanation above, it can be concluded that STEM-ESD competency indicators are developed based on underlying theories, previous research results, and literature that is in accordance with the competency components. STEM-ESD competencies are divided into 3 domains, namely planning, implementing, and professional development, which are then derived into 7 standards and 9 indicators for the planning domain, 1 standard and indicator for the implementing domain, and 1 standard, which includes 2 indicators for the professional development domain. The indicators were then developed into a questionnaire consisting of 51 questionnaire items. The results of the questionnaire were then identified for validity and reliability using Rasch modeling. The results of item validity are determined based on the MNSQ output value, which shows that 42 questionnaire items are valid. Furthermore, the results of personal reliability show a value of 0.98 as an indicator of the consistency of the respondents' answers, which is acceptable at a very good level. Item reliability is worth 0.73 as an indicator of the quality of the items in the instrument, which is a good category. These results indicate that the competency indicators developed can be used to measure teacher competence, but some questionnaire items need to be improved to get better results. The limitation of this study is the scope of participants involved, which is only junior high school science teachers. It is hoped that this competency can be used to see STEM-ESD competencies in teachers of other subjects so that STEM-ESD learning can not only be applied to science subjects.



5. ACKNOWLEDGMENTS

The author would like to thank Lembaga Pengelolaan Dana Pendidikan (LPDP) for providing financial support to the author in his advanced study process. I also thank the promoter team, who contributed their thoughts in writing this article.

REFERENCES

- Acar, D., & Büyüksahin, Y. (2021). Awareness and views of teachers who received in-Service STEM Training about STEM. *International Journal of Progressive Education*, 17(2), 473–490.
- Ammonet, R., Turek, A., & Peter, C. (2022). Pre-service geography teachers' professional competencies in education for sustainable development. *Education Sciences*, 12(1), 42.
- Andrich, D. (2018). Advances in social measurement: A Rasch measurement theory. In *Perceived health and adaptation in chronic disease* (pp. 66–91). Routledge/Taylor & Francis Group.
- Baker-Doyle, K. J. (2011). In search of practitioner-based social capital: A social network analysis tool for understanding and facilitating teacher collaboration in a US-based STEM professional development program. *Professional Development in Education*, 37(1), 75–93.
- Bellová, R., Balázová, M., & Tomčík, P. (2023). Are attitudes towards science and technology related to critical areas in science education? *Research in Science & Technological Education*, 41(3), 1117–1132.
- Bond, T. (2015). Applying the Rasch Model: Fundamental Measurement in the Human Sciences, Third Edition (3rd ed.). Routledge.
- Boone, W. J. (2016). Rasch Analysis for Instrument Development: Why, When, and How? *CBE—Life Sciences Education*, 15(4), rm4.
- Boone, W., Staver, J., & Yale, M. (2014). *Rasch Analysis in the Human Sciences*. <https://doi.org/10.1007/978-94-007-6857-4>
- Byrd, D. R., & Alexander, M. (2020). Investigating special education teachers' knowledge and skills: Preparing general teacher preparation for professional development. *Journal of Pedagogical Research*, 4(2), 72–82/
- Cebrián, G., Junyent, M., & Mulà, I. (2020). Competencies in education for sustainable development: Emerging teaching and research developments. *Sustainability*, 12(2), 579.
- Chai, C. S., Jong, M., & Yan, Z. (2020). Surveying chinese teachers' technological pedagogical STEM knowledge: A pilot validation of STEM-TPACK survey. *International Journal of Mobile Learning and Organisation*, 14(2), 203–214.
- Del Cerro Velazquez, F., & Lozano Rivas, F. (2020). Education for sustainable development in STEM (technical drawing): Learning approach and method for SDG 11 in classrooms. *Sustainability*, 12(7), 2706/
- Guillén-Gámez, F. D., Mayorga-Fernández, M. J., Bravo-Agapito, J., & Escribano-Ortiz, D. (2021). Analysis of teachers' pedagogical digital competence: Identification of factors predicting their acquisition. *Technology, Knowledge and Learning*, 26(3), 481–498
- Hamad, S., Tairab, H., Wardat, Y., Rabbani, L., AlArabi, K., Yousif, M., ... & Stoica, G. (2022). Understanding science teachers' implementations of integrated STEM: Teacher perceptions and practice. *Sustainability*, 14(6), 3594.
- Irmita, L., & Atun, S. (2018). The influence of Technological Pedagogical and Content Knowledge (TPACK) approach on science literacy and social skills. *Journal of Turkish Science Education*, 15, 27–40.



- König, J., Blömeke, S., Jentsch, A., Schlesinger, L., née Nehls, C. F., Musekamp, F., & Kaiser, G. (2021). The links between pedagogical competence, instructional quality, and mathematics achievement in the lower secondary classroom. *Educational Studies in Mathematics*, 107(1), 189–212.
- Lind, J., Pelger, S., & Jakobsson, A. (2022). Students' knowledge of emerging technology and sustainability through a design activity in technology education. *International Journal of Technology and Design Education*, 32(1), 243–266.
- Liou, Y.-H., & Bjorklund Jr, P. (2023). Understanding teacher network formation amidst reform: A mixed-methods study on collaborative structure, network intentionality, closeness, and school climates. *Teaching and Teacher Education*, 134, 104296.
- Saat, R. M., Fadzil, H. M., Adli, D. S. H., & Awang, K. (2021). STEM Teachers' Professional Development through Scientist-Teacher-Students Partnership (STSP). *Jurnal Pendidikan IPA Indonesia*, 10(3), Article 3.
- Surahman, E., & Wang, T.-H. (2023). In-service STEM teacher's professional development programmers: A systematic literature review 2018–2022. *Teaching and Teacher Education*, 135, 104326.
- Taber, K. S. (2018). The Use of cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273–1296.
- Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2020). Enhancing pre-service teachers' technological pedagogical content knowledge (TPACK): A mixed-method study. *Educational Technology Research and Development*, 68(1), 319–343.
- Ye, J., Mi, S., & Bi, H. (2021). Constructing core teaching competency indicators for secondary school science teachers in China. *Journal of Baltic Science Education*, 20(3), 389-406.



IS THERE A RELATIONSHIP BETWEEN KNOWLEDGE, ATTITUDES, AND EATING BEHAVIOR AMONG ADOLESCENTS IN EDUCATION?

Tantri Liana^{1*}, Parlindungan Sinaga², Lilit Rusyati³

^{1,2,3} Mathematics and Science Education Faculty, Universitas Pendidikan Indonesia, Indonesia

*tantri_liana@upi.edu

ABSTRACT

This research aims to see how adolescents' knowledge and attitudes about balanced nutrition are related to their eating behavior. Adolescents are the age group most vulnerable to changes in unhealthy eating habits, which can have a major impact on important aspects of their health. This research involved 160 junior high school students aged 12 to 17 years.

Guidelines for knowledge of balanced nutrition (PUGS) as well as eating attitudes and behaviors are the topics of the Nutritional Literacy Survey. Based on the investigation, it is known that 66.9% are in the middle adolescence group (aged 14–17 years). Most respondents had moderate nutritional knowledge with a percentage of 69.4%, a negative attitude percentage of 55.6%, and eating behavior was also in the moderate category at 65.6%. The results of research using bivariate analysis show that the relationship between knowledge and adolescent eating behavior has a p-value of 0.114 ($p > 0.05$) and the relationship between attitude and adolescent eating behavior has a p-value of 0.108 ($p > 0.05$), so it can be concluded that there is no relationship between knowledge and attitudes towards the balanced nutritional eating behavior of adolescents. The significance of this research lies in the importance of integrating nutrition education into school programs and curricula to increase nutrition knowledge in adolescents, such as nutrition with science, technology, engineering, and mathematics (STEM). Additionally, educational programs that focus on sustainable development and health awareness may be effective in encouraging healthy eating habits in this age group.

Keywords: *nutrition, eating behavior, adolescents, sustainability*

1. INTRODUCTION

Adolescents aged 10–19 years are an important transition period from childhood to adulthood that experiences significant changes due to hormonal maturation and body composition. Adequate nutrition is essential for growth, development, health, well-being, and preventing obesity and chronic disease. Adolescents tend to consume foods rich in carbohydrates and fats between meals, which can trigger nutritional problems. The World Health Organisation (WHO) emphasizes the importance of adequate nutrition for children and adolescents to contribute to transformative change and sustainable development. The eating behavior and food choices of adolescents play an important role in their nutritional needs. Therefore, promoting good nutrition is essential for their overall well-being and their participation in sustainable development (Al-Jawaldeh et al., 2020; Almoraie et al., 2021; Lestari et al., 2022; Suriyati et al., 2021).

Adolescence can cause nutritional problems such as malnutrition, overweight, and obesity, which have increased significantly globally since 1980. Based on 2018 Riskesdas statistics, 25.7% of adolescents in Indonesia aged 13 to 15 years and 26.9% of Adolescents aged 16 to 18 years have a short or very short nutritional status. Additionally, 8.7% of adolescents between 13 and 15 years old and 8.1% of adolescents between 16 and 18 years old are considered thin or very thin. Meanwhile, 16.0% of adolescents aged 13 to 15 years and 13.5% of adolescents aged 16 to 18 years were reported to be overweight or obese (Kemenkes, 2020). This can be caused by an unbalanced diet. Lack of nutritional knowledge among Adolescents, including intelligence in choosing nutrient-rich foods, can influence a person's intake, and the higher the knowledge, the more attention will be paid to food consumption both in terms of quality and type. Attitude also plays an important role in adolescent behavior when choosing food. A positive attitude towards health may not have a direct impact on positive behavior, but a negative attitude can have a direct impact on the behavior of eating balanced nutrition (Muthmainah et al., 2019; Ramadhani et al., 2022; Rosati et al., 2013). Schools are crucial for creating a nurturing learning environment that fosters healthy, educated, and engaged citizens. They promote sustainable eating patterns, encouraging traditional, locally grown foods, which boosts the local economy. A well-nourished,



healthy, and educated population is essential for economic growth. Investing in a whole-school nutrition approach improves students' education, health, and well-being, as well as the economic prospects of individuals, communities, and countries. (World Health Organization (WHO), 2023).

Based on the introduction above, researchers are interested in studying the relationship between knowledge, attitudes and eating behavior of balanced nutrition among students in education.

2. METHODS

This research uses quantitative descriptive research with a cross-sectional design. In October 2023, research was conducted at 3 junior high schools in Bandung. In this study, eating behavior is the dependent variable, whereas adolescents' attitudes and knowledge about nutrition are the independent factors. This research involved all students in grades VII, VIII, and IX as the target population. The Slovin formula was then used to calculate the sample size, namely a minimum of 92 students. While in the field, researchers received questionnaire answers from 160 respondents for further research. This research uses data on the characteristics, knowledge, attitudes, and behavior of respondents in implementing the General Balanced Nutrition Programme (PUGS) and environmental factors such as parental education, the influence of friends and teachers, and exposure to PUGS media.

The instrument used was a questionnaire adapted from the General Guidelines for Balanced Nutrition Research by Novitasari (2009). The categorisation of knowledge and behavior variables is based on standard percentages, with a Less score of <50, a moderate score of 50–75, and a high score of >75, while the attitude category is determined by the standard mean, namely that a score < mean is in the negative category and \geq mean is in the positive category. The data were analyzed univariate and bivariate. Bivariate analysis uses the Chi square statistical test to see the relationship between knowledge and attitudes and students' balanced nutritional eating behavior. Next, the data is presented in the form of tables and narratives.

3. RESULTS & DISCUSSION

3.1 Respondent Characteristics

Based on the results of research conducted on 160 respondents who were students in grades VII, VIII, and IX in 3 schools in Bandung, it showed that 107 respondents (66.9%) were in the middle adolescence category, while the smallest group was the early adolescence group with 53 respondents (33.1%). In addition, there were 72 (45.0%) male respondents and 88 (55.0%) female respondents, as seen in Table 1. Childhood and adolescence are critical periods in establishing a healthy lifestyle because, during this period, there is an increase in nutritional integrity to meet rapid growth. Some habits, including eating behaviors, adopted during this use may continue throughout life (Sawyer et al., 2018). Adolescents between the ages of 10-19 make up 23% of people in low-income nations and 16% of the global population. Future growth depends on their well-being (UNESCO, 2016).

Table 1. Distribution of Respondent Characteristics

Variable	Number of Samples (83 Students)	
	n	%
Age		
Early adolescence (10 -13 years)	53	33.1
Middle adolescence (14 -17 years)	107	66.9
Gender		
Man	72	45.0
Woman	88	55.0

Source: Primary Data, 2023

3.2 PUGS Knowledge



The research results in Table 2 show that the majority of students have moderate level knowledge, namely 69.4%; 19.4% of respondents have Less knowledge of nutrition; and the remaining 11.3% have high knowledge. This is consistent with studies carried out by Ramadhani et al. (2022) regarding nutritional knowledge among students, which shows that of the 270 respondents studied, 42.6% had Enough nutritional knowledge. The large prevalence rate among respondents could be due to the fact that most students have received exposure to information about nutrition both formally and informally but have not absorbed it optimally. Increasing nutritional knowledge will have an impact on nutritional attitudes and behavior in adolescents as well as adolescents' ability to apply nutritional information in everyday life (Patimah et al., 2016). For the purpose of developing their life and making educated decisions about their health, relationships, and general well-being, students must be aware of nutritional facts. Efforts to realize this nutritional strengthening can be made by linking nutrition with science, technology, engineering and mathematics (STEM) clubs (for example, the kitchen garden as a learning laboratory) (World Health Organization (WHO), 2023).

3.3 PUGS Attitude

Table 2 indicates that there were 89 respondents. (55.6%) have a negative attitude towards PUGS and the rest (44.4%) have a positive attitude towards balanced nutrition, meaning that students' attitudes towards PUGS do not fully pay attention to healthy nutrition. Adolescents need time to process things outside their environment. Human attitudes are not formed from birth but rather through social processes that occur during their lives, where individuals gain information and experience (Ramadhani et al., 2022). By influencing students' attitudes, it will have a positive impact on their lives and have a progressive impact on society at large (Qureshi, 2020).

3.4 PUGS Behaviour

Based on Table 2, there are 65.6% of respondents with balanced nutritional behavior in the moderate category, 17.5% of respondents with balanced nutritional behavior in the high category, and the remaining 16.9% are in the Less category, so the majority of respondents have adequate balanced nutritional behavior. This nutritional awareness can be influenced by a lack of optimal knowledge about nutrition or other environmental factors such as age, education, religion, social, economic, and cultural factors. Eating behavior is a behavior that is closely related to eating and types of food, a person's frequency of eating, eating habits, established eating patterns, taboos, sharing of food within the family, preferences for food, and how to choose food (Suhardjo, 2013).

Table 2. Distribution of Nutrition Knowledge, Attitudes and Behavior

Variable	Number of Samples (83 Students)	
	n	%
Knowledge		
High	18	11.3
Moderate	111	69.4
Less	31	19.4
Attitude		
Positive	71	44.4
Negative	89	55.6
Behavior		
High	28	17.5
Moderate	105	65.6
Less	27	16.9

Source: Primary Data, 2023

3.5 Environmental Factors



Environmental factor variables are divided into five categories: father's education level, mother's education, PUGS media exposure, teacher influence, and friend influence. The results obtained show that the father's education is mostly lower middle school, with a percentage of 89.4%, as is the mother's education, which is lower middle school, with a percentage of 90.6%. To measure exposure to PUGS media, it is divided into two categories: having seen media containing PUGS and never seeing media containing PUGS. From table 3, there were 145 respondents, or 90.6%, who stated that they had seen media containing General Guidelines for Balanced Nutrition (PUGS), and only 9.4% had never seen it, meaning that students already had knowledge about PUGS.

Table 3. Distribution of Environmental Factors

Variable	Number of Samples (83 Students)	
	n	%
Father's Education		
Lower middle (\leq high school)	143	89.4
High (\geq D3)	17	10.6
Mother's Education		
Lower middle (\leq high school)	145	90.6
High (\geq D3)	15	9.4
PUGS Media Exposure		
Once	145	90.6
Never	15	9.4
Teacher Influence		
Strong	85	53.1
Weak	75	46.9
Peer Influence		
Strong	88	55.0
Weak	72	45.0

Source: Primary Data, 2023

Researchers asked further about the type of media that respondents saw, and it was discovered that respondents received messages about PUGS from print, electronic media, and direct messages from parents, teachers, friends, coaches, and health workers. Teachers are the largest source of PUGS media delivery, namely 17.8%, followed by the internet at 16.8%, and parents at 12.8%. From this, it can be seen in Table 4 that the influence of teachers in instilling PUGS in students is quite strong, with a percentage of 53.1%. Teachers should be aware of any health-related issues among the children in their classes. Teachers should also encourage students to do some physical activity every day, including food choices while at school (UNESCO, 2016). Encouraging teachers to eat with students to strengthen healthy eating and hygiene practices while strengthening social relationships is one effort to realize sustainable education through strengthening nutrition (World Health Organization (WHO), 2023). Apart from teachers, friends can also influence food choices. Table 3 indicates that about 88 (55.0%) respondents stated that the influence of friends was strong and the rest were weak. Adolescents tend to easily follow the influence of their peers, so Adolescent attitudes and behaviors about balanced nutrition are predicted to improve with a positive approach, such as peer coaching (Nuryani & Paramata, 2018)

Table 4. PUGS Media Types

Media Type	Number of Samples (83 Students)	
	n	%
Print media:		
Newspaper	9	1.8
Magazine	12	2.4



Book	55	10.9
Brochure	35	6.9
Electronic Media:		
Television	55	10.9
Radio	9	1.8
Internet	85	16.8
Teacher	90	17.8
Friend	22	4.3
Parent	65	12.8
Health workers	56	11.1
Etc	13	2.6
Total	506	100

Source: Primary Data, 2023

3.6 Relationship between knowledge and attitudes and eating behavior based on PUGS

Based on the research data in Table 5, it is known that respondents who have a high level of knowledge have a level of high behavior of 22.2%. Respondents who had a high level of knowledge and a fair level of behavior were 61.1%. Apart from that, it can also be seen that students have a positive attitude category with high, moderate, and Less behavior levels of 23.9%, 63.4%, and 12.7%, respectively. Meanwhile, respondents who had a balanced nutritional attitude were in the Less category, with levels of good, enough, and Less behavior of 12.4%, 67.4%, and 20.2%, respectively. Based on the results of bivariate analysis, the p-values for knowledge and attitudes were 0.114 (>0.05) and 0.108 (>0.05), which means there is no significant relationship between knowledge and students' balanced nutritional behavior, and there is also no significant relationship between attitudes towards students' balanced nutritional behavior.

According to theory, behavior is shaped by internal and external factors that interact with each other, where knowledge is an internal factor. Thus, it can be said that the knowledge factor is not Enough to make a significant contribution to the formation of balanced nutritional behavior in students. External factors can be environmental Age, education, employment, religion, socio-economic, and cultural) as well as other factors (Arief et al., 2020). Apart from the factors explained above, it can also be proven that behavior is not only influenced by knowledge but also by the environment, beliefs, and culture. An environment with quite diverse and different sources of information can have an influence on the way individuals behave (Chen et al., 2020). A person's level of nutritional education affects their attitudes and behaviors while making food choices, which in turn affects how well-nourished they are. A person will have better nutritional status the more knowledgeable they are about nutrition. Though someone may be aware of the amount of nourishment their body needs, their knowledge of nutrition may not always translate into altered eating habits if they fail to incorporate this information into their everyday lives (Medina et al., 2020).

There is no relationship between attitudes and students' balanced nutritional behavior ($p\text{-value} = 0.108$). These results show that there is no synergy between attitudes and behavior, considering that the age range of respondents is 12–17 years. For Adolescents, who are generally still unstable and easily influenced, the knowledge they have cannot simply be applied in everyday life because of the influence of friends, family, and the environment.

Table 5. Relationship Between Knowledge And Attitudes And Eating Behavior With Balanced Nutrition

Variable	Behavior								P value
	High		Moderate		Less		Total		
	n	%	n	%	n	%	N	%	
Knowledge									



High	4	22.2	11	61.1	3	16.7	18	100	0.114
Moderate	21	18.9	76	68.5	14	12.6	111	100	
Less	3	9.7	18	58.1	10	32.3	31	100	
Attitude									0.108
Positive	17	23.9	45	63.4	9	12.7	71	100	
Negative	11	12.4	60	67.4	18	20.2	89	100	

Source: Primary Data, 2023

4. CONCLUSION

Based on the research results above, it can be concluded that the majority of students have nutritional knowledge in the moderate category with a percentage of 69.4%, the percentage of Less attitudes is 55.6%, and nutritional behavior is also in the moderate category at 65.6%. There is no relationship between knowledge and students' balanced nutritional behavior, and there is no relationship between students' nutritional attitudes and behavior. There is a need to integrate nutrition education into school programmes and curricula to increase nutritional knowledge in adolescents, such as by linking nutrition with science, technology, and mathematics (STEM). Additionally, educational programmes that focus on sustainability and health awareness may be effective in encouraging healthy eating habits in this age group.

5. ACKNOWLEDGMENTS

The researcher would like to thank the respondents who were willing to participate in this research and several related parties who were also involved in carrying out this research.

REFERENCES

- Al-Jawaldeh, A., Taktouk, M., & Nasreddine, L. (2020). Food consumption patterns and nutrient intakes of children and adolescents in the eastern mediterranean region: A call for policy action. *Nutrients*, 12(11), 1–28.
- Almoraie, N. M., Saqaan, R., Alharthi, R., Alamoudi, A., Badh, L., & Shatwan, I. M. (2021). Snacking patterns throughout the lifespan: potential implications on health. *Nutrition Research*, 91, 81–94.
- Arief, N. A., Kuntjoro, B. F. T., & Suroto, S. (2020). Gambaran aktifitas fisik dan perilaku pasif mahasiswa pendidikan olahraga selama pandemi Covid-19. *Multilateral Jurnal Pendidikan Jasmani Dan Olahraga*, 19(2), 175.
- Chen, P., Mao, L., Nassis, G. P., Harmer, P., Ainsworth, B. E., & Li, F. (2020). Coronavirus disease (COVID-19): the need to maintain regular physical activity while taking precautions. *Journal of Sport and Health Science*, 9(2),
- Lestari, P. Y., Tambunan, L. N., & Lestari, R. M. (2022). Hubungan pengetahuan tentang gizi terhadap status gizi remaja. *Jurnal Surya Medika*, 8(1), 65–69.
- Medina, C. R., Urbano, M. B., De Jesús Espinosa, A., & López, Á. T. (2020). Eating habits associated with nutrition-related knowledge among university students enrolled in academic programs related to nutrition and culinary arts in puerto rico. *Nutrients*, 12(5).
- Muthmainah, F. N., Khomsan, A., Riyadi, H., & Prasetya, G. (2019). Vegetables and fruits consumption in junior high school students as the implementation of indonesian balanced-nutrition guidelines. *Media Kesehatan Masyarakat Indonesia*, 15(2), 178–187.
- Nuryani, N., & Paramata, Y. (2018). Intervensi pendidik sebaya meningkatkan pengetahuan, sikap, dan perilaku gizi seimbang pada remaja di MTsN model Limboto. *Indonesian Journal of Human Nutrition*, 5(2), 96–112.



- Qureshi, S. M. Q. (2020). Learning by sustainable living to improve sustainability literacy. *International Journal of Sustainability in Higher Education*, 21(1), 161–178.
- Ramadhani, Y., Salam, A., Jafar, N., Indriasari, R., & Amir, S. (2022). Hubungan pengetahuan dan sikap dengan perilaku gizi seimbang pada mahasiswa selama pandemi covid-19. *Journal of Indonesian Community Nutrition*, 11(1), 1–4.
- Ready to Learn and Thrive. (2023). In *Ready to Learn and Thrive*. <https://doi.org/10.18356/9789210025775>
- Rosati, P., Triunfo, S., & Scambia, G. (2013). Child nutritional status: a representative survey in a metropolitan school. *Journal of Obesity*, 2013.
- Sawyer, S. M., Azzopardi, P. S., Wickremarathne, D., & Patton, G. C. (2018). The age of adolescence. *The Lancet Child and Adolescent Health*, 2(3), 223–228.
- Patimah, S., Royani, I., Mursaha, A., & Thaha, A. R. (2016). Knowledge, attitude and practice of balanced diet and correlation with hypochromic microcytic anemia among adolescent school girls in maros district, South Sulawesi, Indonesia. *Biomed Res*, 27(1), 165-71.
- Suhardjo. 2013. Berbagai cara Pendidikan Gizi. Jakarta : Bumi Aksara
- Surijati, K. A., Hapsari, W., & Rubai, W. L. (2021). Faktor-faktor yang mempengaruhi pola makan siswa sekolah dasar di kabupaten banyumas factors affecting the diet of elementary school students in banyumas regency. *Nutriology Jurnal: Pangan, Gizi, Kesehatan*, 2(1), 95–100.
- UNESCO. (2016). Unesco strategy on education for health and well-being. In *Unesdoc*.
- World Health Organization (WHO). (2023). *Why is nutrition important for learners' health and well-being?* 1–8.



ENHANCING TEACHER PROFESSIONALISM THROUGH TRAINING OF LIVEWORKSHEETS TO SUPPORT IMPLEMENTATION OF MERDEKA CURRICULUM.

Nur Triani¹, Nur Triana^{2*}

^{1,2} Universitas Negeri Yogyakarta, Indonesia

*nurtriani11@gmail.com

ABSTRACT

This research aims to determine the increase in teacher professionalism through training in making interactive LKPD with Liveworksheets to support the implementation of the Merdeka Curriculum. This research is motivated by the existence of a new paradigm in the implementation of the Merdeka Curriculum in schools where teachers in carrying out learning must be in accordance with the nature of nature and the nature of the times. One of them is the application of technology in learning. The use of technology in the learning process at SMP Negeri 19 Tegal just uses PowerPoint as a media for presenting learning material. Meanwhile, for worksheets and assessments in the learning process, conventional methods are still used, so training needs to be held to enhance professionalism. This type of research is quantitative descriptive. The research subjects were teachers at SMP N 19 Tegal. Data collection in this research used observation, interviews, questionnaires and documentation studies. The data analysis techniques used are data reduction, data percentage, and drawing conclusions. If the teacher's response to training is above 70%, then the training carried out can increase teacher professionalism. The results of the calculation of the questionnaire given showed that the teacher response to the training provided was 92%, which means that the training increased teacher professionalism, especially in the use of IT in the classroom.

Keywords: teacher training, professionalism, Merdeka Curriculum

1. INTRODUCTION

Education is the root of human civilization. To become a civilized human being, education must be able to develop character and ways of thinking. Educational goals can be realized if teachers as learning directors have competencies appropriate to their profession. There are four competencies that teachers must have according to Law No. 14 of 2015 about Teachers and Lectures, pedagogical, professional, social, and personality competencies. This means that a professional teacher is a teacher who not only masters science and technology, but also has the required attitudes (Muhsin, 2015). Armed with these four competencies, it is hoped that the quality of teacher learning will increase so that the quality of education in Indonesia will also increase. The competencies possessed by teachers must also be by current developments and technology. Entering the era of the 21st century, the demand for the use of technology in learning is absolute. The conventional learning system must be changed considering that the learning system is no longer relevant to the development of science and technology (Yusrizal et al, 2017). To support this, according to Daryanto and Syaiful (2017), there are 5 skills that 21st-century teachers must have, they're (1) being able to facilitate and inspire students' learning and creativity, (2) designing and developing learning experiences and assessments in the digital era, (3) modeling how to learn and work in the digital era, (4) encouraging and modeling responsibility and digital society, and (5) participating in professional development and leadership. Efforts to enhance teacher professionalism can be done through training and not training, such as In House Training (IHT), internship programs, school partnerships, distance learning, tiered training and special training, short courses at LPTK, internal coaching by schools, and education. continued (Idris, 2020).

The implementation of the Merdeka curriculum in schools today as a curriculum with a new paradigm guides teachers to ensure that learning is carried out by the nature of nature and the nature of the times. This is done so that students gain knowledge according to their essence or needs while simultaneously utilizing and developing students' technological abilities to prepare them as skilled, civilized, and technological members of society. Therefore, as a professional, teachers must have the ability to solve academic problems related to the teaching and learning process so teachers need to increase their professionalism by developments in science and



technology (Widyaningrum et al, 2019). Learning carried out by teachers must be effective in realizing learning objectives. The steps in carrying out effective learning according to Ma'ruf and Syaifin (2021), are (1) actively involving students, (2) attracting students' interest and attention, (3) arousing students' motivation, (4) providing services to individual students, and (5) preparing and using various media in learning. The use of technology in learning can be one of the efforts made by teachers to implement effective learning.

The use of information and communication technology (ICT) in the world of education has many benefits. Umardulis (2019) said that the benefits of using ICT in the world of education consist of wider learning opportunities, better quality, and efficiency of learning, students can learn independently and cooperatively, and encourage the realization of lifelong learning. The use of technology in learning makes learning more fun and interactive so that students' motivation to participate in learning will increase (Sukono, 2018). Not only that, teacher innovation in designing and implementing learning is important (Haryono et al, 2017). Carrying out innovative learning is one effort to increase teacher professionalism (Kritian & Rahmat, 2018).

The Covid-19 pandemic has made us increasingly aware of the big role technology plays in the world of education. Technology makes learning can be done anywhere and at any time. However, at the beginning of its implementation, online learning reduced students' learning motivation. This is caused by the learning provided by teachers only in the form of providing learning materials and assignments in WhatsApp Groups or e-learning, such as Google Classroom, Schoology, or Moodle. Teaching style also influences students' learning motivation (Atma et al., 2021). To increase students' learning motivation, online learning must be innovative, creative, and able to hone students' critical thinking. The use of varied learning media can occur if the teacher knows this matter. According to Haryono, et al (2017), there needs to be training for teachers that is appropriate to the needs to be applied in the learning process and has an impact on student learning outcomes. The teacher's age and habits in applying conventional methods of learning are obstacles to using technology (Yusrizal in Wardinur, 2019).

Based on the results of observations and interviews, it is known that the use of technology at SMP N 19 Tegal in the learning process is still not optimal. Most teachers more often use technology to deliver learning material, for example using PowerPoint as a presentation medium. In contrast to the delivery of material that utilizes technology, assessment of student learning outcomes is still carried out conventionally so that it is not able to facilitate various student learning styles. Based on the description above, teachers at SMP N 19 Tegal need to receive live worksheet training to increase teacher professionalism in assessing student learning outcomes.

2. METHODS

The research was conducted at SMP Negeri 19 Tegal in the odd semester of the 2022/2023 academic year from March to August 2022. The research subjects were 30 teachers at SMP Negeri 19 Tegal. The method used is quantitative research with a descriptive approach to the implementation of liveworksheets training at SMP Negeri 19 Tegal. Quantitative descriptive research is research that gives meaning to data found in the field so that it is easier to understand (Sugiyono, 2019). The research techniques used were closed questionnaires, observation, interviews, and documentation. A closed questionnaire was used to determine teachers' impressions of the implementation of training and increasing teacher professionalism as a result of training in making interactive student worksheets with liveworksheets. The measurement scale used in the questionnaire is a Likert scale, which is a scale of 1-5 with the following scoring guidelines.

Table 1. Likert Scale Instruments

Rating	Score
Very Agree (SS)	5
Agree (S)	4
Less Agree (KS)	3
Don't Agree (TS)	2
So Do Not Agree	1

Source : Sugiyono (2019,p.132)



There are four indicators used to determine the teacher's responses to the training, namely the suitability of the theme with the material, the mastery of the speaker, the attitude of delivery, and the proportion of time and material according to Pambudi's research (2018). The questionnaire regarding the teacher's responses to the training can be seen in Table 2 below:

Table 2. Indicator and Statement of Teacher's Responses to The Training

No	Indikator	Statement
1	suitability of the theme with the material	• The material is related to training objectives
		• Appropriate material systematic
2	the mastery of the speaker	• The speaker mastered the material
		• The speaker gives tutorials how to make students worksheets in liveworksheets
		• The speaker assists training participants in understanding the material through a Q&A session
3	the attitude of delivery	• The speaker delivers material confidently
		• The speaker gives responses to participants
4	the proportion of time and material	• The duration of delivery of liveworksheets material is appropriate
		• The duration of the liveworksheets practice is appropriate
		• The duration of the Q&A session during training is appropriate

Furthermore, to find out the enhancement in teacher professionalism as a result of training, there are three indicators used, namely adding teacher insight regarding liveworksheets, clarity of steps for making worksheets with liveworksheets, and the use of interactive worksheets with liveworksheets in learning. The questionnaire's indicator and statement about enhancing teacher professionalism can be seen in Table 3 below:

Table 3. Indicator and Statement About Enhancing Teacher professionalism

No	Indikator	Statement
1	enlarge teacher insight about liveworksheets	• Liveworksheets can make the learning process more interesting
		• Liveworksheets can make student worksheet looks more interesting
		• Liveworksheets easy to use
2	clarity of steps for making worksheets with liveworksheets	• I know the steps for designing student worksheets using liveworksheets
		• I know the steps for making student worksheets with liveworksheets
3	the use of interactive worksheets with liveworksheets in the learning process	• Liveworksheets can be used <i>in</i> the subject I teach
		• Liveworksheets can enhance interaction in the learning process
		• Liveworksheets can enhance student motivation

The score obtained from the questionnaire is then calculated as the percentage. According to Utami (in Supartha et al., 2021) the teacher's response is considered good if the average for each indicator gets a percentage of more than or equal to 70%. Increasing teacher professionalism is also reflected in the increase in teacher performance and productivity after receiving training. The indicators used are (1) the teacher can create interactive student worksheets, (2) the teacher write down using interactive student worksheets with Liveworksheets on lesson plans, and (3) the teacher can apply the use of Interactive Digital student worksheets in the learning process.



3. RESULTS & DISCUSSION

The use of technology in the learning process by teachers of SMP N 19 Tegal

Before carrying out training activities, researchers collected data about teacher performance and productivity at SMP Negeri 19 Tegal. Initial data regarding the performance and productivity of teachers at SMP Negeri 19 Tegal in the use of technology in learning can be seen in Table 4 below:

Table 4. IT Competencies of Teachers at SMP N 19 Tegal

No.	Indicator	Number of Teachers	Percentage
1	Able to use the internet to search teaching materials	30	100 %
2	Able to create interactive digital student worksheets for learning process	3	10 %

Based on the table above, it can be seen that the use of technology by teachers is limited to searching teaching materials in the form of PowerPoint or learning videos on YouTube. Meanwhile, only 3 teachers were able to use the Interactive student worksheet. This is supported by the results of an interview with one of the English teachers:

"I usually use videos from YouTube as a learning resource for students in narrative text, procedural text, recount text, and grammar material."

The implementation of Merdeka Curriculum at school where teachers act as facilitators means that teachers must be able to facilitate students' needs, especially in the use of gadgets or cellphones. The use of technology in learning is also able to familiarize students with technology so that they can keep up with current developments. Increased motivation can also occur if teachers utilize technology in learning because it is by the characteristics of current students, Z generation, a generation that is familiar with technology.

Teacher Professionalism Enhancement Training

Su (2023) states that teaching is not a static process, teachers must continually develop their professional knowledge, teaching techniques and attitudes towards learning. It is important to develop teacher professionalism in managing classroom student behavior. If teachers have knowledge related to managing student behavior in the classroom, then the teacher can improve the management of learning in the classroom (Paramita et al., 2023). On the other hand, according to the viewpoint of Sulthon et al. (2021), the use of technology, especially in the use of learning media in the classroom, is still lacking. Many factors influence it. One of them is teachers who lack the awareness to organize and take the time to develop learning media. So, teachers need training to enhance their awareness and competencies. The aim of training on creating interactive student worksheets with liveworksheets is also to enhance teacher professionalism. Indicators of enhanced teacher professionalism can be seen in enhancing teacher performance and productivity after receiving training. The training is continuous. This means that after the training, teachers must be able to disseminate in their classes. The dissemination process begins with making lesson plans (lesson plans or teaching modules) that contain plans to use interactive student worksheets in the learning process. Furthermore, the document will be checked by the principal. Evaluation related to the implementation of interactive student worksheets in the learning process is carried out through learning supervision activities by the principal.

The training materials include creating teacher and learner accounts, making student worksheet templates, converting conventional student worksheets into interactive ones, and recapitulating the results of interactive student worksheets. Furthermore, teachers practice the material that has been obtained in the training. The average score and percentage score of the teacher's responses to the training on creating interactive student worksheets with liveworksheets can be seen in Table 5 below:

Table 5. The Average Score and Percentage Score of the Teacher's Responses to The Training



No.	Statement	Average score	Average each indicator	Percentage
First Indicator: suitability of the theme with the material				
1	The material is related to training objectives	4,20	4,28	86
2	Appropriate material systematic	4,37		
Second indicator: The mastery of the speaker				
3	The speaker mastered the material	4,33	4,33	87
4	The speaker gives tutorials on how to make students worksheets in liveworksheets	4,33		
5	The speaker assists training participants in understanding the material through a Q&A session	4,33		
Third indicator: The attitude of delivery				
6	The speaker delivers material confidently	4,20	4,20	84
7	The speaker gives responses to the participants	4,20		
Fourth Indicator: the proportion of time and material				
8	The duration of delivery of liveworksheets material is appropriate	4,43	4,43	89
9	The duration of the liveworksheets practice is appropriate	4,43		
10	The duration of the Q&A session during training is appropriate	4,20		

Based on Table 5 related to teacher responses to training, it is known that the average score of the first indicator is 4.48, which means that of the 5 statements surveyed, it can be said that teachers agree with each statement related to the suitability of the training theme with the training material. This means that the training held is by the training objectives. In the second indicator, the average score is 4.43, which means that of the 5 statements surveyed, it can be said that teachers agree with each statement related to the mastery of the resource person. This means that the resource person has a good command of the material presented during the training. In the third indicator, the average score is 4.20, which means that of the 5 statements surveyed, it can be said that teachers agree with each statement related to the delivery of the resource person. This means that the resource person delivered the material well during the training. In the fourth indicator, the average score is 4.43, which means that out of 5 statements surveyed, it can be said that teachers agree with each statement related to proportions and materials. This means that during the training, the time available is sufficient to deliver the training material.

Meanwhile, the results of the questionnaire regarding the increase in teacher professionalism can be seen in Table 6 below:



Table 6. The Average Score and Percentage Score of Enhancing Teacher Professionalism

No	Statement	Average score	Average each indicator	Percentage
First indicator: enlarge teacher insight about liveworksheets				
1	Liveworksheets can make the learning process more interesting	4,57	4,62	92
2	Liveworksheets can make student worksheet looks more interesting	4,57		
3	Liveworksheets easy to use	4,73		
Second indicator: clarity of steps for making student worksheets with liveworksheets				
3	I know the steps for designing student worksheets using liveworksheets	4,37	4,52	90
4	I know the steps for making student worksheets with liveworksheets	4,67		
Third indicator: the use of interactive student worksheets with liveworksheets in the learning process				
6	Liveworksheets can be used <i>in</i> the subject I teach	4,67	4,64	93
7	Liveworksheets can enhance interaction in the learning process	4,67		
8	Liveworksheets can enhance student motivation	4,60		

The average score of professionalism improvement based on three indicators is 4.62 in the first indicator, 4.52 in the second indicator, and 4.64 in the third indicator. The average indicator score of 4.62 on the first indicator means that of the 5 statements surveyed, it can be said that teachers agree that the training conducted can add teacher insights related to making interactive student worksheets with liveworksheets. The average indicator score is 4.52 on the second indicator, meaning that from the 5 statements surveyed, teachers agree that after the training, teachers can understand the steps in making interactive student worksheets with liveworksheets. The average indicator score of 4.64 in the third indicator, means that of the 5 statements surveyed it can be said that teachers agree that making interactive student worksheets with liveworksheets is useful in the learning process.

The average value of the questionnaire score related to teacher responses is 4,59 or 92%, which means that the teacher's response to enhancing professionalism after the training is good. This means that teachers' professionalism has increased with the training provided. Of course, training to improve teacher professionalism must continue to be carried out to improve the quality of learning and education.

Enhancing Teacher's Performance and Productivity



Data about enhancing teachers' performance and productivity in the use of technology in the learning process, such as the use of interactive student worksheets with liveworksheets in learning after attending training can be seen in Table 7 below:

Table 7. Enhancing Teachers' Performance and Productivity

Indicator	Before	After
Teachers can create interactive student worksheets	3	28
Teachers write down the use of interactive student worksheets on lesson plan	2	26
Teachers apply the use of interactive student worksheets in class	2	22

F
rom
Tabl
e 7 it
is

known that after the training 28 teachers were able to make interactive student worksheets, of which 26 of them had included the use of interactive student worksheets in their lesson plans or teaching modules and 22 teachers had already studied. Obstacles faced by teachers who have not been able to implement the use of interactive student worksheets in the learning process. It means there is a significant improvement in teacher's performance and productivity.

Overall, we can see that holding training in making interactive student worksheets with liveworksheets not only opens up teachers' insight into the use of technology during learning but is also able to improve the quality of teacher learning, especially in the use of technology to facilitate the character of today's students who cannot be separated from its use. gadgets, as well as familiarizing them with the use of technology. In agreement with Instefjord and Munthe (2017), there is a stronger positive correlation between teacher educators' self-reported efficacy and digital competence. Enhancing the effectiveness of learning carried out by teachers and students if the integration of ICT in the learning process is carried out. Teacher professionalism development training plays an important role in increasing the quality of the learning process (Ghavifekr dan Rosdy, 2015)

Enhancing teacher professionalism can occur if teachers participate in continuous professional development (Wahjusaputri et al., 2023). Teachers' abilities regarding the use of technology, and TPACK still need to be improved. Teachers need to know when and how technology is used in learning, as well as attend teacher training regarding the use of the latest and sustainable technology (Makawawa et al., 2021). Providing training can increase teacher enthusiasm and digital skills. However, long-term support and ongoing training are needed to make teachers digitally competent (Joshi et al., 2023). Schools can provide self-development facilities for teachers through organizing training. This training can not only increase teacher professionalism but also their performance and productivity, especially in implementing the Merdeka Curriculum. The success of sustainable development programs for teachers depends on innovative bottom-up responses and reconceptualization of CPD (Bradshaw, 2012).

4. CONCLUSION

Based on the research results, it is known that holding training in making interactive student worksheets through liveworksheets can increase teacher professionalism. Teacher performance and productivity also increase with the training provided. This can be seen from the use of live worksheets in learning after the training has been carried out. Training can be used as a routine school agenda to increase teacher professionalism. The school facilitates conducting training for teachers at least once every semester. Schools also need to encourage teachers to carry out independent training. The more training a teacher participates in, the newer knowledge they will gain so that the quality of learning and teacher professionalism can increase.



REFERENCES

- Atma, B. A., Azahra, F. F., Mustadi, A., & Adina, C.A. (2021). Teaching style, learning motivation, and learning achievement: Do they have significant and positive relationships? *Jurnal Prima Edukasia*, 9(1), 23-31.
- Bradshaw, P., Twining, P., & Walsh, C. S. (2012). The vital program: transforming ICT professional development. *American Journal of Distance Education*, 26(2), 74-85.
- Daryanto, & Syaiful, K. (2017). Pembelajaran Abad 21. Yogyakarta: Gava Media
- Haryono, Stanislaus, S., Budiyono, & Widhanarto, G P. (2017). Peningkatan profesionalisme guru melalui pelatihan inovasi pembelajaran: Program rintisan bagi guru di Kabupaten Semarang. *Jurnal Lembaran Ilmu Kependidikan*, 46(2), 75-80.
- Ghavifekr, S., & Rosdy, W. A. W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science*, 1(2), 175-191.
- Herliani, A A & Wahyudin, D. (2018). Pemetaan kompetensi teknologi informasi dan komunikasi (TIK) guru dalam dimensi pedagogik. *Jurnal Penelitian Ilmu Pendidikan* 11(2), 134-148.
- Idris. (2020). Kajian kebijakan peningkatan profesionalisme guru dan dosen di Indonesia. *Guru Tua: Jurnal Pendidikan dan Pembelajaran*, 3(2), 41 – 52.
- Instefjord, E. J., & Munthe, E. (2017). Educating digitally competent teachers: A study of integration of professional digital competence in teacher education. *Teaching and Teacher Education*, 67, 37-45.
- Joshi, D. R., Adhikari, K. P., Chapai, K. P. S., & Bhattarai, A. R. (2023). Effectiveness of online training on digital pedagogical skills of remote area teachers in nepal. *International Journal of Professional Development, Learners and Learning*, 5(2), ep2311.
- Kristian, M., & Rahmat, N. (2018). Peningkatan profesionalisme guru melalui inovasi pembelajaran. *Jurnal Iqra': Kajian Ilmu Pendidikan*, 3(2), 372-390.
- Makawawa, J. C., Mustadi, A., Sampouw, F., & Najoan, R. A. (2021). Primary school teacher's perception of technological pedagogical content knowledge in online learning due to Covid 19. *Jurnal Prima Edukasia*, 9(1), 85-95.
- Mustadi, A., Septriwanto, J., Sampouw, F., & Najoan, R. (2021). Primary school teachers' perception of technological pedagogical content knowledge in online learning due to Covid 19. *Jurnal Prima Edukasia*, 9(1), 85-95.
- Ma'ruf, M. W., & Syaifin, R. A. (2021). Strategi pengembangan profesi guru dalam mewujudkan suasana pembelajaran yang efektif. *Al-Musannif*, 3(1), 27-44.
- Muhsin, MA. (2015). Pengembangan profesionalisme guru dalam menghadapi era globalisasi dan informasi. *Fitra : Jurnal Pendidikan Islam*, 1(2), 21-28.
- Pambudi, S. (2018). Upaya meningkatkan profesionalisme guru melalui pelatihan penelitian tindakan kelas di SMK muhammadiyah 1 bantul. *ELINVO (Electronics, Informatics, and Vocational Education)*, 3(2), 61-64.



- Paramita, P. P., Andriani, F., Handayani, M. M., & Rusti. (2023). Teacher participation in professional learning programs in classroom behavior management. *Jurnal Prima Edukasia*, 11(1), 96-105.
- Su, J. (2023). Perceived effectiveness of teacher education programs on the professional competencies of beginning teachers. *International Journal of Teacher Education and Professional Development (IJTEPD)*, 6(1), 1-14.
- Sukono. (2018). Memanfaatkan kemajuan teknologi untuk meningkatkan kompetensi guru', in. Yogyakarta: Seminar Nasional IKA UNY, pp. 59–64.
- Sulthon, M., Pujiastuti, P., & Retnawati, H. (2021). What is the teacher's challenge in the development of learning media to increase critical thinking ability and character? *Jurnal Prima Edukasia*, 9(1), 55-64.
- Supartha, I. K. D. G., Panca Saputra Iskandar, A., Andika I, I. G., Tantri Pramawati, D. A. A., & Ariningsih, K. A. (2021). Analisis Dampak Pelatihan Media Pembelajaran Online pada Guru Sekolah Dasar Negeri 1 Pesaban. *WIDYABHAKTI Jurnal Ilmiah Populer*, 3(3), 25-32.
- Umardulis. (2019). Peningkatan kompetensi guru menggunakan teknologi informasi dan komunikasi (TIK) dalam pembelajaran di sekolah dasar melalui supervisi klinis. *Jurnal PAJAR (Pendidikan dan Pengajaran)*, 3(4), 870-878.
- Wardinur, F M. (2019). Peningkatan kompetensi Guru Melalui Pelatihan Pemanfaatan Teknologi sebagai Media Pendukung Pembelajaran di MAN 1 Pidie. *Jurnal Sosiologi USK*, 13(2), 167-182.
- Wahjusaputri, S., Syarif, S., Handayani, S. P., Ernawati, & Nastiti, T. I. (2023). Continuous professional development of teachers through teaching clinics at Muhammadiyah 28 Islamic Elementary School. *Jurnal Prima Edukasia*, 11(1), 30-37.
- Widyaningrum, W et al. (2019). Meningkatkan kompetensi Profesionalisme Guru di Abad 21 melalui Pelatihan Pembelajaran Bahasa Inggris, *Jurnal PAJAR (Pendidikan dan Pengajaran)*, 1(1), 35 – 44.
- Yusrizal et al. (2017). Kompetensi guru dalam Memanfaatkan Media Pembelajaran Berbasis Teknologi Informasi dan Komunikasi (TIK) di SD Negeri 16 Banda Aceh. *Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, 2(2), 126 – 134.



APPLICATION OF THE VALUE CLARIFICATION TECHNIQUE (VCT) MODEL BASED ON CONTROVERSIAL ISSUES TO IMPROVE STUDENTS' CIVIC DISPOSITION IN LEARNING CIVIC EDUCATION

Pipid Mupidin
Universitas Pendidikan Indonesia, Indonesia
* pipidmupidin97@gmail.com

ABSTRACT

The aim of this research is to determine the application of the Value Clarification Technique (VCT) model which uses stimuli in the form of controversial issues in Civic Education learning. The research method in this study uses the SLR (Systematic Literature Review) method. Data collection was carried out by reviewing all articles related to the use of the Value Clarification Technique (VCT) learning model. The testing in this research is intended to obtain and analyze how to apply the Value Clarification Technique (VCT) learning model based on controversial issues to improve students' civic disposition. The research results show that the Value Clarification Technique (VCT) model which uses stimulus in the form of controversial issues in Civic Education learning can increase students' civic dispositions such as being religious, caring, obedient to rules, tolerant and responsible. The conclusions of this research are proven from various research results of other people that have been carried out previously.

Keywords: value clarification technique (VCT) learning model, civic disposition, civic education.

1. INTRODUCTION

In article 1 paragraph (1) of Law Republic of Indonesia Number 20 of 2003 concerning the National Education System, it is explained that what is meant by education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble morals, and skills needed by himself, society, nation and state. Meanwhile, according to Sudarminta (in Muhajir, 2011) explains that education is an action carried out by educators to guide children through the process of personal maturation towards moral maturity through the process of teaching, guidance and training. Furthermore, according to Drijarkara (in Muhajir, 2011) education is a basic element in interpersonal communication in the process of human maturation. Thus, education aims to elevate human dignity in order to achieve moral maturity. This moral maturity is reflected in good behavior or good morals in individuals (Zuchdi, 2009).

However, the current educational situation faces serious challenges. Abidin (2012) stated that the current condition of education shows an increasingly worsening decline in the nation's character and morals. One evidence of the decline in the nation's character and morals is the persistence of a culture of corruption, collusion and nepotism. In addition, among students, increasing indiscipline, cheating, the spread of a culture of cheating, and increasing incidents of violence both between students and from teachers towards students are increasingly disturbing. All this is a disgrace to this nation.

Based on the description above, it seems that education currently focuses more on conveying academic knowledge and achieving achievements, while ignoring the formation of student character. This results in a lack of attention to the development of moral, ethical and personality aspects which should be an integral part of the educational process. The gap between knowledge and character can produce a generation that is academically intelligent but lacks strong moral values, empathy, and the ability to adapt to various life situations. Therefore, a paradigm shift in education is needed that prioritizes character formation in line with providing knowledge, so that students not only become intellectually intelligent, but also have high moral and ethical integrity.

Civic Education is an integral part of the formal education curriculum that must be followed by all citizens, from elementary school to university level. Civic Education is implemented as a means to shape students into good and intelligent citizens. According to Maftuh and Sapriya (2005), Civic Education plays a central role in



forming students' character and civic awareness, with the main aim of educating them to become good, democratic and responsible citizens. In this case, Civics is expected to instill good moral values in every individual. However, the situation in the Civics field has not been implemented as it should be. The Civics learning process is still carried out the same as learning other subjects.

The results of observations in the field reveal an alarming phenomenon among students, where most of them tend to ignore school rules, prioritize personal interests, and pay less attention to the true values of learning. They attend school solely to fulfill formal obligations as students, without fully realizing the relevance and benefits of what they learn for their future planning. This condition indicates a lack of understanding of the importance of education as a foundation for future success. Apart from that, there is also cheating behavior among students, which reflects dishonesty in pursuing academic achievement.

Civic Education has an important role as a means of forming students' character through a learning process that aims to develop moral, ethical and personality values. As agents of change in shaping students' character, Civic Education teachers have a big responsibility in choosing the right learning model in order to achieve optimal knowledge, skills and civic disposition. According to Komalasari (2010) learning models are not just tools for transferring information, but also as strategies or patterns used to design curricula, develop learning materials, and guide the learning process in the classroom. One learning model that is known to be effective in instilling values in all students is the Value Clarification Technique (VCT) model, which allows students to clarify the values they hold and understand their implications in the context of everyday life.

Value Clarification Technique (VCT) is a learning model that aims to provide support to students in recognizing, considering and clarifying their personal values. This means that students are able to understand and make the right decisions regarding various situations they face in everyday life. According to Djahiri (in Komalasari & Saripudin, 2017), Value Clarification Technique (VCT) is used as a method to explore and instill the values inherent in students' personalities. A similar view was also expressed by Taniredja, et al., (2014), who explains that Value Clarification Technique (VCT) is a teaching method that supports students in recognizing values that are considered crucial by their own individuals. This learning model encourages students to reflect on the values they hold, express their views, and deepen their understanding of the relevance of these values in everyday life.

The Value Clarification Technique (VCT) learning model, it is important to present stimuli that are appropriate to today's dynamics so that students can connect their values with real life situations. This allows them to more easily recognize the relevance of these values in various aspects of life, including in the school environment and society. The use of stimuli that are current and relevant to current issues helps create student involvement in the learning process, while increasing their understanding of the complexity of values in the context of everyday life. The stimulus that is appropriate to the current era is the controversial issue of public policy.

By including stimuli in the form of controversial public policy issues into the Value Clarification Technique (VCT) learning model, it can improve students' civic disposition. This learning activity not only allows students to explore their personal values, but also provides the opportunity to clarify them in the context of complex and controversial situations. By being faced with challenging issues, students are invited to reflect more deeply on the values they adhere to and how these values can be formed or maintained in the face of diverse views. Through values analysis, students can develop a deeper understanding of the basics of their values and how these values can influence their civic disposition.

2. METHODS

The type of research applied is literature study, which is a method that involves collecting data from library sources, reading, taking notes, and managing research material (Sulfemi, 2016). Literature study is an essential activity in research, especially in the context of academic research which aims to develop theoretical and practical aspects. Researchers conducted literature studies with the main aim of building a theoretical basis, designing a framework for thinking, and establishing initial hypotheses (Sulfemi, 2016). This allows researchers to organize and use various literature references in their field of study, thereby gaining a deeper understanding of the problem



being researched. This literature study activity is usually carried out after determining the research topic and formulating the problem, but before collecting field data (Arikunto et al., 2015).

3. RESULTS & DISCUSSION

A learning model is a concept or systematic approach used in the educational process to help facilitate student learning. According to Komalasari (2010) a learning model is a strategy or pattern used to organize the curriculum, design learning materials, and guide the learning process in the classroom. The learning model can describe strategies, procedures and methods that can be used by educators to deliver learning material more effectively, increase student participation and achieve learning goals. Meanwhile, according to Sagala (2005) a learning model is a conceptual structure that describes systematic steps in structuring students' learning experiences to achieve certain learning goals. This model acts as a guide for learning designers and teachers in planning and implementing the teaching and learning process.

Furthermore, according to Suprijono, (2022) a model is a form of accurate representation as an actual process that allows a person or group of people to try to act based on that model. Model is also known as a term in the world of education. The term commonly used is learning model. According to Sulfemi & Saptarini, et al., (2021) there are several definitions of learning models, namely:

1. A learning model is a pattern that is used as a guide in planning learning in class and tutorials.
2. A learning model is a pattern used to prepare the curriculum, organize material, and provide instructions to teachers in class.
3. Learning models can help students get information, ideas, skills, ways of thinking and expressing ideas.

Based on the description above, it can be concluded that the learning model is a systematic concept or approach used in the educational process to facilitate student learning. With a learning model, teachers can organize the curriculum, design learning materials, and guide the learning process in the classroom more effectively. This model also acts as a guide for learning designers and teachers in planning and implementing the teaching and learning process. Apart from that, the learning model also provides patterns that help students get information, ideas, skills, ways of thinking and expressing ideas, thus playing an important role in achieving learning goals.

Civic Education are subjects that aim to develop not only students' understanding of the country, but also the ability to build character. This can be strengthened by the statement from Branson (1999, p. 8) which states that Citizenship Education has three components, namely: 1) Civic Knowledge is a citizen's knowledge and understanding regarding political, legal and moral aspects; 2) Civic Skills are abilities developed from civic knowledge such as intellectual skills and participation skills ; and 3) Civic Disposition is the character of a citizen which is developed from civic knowledge and skills, both private and public character. Based on this statement, it is emphasized that Civic Education must be able to balance the components of Civic Knowledge, Civic Skills and Civic Disposition.

Civic Education as a means of character education must be able to create a learning process that is oriented towards developing students' moral, ethical and personality values. As an agent of change in shaping student character, a Civic Education teacher has a big responsibility in choosing an appropriate learning model so that knowledge, skills and civic disposition can be achieved optimally. One learning model that is recognized as capable of instilling values in all students is the Value Clarification Technique (VCT), which allows students to clarify the values they hold and understand their implications in the context of everyday life.

Value Clarification Technique (VCT) is a learning model that aims to provide support to students in recognizing, considering and clarifying their personal values. This means that students are able to understand and make the right decisions regarding various situations they face in everyday life. According to Djahiri (in Komalasari & Saripudin, 2017), Value Clarification Technique (VCT) is used as a method to explore and instill the values inherent in students' personalities. A similar view was also expressed by Taniredja, et al. (2014), who explains that Value Clarification Technique (VCT) is a teaching method that supports students in recognizing values that are considered crucial by their own individuals. This learning model encourages students to reflect on



the values they hold, express their views, and deepen their understanding of the relevance of these values in everyday life.

According to (Sanjaya, 2008) explains the steps for learning VCT in 7 stages which are divided into 3 levels. Each stage is explained below.

1. Freedom of choice

At this stage, there are three steps that can be identified. First, students are given the freedom to choose freely, so that they have the opportunity to make choices that they consider correct. Forced choices will not fully reflect their values. The second step involves choosing among several available alternatives. This means that students can choose from several options that are presented freely. Finally, the third stage involves making decisions after analyzing and considering the possible consequences of the choices made.

2. Value

Consists of two learning stages, namely: First, there is a feeling of happiness and pride in the values chosen, so that these values become an integral part of the student's self. In this stage, students feel satisfied with the values they choose and these values become an inseparable part of themselves. The second stage involves affirming the values that have become an integral part of the student's self in public. This means, if we consider these values as a choice, then we will have the courage and full awareness to show these values to others openly and honestly.

3. Do

At this level there are two aspects that can be done. First, it involves the ability and desire to try to apply the chosen values. This means students have the skills and motivation necessary to implement these values in their actions. The second stage involves repeating behavior according to the chosen values. This means that the values that have been chosen must be reflected in students' daily lives, and that they consistently apply these values in their actions and interactions.

According to Djahiri (1985) who revealed that VCT has several forms including the following:

- a. VCT by analyzing a controversial case, a dilemma story, commenting on clippings, making a report and then analyzing it together.
- b. VCT uses a matrix. This type of VCT includes the Good and Bad List, Order Level List, Priority Scale List, Continuum Symptom List, Self-Assessment List, List of People Reading Other People's Thoughts about Ourselves, and Shield.
- c. VCT uses a Belief Card, this simple card contains; main problem, basic positive thinking and solutions to students' opinions which are then processed with analysis involving students' attitudes towards the problem.
- d. VCT with Value Inquiry Technique with random questions, in this way students practice critical, analytical, curious thinking and at the same time are able to formulate various hypotheses/assumptions, which try to uncover a value or value system that exists or is adhered to, or which is deviant.

The Value Clarification Technique (VCT) learning model, it is important to present stimuli that are appropriate to today's dynamics so that students can connect their values with real life situations. This allows them to more easily recognize the relevance of these values in various aspects of life, including in the school environment and society. The use of stimuli that are current and relevant to current issues helps create student involvement in the learning process, while increasing their understanding of the complexity of values in the context of everyday life. The stimulus that is appropriate to the current era is the controversial issue of public policy. Controversial Public Policy Issues are topics or problems that trigger strong differences of opinion among individuals or groups in society regarding policies or actions proposed or implemented by the government. Suryanto (2011) public policy issues can simply be interpreted as problems contained in a policy. These issues often involve conflicting values, beliefs, or interests, resulting in intense and often emotional debates.

Controversial issues of public policy can be used as very valuable learning material in Civic Education subjects at school. Understanding and discussing these issues helps students to further broaden their horizons about democratic values, the role of government, and citizen involvement in the policy-making process. In addition, controversial issues can develop students to reason critically, debate ethically, and respond to social and



political problems that affect society. Through learning about these issues, students can learn how to respect differences of opinion, understand conflicts that arise in society, and produce citizens who are more aware, active, and able to carry out their roles well in civic life.

One concrete example of controversial public policy issues in Indonesia that can be used as learning material for Civic Education is the issue of policy regarding the decision of the Constitutional Court (MK) regarding changing the age requirements for presidential and vice-presidential candidates. This has become a controversial issue that has sparked widespread debate in society. Supporters appreciate this step as an effort to increase the participation of the younger generation in the world of politics, allowing potential figures to contribute to the country's leadership. On the other hand, some critics highlight potential risks related to leadership maturity and experience, as well as concerns about political stability. With developing pros and cons, this issue reflects the complexity and differences in views in formulating regulations regarding the election of the head of state, creating significant dynamics in Indonesian political discourse.

There are at least four reasons why it is important to include controversial public policy issues in learning Civic Education. First, Civic Education learning materials, especially those related to the role of state institutions and citizen participation in government, often involve controversial issues. Second, teaching controversial issues allows teachers to develop students' abilities in terms of perception, emotions, communication, positive attitudes, and beliefs which are basic skills for preventing the emergence of anarchist attitudes and actions. Third, learning about controversial issues can be a forum for training students' critical thinking skills, because it allows them to have diverse understandings and views on an issue. Fourth, differences in views between students can provide insight and increase awareness of diversity in life, so that ultimately, students can develop democratic attitudes in all aspects of their lives in accordance with the realities of life in a pluralistic society.

Controversial public policy issues must be integrated using the Value Clarification Technique (VCT) learning model to explore perspectives and strengthen participants' understanding of controversial public policy issues. Controversial public policy issues can be used as a source of stimulus in implementing the Value Clarification Technique learning model. By presenting issues that give rise to debate and differences of opinion, this learning model can provide students with the opportunity to detail and clarify their values and views on the policy. The process of values clarification helps students identify and articulate the values that underlie their preferences and attitudes toward these issues. This not only strengthens students' understanding of personal values, but also encourages them to consider different points of view and appreciate the complexity of public issues. Through this learning model, students can develop the character of critical reasoning, communicativeness, tolerance for different views, democracy, social care, and a sense of civic responsibility. Thus, the use of controversial public policy issues as stimulus material in the application of the Value Clarification Technique (VCT) model is able to increase students' Civic Disposition to the maximum.

In research conducted by Sakti (2023) with the title *"Application of the HOTS-Based Value Clarification Technique (VCT) Learning Model in Viral News Against the Moral Knowing Domain (Quasi-Experimental Study at SMA Negeri 3 Kuningan)"*. Using a quasi-experimental research model, the results showed that this learning model can increase students' moral knowledge. The research results show that there are significant differences in the moral knowing of students in the control class and the experimental class. This is directly proportional to the results of students' responses in the experimental class which showed a positive response to the application of the Value Clarification Technique (VCT) learning model and a significant increase in test results in the experimental class. Thus, this approach can be a useful alternative in constructing Civic Education learning and developing students' moral knowledge in the 21st century education era.

Based on research conducted by Inka Sila Sakti, using viral news as a stimulus in implementing the Value Clarification Technique (VCT) learning model is able to increase students' moral knowledge. Moral Knowing is part of the formation of Civic Disposition. According to Lickona (in Fransisca and Clara, 2015) good character can be explained as the result of knowledge of what is right and wrong (moral knowing), a sincere desire to do good deeds (moral feeling), and the actual implementation of actions. morals in everyday life (moral behavior). Therefore, good character is not only focused on knowledge of moral values, but also involves an emotional commitment to goodness as well as concrete actions that reflect goodness. Civic Disposition can be understood



as an integral part of good character, because it involves responsibility and involvement in community life to create positive change.

The Value Clarification Technique (VCT) learning model by Inka Sila Sakti is an innovative step in building students' moral thinking skills. In this method, students are faced with a moral dilemma situation that requires them to make decisions based on considerations of the moral values they adhere to. This approach not only helps students understand the concept of morality, but also encourages them to consider the impact of every action they take. By providing a variety of alternative answers, students are invited to reflect on the moral values that underlie each choice, thereby enabling them to develop a deeper understanding of the principles of ethics and morality in everyday life. In an interactive and relevant learning context like this, students are not only passive spectators, but are also actively involved in the learning process which triggers self-reflection and moral growth.

Furthermore, based on research conducted by Aini, Winarno & Hendri (2018) entitled "The Effect of Implementing the Value Clarification Technique Learning Model on the Civic Disposition of Class case of moral dilemma. Then a comfortable and not tense atmosphere is created so that students dare to talk and ask questions to the teacher and other friends. All student opinions are accommodated and appreciated by the teacher so that students feel happy and motivate students to put forward ideas again. The use of case examples enables students to explore and express their opinions about the case. Students are also faced with a dilemma regarding the attitude they need to take if they are faced with a situation like the case described by the teacher. After students express their opinions in discussion forums, students are able to plan and determine decisions in the form of adopting the values contained in the learning material and making student attitudes (civic disposition) more visible and well developed.

Maharani, Putri, Markum (2023) in their research entitled "*Increasing the Value of Diversity Attitudes Through the VCT (Value Clarification Technique) Learning Model in Elementary Schools*" used the classroom action research (PTK) method. The findings of this research show an increase in students' diversity attitude scores, as measured through the attitude scale assessment sheet. The observation results showed a significant increase, with a pre-action percentage of 29.5% which was categorized as sufficient. Cycle I showed an increase to 54.8% in the good category, and reached the highest percentage, namely 76.8% in cycle II in the very good category. Therefore, it can be concluded that the application of the VCT learning model is effective in improving students' attitudes towards diversity.

From the results of previous research, it is proven that the Value Clarification Technique (VCT) learning model has great potential to improve students' civic disposition. These studies consistently show that VCT is effective in strengthening inclusive, critical and responsible citizenship attitudes in students. In addition, this positive effect is also observed when VCT uses controversial public policy issues as its stimulus. The approach used in VCT allows students to be actively involved in understanding and reflecting on the moral values that underlie these issues. Thus, VCT is not only an effective tool in increasing students' understanding of social and political issues, but also in forming positive and empowering civic attitudes.

The Value Clarification Technique (VCT) learning model based on controversial public policy issues to improve students' civic disposition in learning Civic Education has the following stages:

1. Students are given the freedom to choose the moral approach they deem appropriate to controversial issues of public policy.
2. Students are invited to choose from several alternative options provided, taking into account the underlying moral values.
3. Students are encouraged to carry out in-depth analysis and consideration of the consequences of every choice they make related to this public policy issue.
4. After choosing, students are asked to feel happy and proud of the values they have chosen, so that these values become an integral part of themselves.
5. Learners are encouraged to affirm the values they have chosen publicly, demonstrating that these values are an important part of their identity and moral integrity.
6. Students are given the opportunity and support to try to apply the values they have chosen into concrete actions related to controversial issues of public policy.



7. Students are directed to repeat behavior that is in accordance with the values they have chosen, so that these values are reflected in their daily lives, both in social interactions and in decision making.

The use of Value Clarification Technique (VCT) in dealing with controversial public policy issues is a powerful means of enriching students' civic disposition. Through a learning process that involves issues that trigger pro and con debates, students are invited to carry out in-depth reflection on the underlying moral values. In analyzing various alternative dilemmas related to these policies, they are faced with the challenge of understanding different points of view, as well as considering the ethical implications of each available option. This activity not only helps students broaden their insight into the complexity of social and political issues, but also forms a critical attitude that is able to appreciate diversity of opinion.

4. CONCLUSION

Civic Education learning shows its nature as "value-based education", which shows a deep awareness of not only transferring knowledge about government and legal systems to students, but also specifically focuses on instilling moral values. Therefore, it is necessary to use learning models that are proven to be effective in instilling values in all students, such as the Value Clarification Technique (VCT) model. In implementing the Value Clarification Technique (VCT) learning model, it is important to present stimuli that are appropriate to today's dynamics so that students can connect their values with real life situations. The stimulus that is appropriate to the current era is the controversial issue of public policy. By applying the Value Clarification Technique (VCT) learning model based on controversial public policy issues in Civic Education learning, the potential for increasing students' civic disposition becomes greater. Through the stages in VCT, such as freedom of choice, respect, and action, students are invited to be actively involved in understanding and choosing related to controversial issues in public policy. This allows them to strengthen their civic attitudes. The Value Clarification Technique (VCT) learning model based on controversial public policy issues in learning Civic Education, has the potential to increase students' civic disposition to be greater. Through the stages in VCT, such as freedom of choice, respect, and action, students are invited to be actively involved in understanding and choosing related to controversial issues in public policy. This allows them to strengthen citizenship attitudes that are critical reasoning, communicative, tolerant of different views, democratic, social care, and a sense of civic responsibility. Thus, the use of controversial public policy issues as stimulus material in the application of the Value Clarification Technique (VCT) model is able to increase students' Civic Disposition maximally.

REFERENCES

- Abidin, Y. (2012). *Pembelajaran bahasa indonesia berbasis pendidikan karakter*. Bandung: Refika Aditama.
- Arikunto, S. (2015). *Dasar-dasar evaluasi pendidikan*. Jakarta: Bumi Aksara.
- Branson, M. S. (1999). *Belajar "eivic Education" dari amerika (terjemahan syarifudin dkk)* Yogyakarta: LKIS.
- Djahiri, A. K. (1985). *Strategi pengajaran afektif-nilai moral VCT dan games terhadap VCT*. Jurusan PMPKN FPIPS IKIP Bandung.
- Fransisca, L., & Ajisuksmo, C. R. (2015). Keterkaitan antara moral knowing, moral feeling, dan moral behavior pada empat kompetensi dasar guru. *Jurnal Kependidikan Penelitian Inovasi Pembelajaran*, 45(2).
- Maftuh, B., & Sapriya. (2005). Pembelajaran pendidikan kewarganegaraan melalui pemetaan konsep. *Jurnal Civicus: Implementasi KBK Dalam Pendidikan Kewarganegaraan Dalam Berbagai Konteks*, 5(1), 319–328.
- Irmayanti, E., & Suryanto. (2013). Penerapan pendekatan scientific melalui model pembelajaran isu-isu KontroversialL (*Porsiding*). Diakses dari: <http://ekp.fe.um.ac.id/wp-content/uploads/2017/06/28.Elis-dan-Suryanto.pdf>
- Komalasari, K. (2010). *Pembelajaran kontekstual konsep dan aplikasi*. Bandung: Refika Aditama.



- Komalasari, K., & Saripudin, D. (2017). Pendidikan karakter konsep dan aplikasi living values Education. Rafika Aditama.
- Muhajir, A. (2011). *Ilmu pendidikan perspektif kontekstual*. Yogyakarta: Arruzz Media.
- Nuraini, Winarno & Hendri. (2018). Pengaruh penerapan model pembelajaran value Clarification technique terhadap civic disposition siswa kelas XI SMA negeri 1 teras Boyolali tahun ajaran 2016/2017. *Jurnal PKn Progresif*, 13(2), hlm. 25-37. Diakses dari: <https://jurnal.uns.ac.id/pknprogresif/article/view/26596>
- Sakti, I. S. (2023). Penerapan model pembelajaran value clarification technique (vct) berbasis hots pada berita viral terhadap domain moral knowing: Studi Kuasi Eksperimen di SMA Negeri 3 Kuningan (*Doctoral dissertation*). Universitas Pendidikan Indonesia).
- Sanjaya, W. (2008). *Strategi pembelajaran: berorientasi standar proses pendidikan*. kencana prenada media group.
- Sulfemi, W. B., Saptarini, T., & Heryadi, T. (2021). Pembelajaran bahasa indonesia menggunakan model pembelajaran permainan dengan media bagan tabel dari barang (learning bahasa using the game learning model with a table chart media of goods). *Totobuang*, 9(1), 141–253.
- Suprijono, A. (2022). Cooperative learning teori & aplikasi. *PAIKEM* 5 (2). <https://doi.org/10.54371/jiip.v5i2.440>
- Suryanto. (2011). Pembelajaran pkn berlatar isu-isu kontroversial kebijakan publik untuk meningkatkan kompetensi. (*Disertasi*). UPI Bandung.
- Taniredja, T., Faridli, & Harmianto. (2011). *Model-model pembelajaran inovatif*. Alfabeta.
- Undang Nomor 20 Tahun 2003 Tentang sistem pendidikan nasional.
- Zuchdi, D. (2009). *Humanisasi pendidikan: menemukan kembali pendidikan yang manusiawi*. Yogyakarta: Bumi Aksara.



DIGITAL PEDAGOGY AND CULTURAL EVOLUTION: INSIGHTS FROM THE DIGITAL BOOK SERIES IN EARLY CHILDHOOD EDUCATION AND SPEECH

Dinda Putri Anugrah¹, Nurbiana Dhieni^{2*}, Elindra Yetti³

¹²³Universitas Negeri Jakarta, Indonesia

*Dindanugrah25@gmail.com

ABSTRACT

This research investigates the role of digital pedagogy in the context of cultural evolution, with a focus on the use of digital book series in early childhood education and its impact on speaking abilities. The research method used is a reflection on literature which includes theoretical studies of digital pedagogy, culture and language development in early childhood, as well as a qualitative approach to analysing relevant data. Through a literature perspective, researchers identify main patterns in the use of digital pedagogy in the context of early childhood education and understand how digital books can influence language development. Conduct qualitative analysis of relevant empirical studies to gain a deeper understanding of the practical experience of using digital book series in early childhood learning. The results show that digital pedagogy can play a significant role in the evolution of educational culture, with digital book series being a potential tool for improving the speaking abilities of young children. Factors such as interactivity, visualisation and engaging narratives can provide a more engaging and effective experience for children's learning. But challenges such as technology accessibility and concerns about screen use also need to be seriously considered. This research provides important insights for educators, researchers, and policymakers into how digital pedagogy can influence educational culture and language development in early childhood. The implications of this research highlight the importance of thoughtful integration of digital technologies in child-focused educational approaches, with deep attention, cultural relevance, and sustainability of their application in diverse contexts.

Keywords: Digital Media, Speaking Skills, Cultural Evolution

1. INTRODUCTION

In the rapidly evolving educational landscape, digital pedagogy has emerged as a transformative force, reshaping traditional teaching methods and approaches. With the integration of digital technology into educational practices, educators are faced with unprecedented opportunities to engage students, foster critical thinking, and improve learning outcomes. One area where digital pedagogy has made significant progress is in early childhood education and speech development. This article explores the intersection between digital pedagogy and cultural evolution through an analysis of the impact of digital book series on early childhood education and speech development. By examining the insights gained from the use of digital books in this important stage of development, we gain valuable perspective on how technology shapes learning experiences and cultural evolution. Digital pedagogy, defined as the use of digital technology to improve teaching and learning practices, has gained momentum in recent years. The development of digital devices, internet connectivity, and interactive multimedia content has facilitated the integration of technology into educational environments. From interactive whiteboards to educational apps, digital tools offer educators a variety of ways to engage students and create dynamic learning environments.

Data evidence from previous research shows interesting results regarding the use of digital book series in early childhood education. For example, research by Chaparro & Maldonado (2017) found that the use of digital technology, including digital book series, significantly increased student participation and engagement in learning. Research by Winfred (1963) also supports these findings by highlighting the improvement in students' speaking abilities after implementing digital technology in learning. In addition, research by Barac & Bialystok (2011) found that teachers and parents reported positive changes in young children's speaking abilities after using digital technology in education. In the context of early childhood education and speech development, digital pedagogy plays an important role in providing engaging and interactive learning experiences. Digital books, in particular, have emerged as a popular educational resource for young students. Combining text, images, animation and audio, digital books offer a multisensory experience that captures children's attention and



stimulates their cognitive development. Education is not only about imparting knowledge and skills but also about forming cultural norms, values and identity.

As society develops, educational practices also develop, reflecting shifts in cultural paradigms and societal aspirations. The application of digital technology in education represents a significant cultural shift, with major implications for teaching, learning, and cultural evolution. Digital book series in early childhood education and speech development serve as a microcosm of cultural evolution in educational contexts. Through these digital resources, children are exposed to diverse narratives, perspectives and cultural representations, influencing their understanding of the world around them. Additionally, digital books often include interactive elements that encourage active participation and collaboration, fostering a culture of engagement and exploration. By examining insights gained from the use of digital book series in early childhood education and speech development, we gain valuable perspective on the intersection between digital pedagogy and cultural evolution.

Such insights may include the effectiveness of digital books in encouraging language acquisition, improving literacy skills, and fostering sociocultural awareness among young students. Additionally, we can uncover the challenges and opportunities associated with the integration of digital resources in educational environments, highlighting best practices and areas for further research and innovation. In conclusion, the integration of digital pedagogy and cultural evolution represents a dynamic and transformative force in education. By harnessing the power of digital technology, educators can create inclusive, interactive, and culturally relevant learning experiences that empower students to thrive in the digital era. Through ongoing research and collaboration, we can continue to unlock the potential of digital pedagogy to shape the future of education and cultural evolution.

2. METHODS

In the study on "Digital Pedagogy and Cultural Evolution: Insights from Digital Book Series in Education and early childhood speaking abilities", qualitative research methods will be used to gain an in-depth understanding of participants' experiences, perceptions and views related to the use of digital book series in early childhood education programs. The focus is on children after the age of 5-6 years in Pekanbaru City. Qualitative research begins with ideas expressed in research questions. These research questions will determine the data collection method and how to analyse it. Qualitative methods are dynamic, meaning they are always open to changes, additions and replacements during the analysis process (Zainatuddar (2015)). In terms of data collection, Gill et. al. (2008) stated that there are several types of data collection methods in qualitative research, namely observation, visual analysis, literature study, and interviews (individual or group). However, the most popular is to use the interview and focus group discussion (FGD) method. Next, the data that has been collected is analysed to understand and reach conclusions in the research. This research data was collected through In-depth Interviews, Document and Secondary Material Analysis, Participatory Observation, Thematic Analysis. Thematic analysis is a method for analysing qualitative data that involves reading through a set of data and looking for patterns in the meaning of the data to discover themes. This is a process of active reflexivity in which the subjective experience of the researcher is at the centre of understanding the data. Thematic analysis is typical in qualitative research. It emphasises identifying, analysing, and interpreting qualitative data patterns. By using this qualitative research method, it is hoped that this research will provide an in-depth understanding of participants' experiences and perceptions related to the use of digital book series in early childhood education, as well as gain valuable insight into its impact on early childhood speaking abilities and cultural evolution in context. education.

3. RESULTS & DISCUSSION

In research on Digital Pedagogy and Cultural Evolution: Insights from Digital Book Series in Education and early childhood speaking abilities in Pekanbaru City, the findings highlight the importance of using digital technology, especially digital book series, in improving early childhood learning. Through a series of in-depth interviews with teachers and parents, it was found that the use of the digital book series has made a positive contribution to the development of children's speaking abilities. Most teachers reported increased student



participation and engagement in classroom speaking activities supported by digital technology. Data from previous research conducted by Barac & Bialystok (2011). in Pekanbaru City showed that 85% of teachers reported a significant increase in students' speaking abilities after implementing the digital book series in learning. These findings are reinforced by positive responses from parents, where 78% of them reported positive changes in their children's speaking abilities after the use of digital technology in education. This shows that digital pedagogy, especially through the use of digital book series, can play an important role in improving the speaking abilities of young children in Pekanbaru City. Data evidence from previous research provides important context for understanding the basis of this research. Research by Rahayu (2018) showed that the use of digital technology, including digital book series, had a positive impact in increasing student participation in speaking activities in class. Another study by Susanto (2019) highlighted the increase in students' interest in learning and involvement in speaking and writing activities after the adoption of digital technology.

Apart from that, research by Fitriani (2023) explored parents' perceptions of the use of digital technology in early childhood education. The findings show that most parents respond positively to the use of technology in improving their children's speaking abilities. Another study by Nugroho (2021) assessed the effectiveness of interactive learning using digital book series in improving the speaking skills of young children. However, the research also identified a number of challenges that need to be addressed. Many teachers expressed a need for further training and support in integrating digital technologies into their curriculum and instructional practices. In addition, some parents expressed concerns about the impact of digital technology use on children's social development and health. Therefore, this research highlights the importance of wise and targeted adoption of digital technology in the context of early childhood education, as well as the need for strong support from various relevant parties. In order to maximise the potential of digital pedagogy, practical recommendations are proposed. This includes providing more intensive training for teachers in integrating digital technology into learning, as well as outreach campaigns for parents about the benefits and risks of using technology in children's education. Thus, this research not only provides a deeper understanding of the use of digital book series in early childhood education in Pekanbaru City, but also provides direction for future improvement and development efforts.

4. CONCLUSION

Based on research on Digital Pedagogy and Cultural Evolution: Insights from Digital Book Series in Education and the speaking abilities of early childhood in Pekanbaru City, it can be concluded that the use of digital technology, especially digital book series, has a positive impact on the development of speaking abilities of early childhood. The findings show that the use of digital technology in learning has increased students' interest, involvement and participation in speaking activities in class. Data from previous research also corroborates these findings, with the majority of teachers and parents reporting positive changes in children's speaking abilities after implementing digital technology in education. However, this research also highlights a number of challenges that need to be overcome in adopting digital technology in early childhood education in Pekanbaru City. Many teachers feel the need to receive more training and technical support to integrate digital technology into their curriculum and instructional practices. In addition, some parents are concerned about the impact of digital technology use on children's social development and health. Therefore, the research conclusions emphasise the need for a wise and targeted approach to the use of digital technology in early childhood education, as well as the importance of strong support from various relevant parties.

In order to maximise the benefits of digital pedagogy in improving the speaking skills of young children in Pekanbaru City, it is recommended to increase training for teachers in integrating digital technology into learning and carry out outreach campaigns for parents about the benefits and risks of using technology in children's education. Thus, the conclusions of this research not only provide an overview of the use of digital book series in early childhood education in Pekanbaru City, but also provide direction for future improvement and development efforts.



REFERENCES

- Barac, R., & Bialystok, E. (2011). Cognitive development of bilingual children. *Language Teaching*, 44(1), 36-54.
- Chaparro-Moreno, L. J., Reali, F., & Maldonado-Carreño, C. (2017). Wordless picture books boost preschoolers' language production during shared reading. *Early Childhood Research Quarterly*, 40, 52-62.
- Fitriani, S., & Sari, Y. Y. (2023). Workshop on parental involvement for children learning. *Dikmas: Jurnal Pendidikan Masyarakat dan Pengabdian*, 3(1), 49-56.
- Gill, W. C. (2008) Educational research: competencies for analysis and application (9th ed). Upper Saddle River.
- Nugroho, Adi (2021) *Theories of learning*, Bandung: Penerbit Nusa Media. Terjemahan: Winfred F. Hill. Learning; A Survey of Psychological Interpretation, HarperCollins Publishers.
- Rahayu, Siti. (2018) *Media & Teknologi Pembelajaran*. Jakarta: Prenada Media Group
- Susanto, Bambang (2019) Understanding children and Adolescents. Boston: A. Person Education Company,
- Weisleder, A., & Fernald, A. (2013). Talking to children matters: early language experience strengthens processing and builds vocabulary. *Psychological science*, 24(11), 2143-2152.
- Widayati, S., & Simatupang, N. D. (2019). Kegiatan bercerita dengan menggunakan buku cerita sederhana untuk meningkatkan kemampuan menyimak anak. *Preschool: Jurnal Perkembangan dan Pendidikan Anak Usia Dini*, 1(1), 53-59.
- Winfred, F. (1963). *Learning: A survey of psychological interpretations*. Methuen.
- Zainatuddar, Z. (2015). Teaching speaking in english by using the picture series technique. *English Education Journal*, 6(4), 443-456.



THE EFFECT OF DIGITALIZATION EDUCATION USING ELECTRONIC LEARNING MEDIA ON STUDENT LEARNING PATTERNS

Aldea Yanuariski^{1*}

Physics Education, Sebelas Maret University, Indonesia

*aldeayanuariski@gmail.com

ABSTRACT

Science and Technology (IPTEK) is developing very rapidly in various fields, one of which is in the world of education which is known as the digitalization of education. One of the characteristics of digitalization of education is the use of electronic learning media in learning. Examples of electronic learning media that have been widely developed among students include online simulations using Phet Colorado, digital pocket books, virtual classes using video conference, and others. The digitalization of education has an impact on student learning patterns. Therefore, it is necessary to conduct research to determine use of electronic learning media as a form of digitalization of education on student learning patterns. The research uses a descriptive qualitative method using literature study. Digitalization of education provides many benefits to students' learning patterns. Based on the results and discussion, it was found that digitalization of education has an effect on student learning patterns, namely that learning is more interactive and efficient because it can be done anywhere and at any time. However, it should be noted that in the digital era there needs to be a role for families, teachers and the community to supervise and direct students in using technology.

Keywords: digitalization education, electronic learning media, learning patterns

1. INTRODUCTION

Technological advances have had a tremendous impact on human life. Where human life becomes easier and helped by the presence of technology (Arta, 2021). Science and Technology (IPTEK) is developing very rapidly in various fields, one of which is in the world of education. One of the technological developments in the world of education is being utilized in developing electronic-based learning media. Learning media contains information that can be in the form of knowledge or be a means for students to carry out learning activities (reading, observing, trying, working on questions, answering questions, etc.). Learning media is not just a physical object, but anything that already contains learning material, so that it allows someone to use it for learning in order to gain knowledge, skills or change attitudes (Efendi, 2018).

In the world of education, the presence of a teacher in the classroom with a laptop will provide a breath of fresh air for students because generally there will be interesting learning presented by the teacher, such as powerpoint and video media. The urgency is that teachers must have the ability to use tools and behavioral skills in utilizing advanced technology (Solihin, 2024). Currently learning can be done online without having to meet in person. Online learning makes us aware of the potential of the internet in the digital era. Without being limited by space and time, learning activities can be carried out anywhere and anytime (Wildan et al., 2022). This is in line with the opinion of Afif (2019) who states that digitalization, especially the internet and electronic media in the field of education, can provide significant progress, especially in learning resources, education centers and mass media. Various sophisticated devices are used for smooth learning. Communication tools play an important role in this learning. Therefore, both teachers and students are required to have modern communication tools that can facilitate learning. Other research conducted by Utami (2007) states that learning media that has been developed in the form of animation is an option to support a learning process that is fun and interesting for students and also strengthens motivation, and also to instill understanding in students about the material being taught. Apart from helping students to facilitate understanding of teaching material, it also provides meaningful experiences for students so that it can arouse students' interest in the teaching and learning process.

Curriculum development in Indonesia is currently being enlivened by the Ministry of Education and Culture of the Republic of Indonesia which is promoting the concept of changing the curriculum to an independent learning curriculum. One of the work programs in the independent learning curriculum is a major concern in the



digitalization of education (Naufal et al., 2021). School digitalization is an intervention that encourages the provision of fast, automatic and open services so that they can be in line with current technological and information developments (Solihin, 2024). Nowadays, technological developments have a huge influence on innovation in the world of education. Equal distribution of education in outermost, disadvantaged and remote areas is helped by the digitalization of education (Cristiana, 2021). Conventional learning patterns have begun to be abandoned and shifted to using information and communication technology-based learning, this can be done by learning using e-learning (Solihin, 2024).

2. METHODS

This research uses a descriptive qualitative research method, namely a research method used to examine the condition of a natural object by studying something to the fullest with the aim of describing, explaining and answering in detail the problems being studied. The descriptive qualitative research method is carried out by collecting relevant previous research data and then connecting it to the problem being studied.

3. RESULTS & DISCUSSION

One of the problems faced by Indonesia in the world of education is that the quality of education is far from other countries, so it can be said that the quality of Indonesian education is low, seen from the product of the education itself to the educational process currently underway. Changing curricula with time gaps that tend to be short so that the evaluations obtained tend to be minimal, making Indonesia's education pattern immature. As time goes by, Indonesia is faced with developing technology with the use of digitalization (Efendi, 2018). In the educational context, digitalization can be interpreted as the ability to change various aspects and educational processes into various digital variants. The digitization process has an impact on various processes in education, especially changes in organizations and transformative leadership (Bejinaru, 2019). It is believed that digitalization is one of the answers needed to answer future educational challenges (Cristiana, 2021).

A culture where education is closer and closer to digitalization, a culture that combines technology-based education with more humanistic conventional education. With this combination, this new educational culture brings optimism and bright spots in the progress of digital literacy to face the era of industrial revolution 4.0. The relationship between the development of the world of education in the post-pandemic period, the era of industrial revolution 4.0, education and digital literacy is expected to be able to prepare quality graduates who are able to compete globally, as well as mastering technological developments which are very important for everyone and for the future of a nation. and country (Prasetyo & Maulida, 2022). Talking about education in the industrial revolution 4.0, it is said that this is a term used by education experts/practitioners in integrating or combining cyber technology in the teaching and learning process, which in popular language is known as the digital era. Education in this digital era is a response to the needs of the industrial revolution 4.0 in which machines and humans are harmonized or combined in terms of getting solutions to existing problems, solving problems and finding new innovation possibilities (Sufyan, 2022).

According to (Gumelar, 2020), Education in the era of industrial revolution 4.0 like this presents its own challenges for teaching staff such as teachers and lecturers in implementing it in teaching and learning activities. At a minimum, teachers are required to have 4 competencies, namely:

1. Have critical thinking skills in problem solving

This skill is a skill in understanding a problem that is occurring, searching for and obtaining as much information as possible so that you are able to create various perspectives in solving the problem. And it is these competencies that teachers then teach and implement to those they teach.

2. Have skills in communication and collaboration



This skill is related to information technology-based learning, so that teachers can optimize collaboration skills in the teaching and learning process.

3. Have creative and innovative thinking skills

In learning activities, it is very important for every teacher to have a creative and innovative spirit. This attitude can trigger students to participate in creative and positive thinking in studying.

4. Technology and information literacy skills

To become a successful teacher, someone must be able to explore many references to support their teaching and learning activities more optimally and precisely.

According to the learning approaches or learning methods that can be applied in the era of transformation from conventional learning to digital learning, there are 3 (three), namely student-centered learning, problem-based learning and flipped learning. Implementing Student Centered Learning, learning must be adapted to student characteristics. According to Oktarina (2017) explains that Student-Centered Learning is a teaching and learning activity that is centered on students. In another sense, this method requires students to become active actors in the teaching and learning process. This is of course in sharp contrast to Teacher-Centered Learning where teaching and learning activities are more dominated or centered on educators. Learning using the student-centered learning method certainly provides many benefits for both students and educators. Furthermore, the Problem-Based Learning approach is one of constructivist learning which is an alternative learning that can be implemented in an effort to overcome misconceptions apart from other teaching and learning strategies, for example through relationship analogies, dialogic interviews, group discussions, computer simulations, concept maps, field experience or experiments as well as ongoing questions. Thus, the problem-based learning method or Problem-Based Learning is a learning method that focuses on the root of the problem and then solves the problem. (Abudin, 2011). Furthermore, the Flipped-Learning learning approach is an innovative pedagogical approach that focuses on student-centered teaching by flipping the traditional classroom learning system that has been carried out by teachers. This is in line with the statement (Keengwe, 2014) which states: "The flipped classroom is an instructional approach that educators use to turn the traditional classroom lecture model into a more active learning classroom". In other words, flipped-learning is more directed towards blended lessons (Tantri, 2021).

According to the learning approaches or learning methods that can be applied in the era of transformation from conventional/traditional learning to digital learning, there are student-centered learning, problem-based learning and flipped learning. The application of Student-Centered Learning, this learning is adjusted to the characteristics of students. Student-Centered Learning is a teaching and learning activity that is centered on students. This means that the use of this method requires and requires students to become active actors and take part in the teaching and learning process (Sufyan, 2022).

Some parties believe that the digitalization of education has the potential to have a negative impact on the educational culture and quality of human resources (HR) of Indonesian students. However, this problem will be refuted by Abuddin (2011) statement explaining that Islamic education requires reliable human resources, high commitment and work ethic, management based on strong systems and infrastructure, adequate financial resources, strong political will, and superior standards. The world of education must be responsive to the digital era that has emerged with internet-based management systems. Then clarified by the opinion of M. Enoch Markum, the development of the education sector has a strategic role as one of the factors in realizing the reliability of Human Resources (HR). What is needed as one of the basic capital for sustainable national development (Hermawansyah, 2021).



The positive impact for children is the availability of mass media to search for information and flexible learning time. Meanwhile, the negative impact on children is that children have difficulty understanding the material, become lazy about studying, misuse of technology during online learning, and the emergence of an indifferent attitude towards the surrounding environment. The positive impact of digitalization of education for parents is that they can monitor their children's learning activities while at home. The negative impact of digitalization of education is that parents have difficulty understanding children's material and expenses increase as a result of providing children with facilities (Wulandari & Ardianti, 2021).

In the world of education, the impact of digitalization is taking place quickly and has a big impact. An example is the emergence of various new learning resources. With the emergence of various new learning sources, this has had an impact on students' activeness in obtaining information about education. The impact is that teachers are now not the only source of educational information obtained by students. With this, it is possible that students can be more updated than teacher educators. It cannot be denied that the spread of information on the internet is very fast and spreads easily. This is what makes digitalization have a positive impact on the world of education (Wildan et al., 2022).

4. CONCLUSION

Based on the results and discussion, it was found that digitalization of education has an effect on student learning patterns, namely that learning is more interactive and efficient because it can be done anywhere and at any time. However, it should be noted that in the digital era there needs to be a role for families, teachers and the community to supervise and direct students in using technology. Conventional learning patterns have begun to be abandoned and shifted to using information and communication technology-based learning, this can be done by learning using e-learning. This media learning pattern, learners can choose learning materials based on their own interests, so that learning becomes fun, not boring, full of motivation, enthusiasm, attracting attention and so on. Conventional learning patterns make learners only actively learn about the material without being developed again, while learning patterns in the era of digitalisation of education use innovative ways that can produce practical ways of learning and can be applied directly.

5. ACKNOWLEDGMENTS

The researcher would like to express his gratitude to the parents who have given all their prayers and support for their little daughter, as well as to my brothers, sisters and friends, I would like to express my gratitude for all forms of motivation and support to complete this project.

REFERENCES

- Abuddin, N. (2011). *Manajemen pendidikan, mengatasi kelemahan pendidikan di Indonesia*. Jakarta: Kencana Prenada Media Group.
- Afif, N. (2019). Pengajaran dan pembelajaran di era digital. *IQ (Ilmu Al-Qur'an): Jurnal Pendidikan Islam*, 2(01), 117–129.
- Arta, I. G. A. J. (2021). Digitalisasi pendidikan: dilematisasi dan dehumanisasi dalam pembelajaran daring perspektif filsafat paulo friere. *Prosiding Webinar Nasional LAHN-TP Palangka Raya*, 3, 96–107.
- Bejinaru, R. (2019). Impact of digitalization on education in the knowledge economy. *Management Dynamics in the Knowledge Economy*, 7(3), 367-380.



- Cristiana, E. (2021). Digitalisasi pendidikan ditinjau dari perspektif hukum. *Prosiding Webinar Nasional IAHN-TP Palangka Raya*, 3, 58–66.
- Efendi, N. M. (2018). Revolusi pembelajaran berbasis digital (penggunaan animasi digital pada start up sebagai metode pembelajaran siswa belajar aktif). *Jurnal Pendidikan, Sosiologi Dan Antropologi*, 2(2), 173–182.
- Gumelar, D. R., & Dinnur, S. S. (2020). Digitalisasi pendidikan hukum dan prospeknya pasca pandemi covid-19. *Al-Ahwal Al-Syakhsyiah: Jurnal Hukum Keluarga Dan Peradilan Islam*, 1(2), 111-122.
- Hermawansyah. (2021). Manajemen lembaga pendidikan sekolah berbasis digitalisasi di era Covid -19. *Jurnal Studi Pendidikan*, 12(1), 28–46.
- Keengwe, J. e. (2014). *Promoting active learning through the flipped classroom model*. United State of America: IGI Global
- Naufal, T., Putra, H., Yoenanto, N. H., & Airlangga, U. (2021). Kesiapan guru menuju digitalisasi pendidikan di era merdeka belajar ditinjau dari komponen TPACK. *Prosiding Seminar Nasional Fakultas Psikologi Universitas Airlangga*.
- Oktarina, P. S. (2017). Implementasi metode problem-based learning (PBL) untuk optimalisasi student-centered learning (SCL) di perguruan tinggi. *Jurnal Penjaminan Mutu*, 3(1), 76-86.
- Prasetyo, A., Maulida, A. N., & Rahmasyah, A. S. O. (2022). Literasi 4.0: digitalisasi pendidikan sebagai budaya baru dalam pembelajaran di era post pandemic. *Prosiding Konferensi Ilmiah Pendidikan*, 3, 593-596.
- Solihin, F. N. M. (2024). Implementasi edumu dalam penilaian akhir semester untuk meningkatkan motivasi belajar. *Jurnal Syntax Admiration*, 5(1).
- Sufyan, Q. A. Y., & Ghofur, A. (2022). Pemanfaatan digitalisasi pendidikan dalam pengembangan karakter peserta didik. *MUBTADI: Jurnal Pendidikan Ibtidaiyah*, 4(1), 62-71.
- Tantri, N. N. (2021). Memanfaatkan digitalisasi pendidikan dalam pengembangan potensi siswa. *Prosiding Webinar Nasional IAHN-TP Palangka Raya*, 3, 225–238.
- Utami, D. (2011). Animasi dalam pembelajaran. *Majalah Ilmiah Pembelajaran*, 7(1).
- Wildan, M., Putra, F., Budi, R., Mahardika, P., Syahputra. (2022). Digitalisasi pendidikan di masa pandemi Covid-19. *Prosiding Seminar Nasional Ilmu Ilmu Sosial (SNIIS)*, 1, 715–723.
- Wulandari, R., & Ardianti, S. D. (2021). Tantangan digitalisasi pendidikan bagi orang tua dan anak di tengah pandemi Covid-19 di Desa Bendanpete. *EDUKATIF : Jurnal Ilmu Pendidikan*, 3(6), 3839–3851.



DESIGNS OF DEVELOPING TEACHING MATERIALS BASED ON PROJECT-BASED LEARNING: A SYSTEMATIC LITERATURE REVIEW

Ivana Fauziah Sesfa'o¹, Sjaeful Anwar^{2*}, Ijang Rohman³
^{1,2,3}Universitas Pendidikan Indonesia, Bandung, Indonesia
*saefulanwar@upi.edu

ABSTRACT

This research aims to determine the various designs that have been used in developing project-based learning-based teaching materials so that they can support the student learning process. This research uses the Systematic Literature Review (SLR) method by conducting a literature study of the designs used in developing project-based learning teaching materials. Data collection techniques are carried out by collecting and reviewing articles appropriate to the topic being studied and related to research keywords. 600 articles have been collected from National and International Journals sourced from online databases such as Scopus, ERIC, and Google Scholar. Next, the articles were selected according to several predetermined research criteria until 13 articles were obtained, which would be used as secondary data and then analyzed. This research shows that many teaching material development designs can be used to prepare teaching materials based on project-based learning. Furthermore, the results of this research can be used as interesting further research by examining the process of developing teaching materials using a particular design to build students' high-level thinking skills.

Keywords: *Teaching Materials, Project-Based Learning, Systematic Literature Review.*

1. INTRODUCTION

Education in the 21st century faces various complex challenges, including the need to prepare students with relevant skills and knowledge to face an ever-changing world. Various educational institutions are starting to implement learning that can encourage students to improve their cognitive knowledge and professional skills, such as teamwork problem-solving (Volger et al., 2018). Of course, education cannot achieve this if it still uses traditional learning methods, where teachers are still the primary source of knowledge and students are passive recipients of knowledge. (Guo et al., 2020). Therefore, it is necessary to change the methods used in learning, where students should be the center of the teaching and learning process (Rungsirisakun et al., 2019).

One learning model that can be applied so that students can be actively involved in the teaching and learning process and create student-centered learning is a project-based learning model. (Nainggolan et al., 2020). Project-based learning combines knowledge with skills to solve a real investigation within a certain period with a focus on solving problems and producing a product. (Santyasa et al., 2021).

PjBL learning can be expressed in exciting teaching materials that suit the needs of the teaching and learning process, where the teaching materials can be equipped with PjBL learning steps such as 1) start with the essential question, 2) design a plan for the project, 3) create a schedule, 4) monitor the students and the progress of the project, 5) assess the outcome, and 6) evaluate the experience (Santyasa et al., 2021).

Teaching materials themselves are all forms of materials or materials that are arranged in a structured and systematic manner, which are designed in accordance with curriculum demands and become learning resources for students, as well as materials or materials for teachers in carrying out teaching and learning activities (Anwar, 2023). Teaching materials can be developed through various development designs, such as several designs that are widely used today, namely ADDIE, 4D, and 4STMD (Anwar & Sumarna, 2022). Then, selecting the design used in developing PjBL-based teaching materials can follow the stages of each design by integrating project-based learning into it.

Based on the background described above, the research focuses on "Designs of Developing of Teaching Materials Based on Project-Based Learning".



2. METHODS

In providing an overview of the designs used in developing project-based learning-based teaching materials, this research uses the Systematic Literature Review (SLR) method. Systematic Literature Review (SLR) is a systematic research method in which researchers collect, critically evaluate, integrate, and present various findings from research that has been conducted regarding research questions or topics of interest (Pati & Lorusso, 2018). There are three main stages in research using this method, namely searching for literature relevant to the chosen theme, selecting the literature to be analyzed, and data analysis. (Albeshree, et al., 2020).

Literature search sources were taken from national journals to international journals, which will be used as secondary data in research by searching home bases such as Scopus, ERIC, and Google Scholar. The keywords used to search for literature are Teaching Materials, Project-Based Learning, and Systematic Literature Review.

There are several criteria for articles that will be used as secondary data, namely the year the article was published, a maximum of five years ago, the article has the same keywords as the research topic, focuses on students in mathematics and science learning, and the article has a review that focuses on designs. Used in developing project-based learning-based teaching materials. The following are the stages of selecting research literature, which are processed using the PRISMA method (Haddaway et al., 2022).

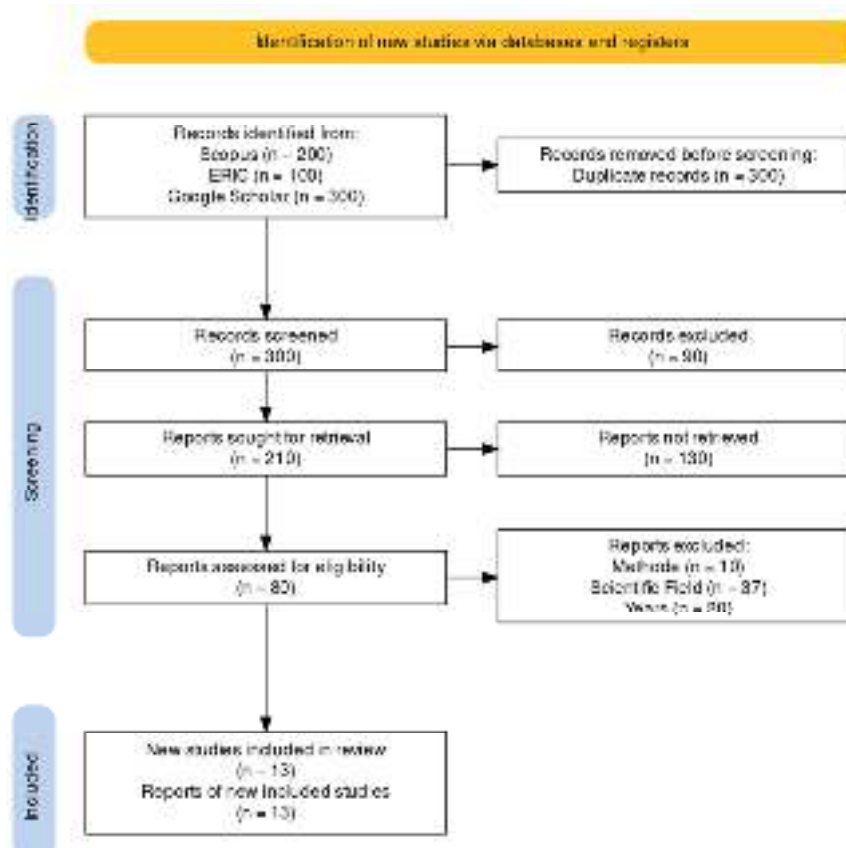


Figure 1: PRISMA Diagram of Secondary Data Analysis Results

Based on the selection results above, a total of 13 articles were obtained, which will be analyzed as literature sources.

3. RESULTS & DISCUSSION

The articles analyzed were collected from various national and international journals and obtained through online databases such as Scopus and Google Scholar, which contain data in the form of designs used in



developing project-based learning-based teaching materials. From the results of the search carried out, 13 articles were obtained, which are presented in Table 1 below:

Table 1. Results of Article Analysis Regarding The Design of Developing Teaching Materials Based on Project-Based Learning

Years	Article Title and Author	Research Result
2023	Validation of the virus teaching module based on project-based learning on creative thinking abilities (Putra et al., 2023)	This research uses a 4D development design with development stages, namely Define, Design, Develop, and Disseminate, but only reaches the product validity stage. The results of this research were that the results of the validity of project-based learning-based teaching modules received a high score so that they could be implemented in the teaching and learning process to improve students' creative thinking skills.
2023	Development of E-Worksheet Based on STEAM-PjBL in Reaction Rate Material to Improve Creative Thinking Skills High School Students (Rr Tasya Noor Nabila & Agus Kamaludin, 2023)	This research uses a 4D development design with development stages, namely Define, Design, Develop, and Disseminate. This research obtained ideal results from media experts, material experts, reviewers, and student responses of 97%, 93%, 90%, and 93%, respectively, in the very good category. Therefore, it can be concluded that the resulting E-Worksheet can improve students' creative thinking and is worthy of being used as an alternative learning media in the learning process.
2023	Module Development through Project-Based Learning to Enhance Students' Creative Thinking (Praptama et al., 2023)	This research uses a 4D development design with development stages, namely Define, Design, Develop, and Disseminate. Based on the validity results, it was found that the module developed was declared valid and practical, with the respective scores obtained for validity and practicality being 83.3% and 85%, so the PjBL-based module developed could improve students' creative thinking skills.
Years	Article Title and Author	Research Result
2022	Creative project-based learning model to increase creativity of vocational high school students (Usmaldi & Amini, 2022)	This research uses a 4D development design with development stages, namely Define, Design, Develop, and Disseminate. It was stated that the teaching materials developed were valid based on the components of appropriateness of content, appropriateness of presentation, appropriateness of language, and appropriateness construct based on three expert assessments. PjBL-based teaching models and materials are effective based on learning outcomes in the realm of students' knowledge, skills and attitudes so that they can increase students' creativity and competence in the form of mastery of



		teaching materials, skills in making creative products and work attitudes.
2022	The Development of Teaching Materials Based on Project Oriented TPACK Approach to Improve the Creative Thinking Skills of Elementary School Teacher Prospective Students (Rahayu et al., 2022)	This research uses an R&D development design with stages initial research and information gathering, planning, initial product format development, initial trial, initial product revision, Test field trials, product revisions, Validation and field trials, Final product revisions, and Dissemination and implementation. Teaching materials are demonstrated to be appropriate for utilization in learning with the criteria of being substantial, viable, and successful, so commonsense educating materials are connected in learning and demonstrated viable in moving forward the imaginative considering abilities of imminent instructors.
2021	The Development of Scientific Teaching Materials Based on Stem-Pjbl As a Chance to Improve Students' Creative Thinking Ability on the Topic of Analyzing Light and Optics (Sari, PR, et al., 2021)	This research uses a 4D development design with development stages, namely Define, Design, Develop, and Disseminate. Educating materials are demonstrated to be appropriate for utilization in learning with the criteria of being substantial, viable, and successful, so it can be concluded that commonsense educating materials are connected in learning and demonstrated viable in moving forward the imaginative considering abilities of imminent instructors.
2021	Student Worksheet Oriented on Project-Based Learning to Train Student Creative Thinking Skills on Acid-Base Material (Zahro & Mitarlis, 2021)	This research uses a 4D development design with development stages, namely Define, Design, Develop, and Disseminate. The investigation found that the worksheet utilized was demonstrated to be doable based on the legitimacy, common sense, and adequacy that came about. So, educational materials are appropriate for utilizing within the learning process to progress imaginatively and consider abilities.
2020	Improving the problem-solving skills through the development of teaching materials with STEMPjBL (science, technology, engineering, and mathematics-project based learning) model integrated with TPACK (technological pedagogical content knowledge) (Purwaningsih et al., 2020)	This research uses a 4D development design with development stages, namely Define, Design, Develop, and Disseminate. Material science educating materials with the STEM-PjBL (Science, Innovation, Building, Science and Project-based Learning) show coordinates with TPACK (Innovative Educational Substance Information) are exceptionally substantial, commonsense, and measurably compelling for making strides in students' problem-solving capacities, so they are exceptionally viably actualized in learning.
2020	Development of mathematical teaching materials based on project-based learning to improve students' HOTS and character (Sofiyan et al., 2020)	This research uses the ADDIE development design with development stages, namely Analysis, Design, Development, Implementation, and Evaluation. The conclusions were that the PjBL-based education materials created were appropriate and great for learning, and based on approval tests, the components of substance, plan, and dialect met the criteria for the



		exceptionally substantial category. Educating fabric that's tried in learning can move forward HOTS and understudy character. So those instructing materials are considered viable in progressing understudy character and HOTS.
2020	The Development of Local-Based Teaching Materials in Project-Based Learning (Wardani et al., 2020)	This research uses an R&D development design with the stages Research and Information Collection, Planning, Develop Preliminary form of product, Preliminary Field Testing, operational field testing, operational product revision, main field testing, Main Product Revision, Final Product Revision, Dissemination and Implementation. This inquiry appears to show that the education materials created have substantial legitimacy and down-to-earth scores that can be utilized in learning.
2019	Development of Motion-Theme Teaching Materials for Science Learning in Junior High School (Pursitasari et al., 2019)	This research uses a 4STMD development design with development stages, namely Selection, Structuring, Characterization, and Didactic Reduction. It can be concluded that created educational materials on the subject of movement had substantial categories, were profoundly organized, simple to get, and had a really great possibility. So, instructing materials can be actualized in learning.
2019	The Effectiveness of Teaching Materials Using Project-Based Learning (PjBL) in Concrete Stones Practice Course (Syah et al., 2019)	This research uses a 4D development design with development stages, namely Define, Design, Develop, and Disseminate. It was found that the teaching materials developed were declared valid and effective, so they had a good impact on improving students' cognitive, affective, and psychomotor abilities, which resulted in increased student learning outcomes.
2019	Development of mathematics teaching materials using project-based learning integrated STEM. (Priatna et al., 2019)	This research uses an R&D development design with stages of Data Collection and information, Design, Product Creation, small-scope trials, and Evaluation and revision. The results showed that it has a high flexibility value because it has a number of instructions that are easy to understand. Experts elaborated on the development of teaching materials using the PjBL syntax model, and they were then integrated with STEM syntax. So, teaching materials can be implemented in learning.

Based on the results of the analysis of all the secondary data literature above, it was found that there are several designs that can be used in developing project-based learning-based teaching materials so that these teaching materials are able to improve creative thinking skills, HOTS, and other high-level skills in students.

Discussion

Project-based learning is a learning model that can encourage students to implement and apply the knowledge and skills they have through an interesting project, which often results in a product that can be utilized.



Project-based learning is very suitable for application in mathematics and science learning. Students will be more active in the learning process by completing problem-based projects so that students will have a better understanding of mathematics and science concepts and can apply them to real concepts.

Project-based learning can be integrated into learning through the use of PjBL-based teaching materials. In several studies, it is explained that PjBL-based teaching materials can be developed using 4D development design with the Define, Design, Develop and Disseminate stages (Putra et al., 2023; Nabila & Kamaludin, 2023; Praptama et al., 2023; Usmeldi & Amini, 2022; pursitasari, et al., 2021; Zahro & Mitarlis, 2021; Purwaningsih et al., 2020; Syah et al., 2019). PjBL-based teaching materials developed using 4D design obtain good validity, practicality, and effectiveness results. They can be used to support the learning process and help students improve their high-level skills, such as creative thinking skills and HOTS.

Not only 4D design, the development of PjBL-based teaching materials can use ADDIE design with stages, Design, Development, Implementation, and Evaluation (Sofiyana et al., 2020), where PjBL-based teaching materials developed using this design can improve HOTS and student character, so they are considered effective for use in learning. Then, there are the Four Steps Teaching Material Development(4STMD) design used in developing teaching materials with stages Selection, Structuring, Characterization, and Didactic Reduction (Pursitasari et al., 2019) that developed teaching materials on the subject of motion had valid categories, highly structured, easy to understand and having a very good feasibility. So, teaching materials can be implemented in learning.

Furthermore, there is an R&D design that can be used in developing teaching materials by following several stages, such as stages Initial research and information gathering, Planning, Initial product format development, initial trial, Initial product revision, Test field trials, Product revisions, Validation and field trials, Final product revisions, and Dissemination and implementation (Rahayu et al., 2022) and stages Research and Information Collection, Planning, Develop Preliminary form of product, Preliminary Field Testing, operational field testing, operational product revision, main field testing, Main Product Revision, Final Product Revision, Dissemination and Implementation (Wardani et al., 2020). Development at this stage is proven to be suitable for improving students' thinking skills based on the results of valid, practical and effective criteria.

Apart from that, the development of teaching materials uses designated Collection and information, Design, Product Creation, Small Scope Trials, and Evaluation and revision (Priatna et al., 2019) are seen as having high flexibility value because they have a number of instructions that are easy to understand so that teaching materials can be implemented in learning.

4. CONCLUSION

Based on the research results and discussions that have been described, it can be concluded that there are several teaching material development designs that can be used in compiling or developing project-based learning-based teaching materials, including 4D, ADDIE, 4STMD and other R&D developments. Teaching materials developed using several designs are considered suitable for use based on the results of valid, practical, and effective criteria. PjBL-based teaching materials can be used in learning to improve students' knowledge, skills, and character.

REFERENCES

- Anwar, S. (2023). *Metode pengembangan bahan ajar four steps teaching material development (4STMD)*. Bandung:Indonesia Emas Group.
- Anwar, S & Omay, S. (2022). *Pengembangan bahan ajar IPA terpadu*. Bandung:Indonesia Emas Group.
- Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: student outcomes and measures. *International Journal of Educational Research*, 102(May), 101586. <https://doi.org/10.1016/j.ijer.2020.101586>



- Haddaway, N. R., Page, M. J., Pritchard, C. C., & McGuinness, L. A. (2022). PRISMA2020: An R package and shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimized digital transparency and Open Synthesis. *Campbell Systematic Reviews*, 18(2), 1–12.
- Nainggolan, B., Hutabarat, W., Situmorang, M., & Sitorus, M. (2020). Developing innovative chemistry laboratory workbook integrated with project-based learning and character-based chemistry. *International Journal of Instruction*, 13(3), 895–908.
- Pati, D., & Lorusso, L. N. (2018). How to write a systematic review of the literature. *Health Environments Research and Design Journal*, 11(1), 15–30.
- Praptama, S. S., Purwaningsih, E., Taufiq, A., & Setiyoaji, W. T. (2023). Module development through project-based learning to enhance students' creative thinking. *Jurnal Pendidikan Fisika*, 11(2), 215–224.
- Priatna, N., Martadipura, B. A. P., & Lorenzia, S. (2019). Development of mathematic's teaching materials using project-based learning integrated STEM. *Journal of Physics: Conference Series*, 1157(4).
- Pursitasari, I. D., Program, S. E., Rubini, B., Program, S. E., & Firdaus, F. Z. (2022). Cypriot Journal of Educational mote critical thinking skills. *Cypriot Journal of Educational Sciences*, 17(6), 2105–2116.
- Purwaningsih, E., Sari, A. M., Yuliati, L., Masjkur, K., Kurniawan, B. R., & Zahiri, M. A. (2020). Improving the problem-solving skills through the development of teaching materials with STEM-PjBL (science, technology, engineering, and mathematics-project based learning) model integrated with TPACK (technological pedagogical content knowledge). *Journal of Physics: Conference Series*, 1481(1).
- Putra, A. P., Zaini, M., & Sari, M. M. (2023). Validation of the virus teaching module based on project based learning on creative thinking ability. *BIO-INOVED: Jurnal Biologi-Inovasi Pendidikan*, 5(3), 388. <https://doi.org/10.20527/bino.v5i3.17616>
- Rahayu, G. D. S., Altaftazani, D. H., & Wardani, D. S. (2023). The development of teaching materials based on project-oriented TPACK approach to improve the creative thinking skills of elementary school teacher prospective students. *ELEMENTARY: Islamic Teacher Journal*, 10(2), 225.
- Rungsirirakun, R., Intarapong, P., Lekprasert, B., & Tantiwisawaruji, S. (2019). Using project based learning in a fundamental chemistry course: An Experience Report. *Psychology*, 9(1), 6–10.
- Nabila, R. T. N., & Kamaludin, A. (2023). Development of E-worksheet based on STEAM-PjBL in reaction rate material to improve creative thinking skills high school student. *Jurnal Iqra': Kajian Ilmu Pendidikan*, 8(1), 299–317.
- Santyasa, I. W., Agustini, K., & Pratiwi, N. W. E. (2021). Project based e-learning and academic procrastination of students in learning chemistry. *International Journal of Instruction*, 14(3), 909–928.
- Sofiyani, S., Amalia, R., & Suwardi, A. B. (2020). Development of mathematical teaching materials based on project-based learning to improve students' HOTS and character. *Journal of Physics: Conference Series*, 1460(1).
- Syah, N., Haq, S., Pratama, Y. F., Sarwandi, Hutria, W., & Nofianti, L. (2019). The effectiveness of teaching materials using project-based learning (PjBL) in concrete stones practice course. *Journal of Physics: Conference Series*, 1387(1).
- Usmeldi, U., & Amini, R. (2022). Creative project-based learning model to increase creativity of vocational high school students. *International Journal of Evaluation and Research in Education*, 11(4), 2155–2164.
- Vogler, J. S., Thompson, P., Davis, D. W., Mayfield, B. E., Finley, P. M., & Yasseri, D. (2018). The hard work of soft skills: Augmenting the project-based learning experience with interdisciplinary teamwork. *Instructional Science*, 46(3), 457–488.



- Wardani, D. S., Fauzi, M. R., Zafira, R., & Kurniawati, D. (2020). Creating props: improving writing skills of teaching materials of elementary teacher education students through project-based learning model. *Mimbar Sekolah Dasar*, 7(2), 216–234.
- Zahro, B. L., & Mitarlis, M. (2021). Student worksheet oriented on project-based learning to train student creative thinking skills on acid-base material. *UNESA Journal of Chemical Education*, 10(1), 1–9.



MADRASAH ACCREDITATION MANAGEMENT AT MTs. SWASTA NURUL IMAM TANJUNG MORAWA

Dian Ratna Puri^{1*}

¹Universitas Negeri Medan, Indonesia

*diarpury@gmail.com

ABSTRACT

Accreditation of madrasah is a comprehensive process to assess whether an educational program is suitable and of high quality. The purpose of this study is to provide a deeper understanding of accreditation management at the MTS Swasta Nurul Iman Tanjung Morawa. and to recommend concrete steps to achieve excellent and optimal accreditation levels. A descriptive qualitative approach is used in this research method by collecting data through interviews, observations, and documentation. To ensure data validity, the credibility triangulation technique is used, which involves checking data from various sources and through various methods and times. The results of the study indicate that the implementation of accreditation at the MTS Swasta Nurul Iman Tanjung Morawa needs to pay attention to madrasah accreditation management, which includes: (1) planning, by preparing accreditation according to the 4 IASP Components to be evaluated; (2) organizing, carried out by forming an accreditation team involving educational stakeholders to be agreed upon together; (3) actuating, involving the collection of documents related to graduate quality, learning processes, teacher quality, and madrasah management; and (4) controlling, carried out by the head of the madrasah by conducting discussions, monitoring, and evaluating the performance of the madrasah accreditation team. In managing the accreditation management of MTS Swasta Nurul Iman Tanjung Morawa, it is also necessary to consider the weaknesses and strengths in achieving accreditation as well as strategies that can be used to improve accreditation management, follow-up after accreditation, and steps to achieve optimal and excellent accreditation.

Keywords: accreditation, accreditation management, madrasah

1. INTRODUCTION

In an effort to improve the quality of education in the educational environment, Madrasahs need to take steps to revitalise educational activities to be in line with the direction of established educational policies. This is done by increasing the effectiveness and efficiency of the educational processes and activities carried out. One of the initiatives taken by Madrasahs to improve their quality is through the implementation of an Internal Quality Assurance System (SPMI) and an External Quality Assurance System (SPME). The implementation of SPMI is an internal initiative carried out and evaluated by the Madrasah itself. Meanwhile, SPME is carried out externally by the National Madrasah Accreditation Board (BAN-S/M) through an accreditation process. Madrasah accreditation is important to assess whether the Madrasah meets the appropriate criteria in carrying out the educational process (Nawaroni et al., 2022).

Accreditation functions as an internal mechanism to enable Madrasahs to understand the dimensions of their strengths and weaknesses, encouraging efforts to continue to improve their strengths and improve their shortcomings on an ongoing basis. As the front guard in human development, it is important for Madrasahs to be monitored and evaluated in every aspect of their education, both in the process and in the final results of their graduates. With this accreditation process, it is hoped that Madrasahs can achieve standards and quality that are in accordance with the established standards (Thobi & Sucitra, 2022).

Recognition of Madrasah Accreditation follows established standards, as a form of public responsibility which is carried out in an objective, fair, transparent and comprehensive manner, using tools and criteria that follow the National Education Standards. The impact of accreditation of an educational institution has several benefits, including: (a) Encouraging quality improvement; (b) Empowering and improving the performance of the Madrasah community; (c) Increasing the quality of Madrasahs gradually; (d) Support the Madrasah in developing student placement plans, help identify the Madrasah's need for assistance, and provide constructive feedback to strengthen the Madrasah's performance in conducting continuous self-evaluation (Utiahman et al., 2017).

In fact, some Madrasahs still have not optimised their preparations when facing the accreditation process. This is evident from data from the 2022 Deliserdang Regency Regional Education Balance which records that only



23.87% of junior high school level Madrasahs have been accredited A. Meanwhile, the percentage of B accreditation reached 56.19%, C accreditation was 10.88%, and the number of Madrasahs that had not been accredited reached 9.06%.

The implementation of the Madrasah accreditation process often does not run smoothly, hampered by various problems that arise. Preparations are often rushed, physical evidence is inadequate, accreditation guidelines are incomplete, self-evaluations are not carried out, and there is a lack of coordination and communication between individuals and teams. Several obstacles that arise in the Madrasah accreditation process include a lack of thorough preparation on the part of the school, differences in perceptions between teachers, principals and supervisors regarding IASP assessment standards, as well as limitations in guaranteeing and improving the quality of education. The results of school self-evaluations have not been utilised optimally to improve the quality of education in a sustainable manner. Thus, it was found that difficulties in the Madrasah accreditation process were caused by a lack of serious preparation. Therefore, Madrasahs should treat the accreditation process seriously and make thorough preparations, as is done by MTs. Swasta Nurul Iman Tanjung Morawa.

Preparation for upgrading MTs. Swasta Nurul Iman Tanjung Morawa is underway, but there are still challenges that need to be overcome. Several aspects of accreditation still need to be improved. There are still a number of issues that need to be resolved, including character issues, teacher needs, and inadequate facilities. Nevertheless, MTs. Swasta Nurul Iman Tanjung Morawa continues to uphold the quality of education with various quality improvement programs.

Accreditation process at MTs. Swasta Nurul Iman Tanjung Morawa is not running smoothly because it is faced with various obstacles that hinder it. Hasty preparation, lack of adequate physical evidence, and accreditation guidelines that are still less comprehensive are some of the problems that often arise. Apart from that, Madrasahs also find it difficult to find time to carry out self-evaluations and there are deficiencies in coordination and communication between individuals and teams. The challenges faced in the accreditation process include conceptual, instrumental, infrastructure, administrative and human resource aspects. This shows that these problems arise due to a lack of thorough and serious preparation on the part of the Madrasah in facing the accreditation process. As educational institutions, Madrasahs should treat the accreditation process seriously and regard it as important (Sholihin et al., 2018).

One of the main problems often faced in the assessment process is the lack of efficiency in the time used. Apart from that, unclear standards make it difficult for Madrasahs to prepare physical evidence for assessment. Until now, there is no specific information regarding the appropriate formulation or technique to address the four assessment components, which are very necessary to help Madrasahs prepare for accreditation assessments.

Based on existing realities, the accreditation process is only considered a formal process for achieving value alone. Madrasah accreditation is still seen as an administrative obligation that must be fulfilled, causing pressure for educators and education staff when Madrasahs are about to be audited. The unpreparedness of Madrasahs and the large administrative burden make the accreditation process more of a burden, giving rise to the possibility of manipulation in its assessment (Wahiddin, 2019).

In this context, it is important to carry out research that explores various factors related to the accreditation process of Private MTs Nurul Iman Tanjung Morawa. Achieving optimal accreditation is not just an easy step; This requires careful struggle and strategy on the part of the Madrasah. Directed management has a big role in the success of the accreditation process. It is hoped that, through this research, a significant contribution can be made to all parties involved, especially to Madrasah leaders, teachers and students, so that they gain a deeper understanding of the importance of Madrasah accreditation and its preparations.

Based on the previous explanation, the author intends to undertake comprehensive and in-depth research regarding the management implemented by all parties involved at MTs Private Nurul Iman Tanjung Morawa during the madrasa accreditation process. Starting from the planning stage, with careful preparation in accordance with the 4 IASP components that will be assessed; the organising stage, which involves forming an accreditation team with participation from various education stakeholders to reach a mutual agreement; implementation stage, which involves collecting documents related to graduate quality, learning processes, teacher qualifications, and madrasa administration; and the control stage, which is carried out by the head of the madrasah through discussion,



monitoring and evaluation of the performance of the madrasah accreditation team. In managing the accreditation management of MTs Swasta Nurul Iman Tanjung Morawa, it is important to consider the weaknesses and strengths in achieving accreditation and develop strategies that can improve accreditation management, post-accreditation steps, and efforts towards achieving optimal and superior accreditation.

2. METHODS

The method applied in this study is descriptive qualitative, namely a type of research that describes ongoing phenomena or events by identifying and answering existing challenges. The qualitative approach allows researchers to understand the natural state of the object under study, where the researcher himself becomes the main instrument. Data collection techniques include observation, interviews and documentation, as well as the application of qualitative data analysis which places greater emphasis on interpreting meaning, description and narrative, without prioritising aspects of numbers or calculations. (Sugiyono, 2017).

The researcher chose a descriptive approach to reveal more in depth, as stated by Siddiq that qualitative research tends to be descriptive, where the data obtained consists of words or images. In the context of qualitative research which adopts a descriptive approach, the focus is on collecting abundant descriptive data, which is then presented in the form of detailed reports and descriptions. (Sidiq, 2019).

This research took place at MTs. Private Nurul Iman Tanjung Morawa, an educational institution in Pasar XIII, Limau Mainis village, Tanjung Morawa. The research period was carried out from November to April 2023. The focus of this research is accreditation management, including the planning stages, socialisation, team formation, work meetings, setting work targets, filling out instruments, collecting documents, evaluating, fulfilling instrument items, collecting documents, and the visitation process. The subject of this research refers to the individual who is the main source of information that contributes to this research.

3. RESULTS & DISCUSSION

MTs Swasta Nurul Imam Tanjung Morawa Accreditation Management

Accreditation management has enabled Madrasah Nurul Iman Tanjung Morawa to carefully manage the accreditation process, creating a supportive environment so that the accreditation process runs smoothly and is able to reflect the Madrasah's quality standards. The stages of accreditation management at Madrasah Nurul Iman Tanjung Morawa begin with:

(a) Planning

Planning is a step in organising a series of activities to achieve a desired goal. Planning is an effort to calculate and determine the steps needed to achieve a particular goal, including who will carry it out, when, where, and in what way. (Latri, 2020). Planning is an irreplaceable foundation for the success of an endeavour. An activity that does not start with planning will lose its optimal potential. That is why, in carrying out the mission of maintaining superior accreditation, as is done by MTs Swasta Nurul Iman Tanjung Morawa, planning is the main milestone. Careful and measurable planning is needed to direct efforts towards results that meet expectations. Members of the accreditation team also emphasised the importance of the initial planning phase, underlining that a strong foundation of planning plays a central role in the success of an action. Without careful planning, the expected results will be difficult to achieve.

With careful planning, we can identify strengths and weaknesses that may arise and anticipate them quickly. In addition, planning allows madrasahs to optimise the use of time. Planning is not just limited to the madrasah accreditation team; each team member uses strategies to achieve the desired goals. It is important to plan the strategies that will be implemented during the accreditation process until the assessment is carried out. The madrasah head has prepared a strategy to face these challenges. MTs. Nurul Iman Tanjung Morawa has prepared all the requirements to apply for accreditation, including having a letter of decision on the establishment/operation of the madrasah, students at all grade levels, educational facilities, teaching staff, curriculum implementation, and student graduation.

(b) Accreditation Organizations



Organising emerged as the next step in management governance. At MTs SwastaNurul Iman Tanjung Morawa, the organisation under accreditation management aims to allocate core responsibilities and functions related to madrasa accreditation. Steps were taken to group accreditation elements according to the four existing standards.

1. Accreditation Team

The formation of the accreditation team involves the madrasa head, teachers, education staff and the madrasa committee. The madrasa head is responsible for socializing accreditation activities to all members of the madrasa community. The formation of the accreditation team must be done carefully by considering the skills and capabilities of each teacher and staff. After that, the accreditation team will download and study the required Accreditation Tool documents.

In order to prepare for madrasa accreditation in a more structured manner, MTs. Private Nurul Iman Tanjung Morawa has formed an Accreditation Team as the main pillar in ensuring the success of accreditation. The team's organizational structure is prepared in accordance with the needs of the accreditation evaluation tool to ensure the completeness and achievement of the four IASP components. Each team member is responsible for assessing each of the four components, so that in the assessment process for each accreditation standard, there is a special person responsible for compiling the documents required by the assessor.

2. Draft Committee Decree

Implementation fully follows the 4 IASP components as the main guide. Not only paying attention to the RKM, but every aspect of the required documents will be given maximum attention by the madrasah accreditation team, ensuring that accreditation management at MTS Swasta Nurul Iman Tanjung Morawa runs according to shared expectations. The accreditation team is formed at the accreditation team performance meeting, and has been officially formed since the planning stage began, with each task and function adjusted to the needs of the accreditation component. In addition, the discussion also covers each group of accreditation items from the relevant IASP components.

Tabel 1. Draft of Committee Decision Letter

No	Name	Position	Duties and Responsibilities
1	Syakir Naim Siregar, SP, M.Si	Head of Madrasah	Chairman of the Committee
2	Rudi Siagian, S.Pd	Deputy Head of Education. graduate quality documents	Person in charge/team leader for preparing graduate quality documents
3	Amran Amil Harahap, ST	Deputy Chief of Staff. Auction Curriculum	Responsible person/ Leader of the team for preparing the Teacher Quality Components document
4	Budi Setiawan, SH.	Aqidah Akhlak Teacher	Leader of the team for preparing Learning Process Component documents
5	Dimas Wahyudi, S.Pd	Social Studies Teacher/Class IX-4 Homeroom	Leader of the School Management Component document preparation team

According to the head of the Madrasah, forming an accreditation team requires a strategy that includes a primary choice of teachers who are certified and have a high attendance rate. This aims to ensure that teachers can optimally prepare the documents and instruments needed in the accreditation process.

3. Carrying out Coordination Meetings

The entire MTs SwastaNurul Iman Tanjung Morawa community is jointly responsible for carrying out Accreditation Tasks. As a leader, the madrasa head has an important role in inspiring his staff to carry out the madrasa accreditation program with enthusiasm. This requires encouragement so that each team member carries out their tasks with high enthusiasm. Efforts and collaboration between educators and educational staff are very important to maintain in the madrasa accreditation process.



In anticipation of the school accreditation process in 2023, MTs. Private Nurul Iman Tanjung Morawa held a Coordination Meeting for Preparation and Implementation of Accreditation in the MTs Hall. Private Nurul Iman Tanjung Morawa on July 26 2023. The meeting agenda includes evaluation of four aspects that are the focus of accreditation assessment, namely Quality of Graduation, Quality of Teaching Staff, School Governance and Learning Process.

4. Completion of Accreditation Instruments and Physical Evidence

There are several steps in the process of preparing accreditation instruments and physical evidence in madrasahs. First, participants must attend an outreach session regarding madrasah accreditation led by the supervisor. The second step involves completing a checklist on the accreditation instrument provided by the supervisor. The third step is to prepare the data that will be used as physical evidence. Finally, the fourth step involves carrying out the collection of physical evidence in accordance with the requirements stated in the accreditation instrument.

The process of filling out accreditation instruments and physical evidence at MTs. Private Nurul Iman Tanjung is carried out through several stages, namely: (1) Participating in socialization activities for madrasah accreditation led by supervisors. During the socialization, madrasahs were given a complete accreditation instrument with in-depth explanations regarding each point covered in the four components; (2) Checking the accreditation instruments provided by the supervisor. Filling out or checking the instrument is carried out by considering the high standards that the madrasah wishes to achieve, in line with the Madrasah Self-Evaluation data; (3) Prepare data that will be used as physical evidence. Some data or documents for accreditation purposes are prepared long before the implementation of accreditation, while others are prepared before the implementation of accreditation; (4) Collect physical evidence in accordance with the requirements stated in the accreditation instrument. Physical evidence can be in the form of official documents or photos that support each point contained in the instrument; and (5) Distribute tasks to the team responsible for the accreditation process.

5. Accreditation Committee Decision Letter

The Decree issued by the head of the madrasah is a formal step that confirms the legitimacy of the committee as a form of legality in the Madrasah accreditation process. Implementation of Madrasah accreditation at MTs. Private Nurul Iman Tanjung Morawa involves all related parties, who must mobilize personnel to carry out the program with high enthusiasm. Mobilizing team members means encouraging them to carry out tasks with enthusiasm. Madrasah heads have designed special strategies to overcome these challenges. Even though the duties of the Team Responsible for Accreditation look simple, they actually involve many meetings with a structured work team. These meetings provide a valuable opportunity to share ideas to meet accreditation needs. When one member needs help, all team members try to provide the best possible support according to their respective abilities. With the formation of the Madrasah accreditation team, the goals to be achieved will become more focused and clear for all parties involved.

a) Implementation

Madrasahs need to undergo a school self-evaluation (EDS) process first by filling out the EDS instrument that has been published by the National Standards Agency. After that, a team from BAN-SM will conduct a visit to assess the accuracy and suitability of the data obtained from completing the self-evaluation (Sholihin et al., 2018). The process of filling out the instrument and providing physical evidence involves several stages: a) Socialization by the education office, b) Checking the accreditation instrument, c) Preparing data as physical evidence, d) Ensuring compliance with the physical evidence in accordance with the accreditation instrument (Antonius, 2017).

b) Implementation of Accreditation by the Assessor Team

In order to fulfill the requirements for Madrasah Accreditation, the Accreditation Assessment Team from the National Accreditation Board for Madrasah Schools (BAN-SM) conducted a visit to MTs. Private Nurul Iman Tanjung Morawa on October 18 2023. The presence of the Assessment Team was welcomed with high enthusiasm by the Head of the Madrasah and his staff members, who accompanied the Assessment Team in carrying out its duties. This visit activity is an important step in maintaining the quality of education, where the assessors are tasked with evaluating through the Visitation Assessment System, collecting relevant data and



information related to the accreditation process, and providing assessments in accordance with the accreditation criteria applicable to MTs. Swasta Nurul Iman Tanjung Morawa.

In his speech, the Head of the Madrasah expressed his gratitude for the visit of the BAN-SM Assessor Team and expressed his hope that the accreditation process could run smoothly. The presence of the Assessor Team here is aimed at ensuring the suitability of the documents that have been uploaded to actual conditions. They also reminded us that the assessment or predicate given would later be determined by the central BAN leadership, in accordance with the information we conveyed regarding this evaluation visit.

Apart from clarifying the data, they also carried out direct inspections in the classroom to observe the dynamics of learning and also evaluated the facilities and infrastructure at the madrasah. Apart from interacting with madrasah staff, assessors also dialogue with school principals, teachers, administrative staff, security officers, parents, and collect responses from students through written surveys.

The assessor's duties involve stages of observation and document review to verify data accuracy as well as carrying out visits for two days, with a duration of five hours per day. On the first day, the assessor team observed the school environment including classrooms, library, teachers' room, prayer room, UKS, and canteen. Meanwhile, on the second day, the assessor team together with the district KPA reviewed the files. Even though the actual value of accreditation is the school itself, the challenge is how MTs Swasta Nurul Iman Tanjung Morawa can measure and improve himself in line with the values obtained.

Strengths and Weaknesses in Implementing Improvements in Accreditation Management at Mts. Private Nurul Iman Tanjung Morawa

1. Comprehensive and relevant curriculum in accordance with National Education Standards

Private Madrasah Tsanawiyah (MTs.) Nurul Iman Tanjung Morawa is still applying the 2013 Curriculum (K13) with the leadership of Mr. Amran Amil, ST as WAKABID Curriculum. However, currently, MTs. Private Nurul Iman Tanjung Morawa has started introducing the Independent Curriculum and is actively participating in various workshops regarding its implementation. The Merdeka Curriculum is sought as the basis for a more adaptive curriculum, while also focusing on the main substance and character formation and competence of students. Distinctive features of this curriculum that encourage learning improvements include: 1) Implementation of project-based learning to strengthen interpersonal skills and character in line with the Pancasila Learner profile. 2) Emphasis on core material so as to allow adequate time for comprehensive learning of basic skills such as literacy and numeracy. 3) Flexibility for educators to adapt different learning according to the individual needs and abilities of students and following local context and characteristics.

2. Availability of adequate facilities and infrastructure

MTs Madrasah. Private Nurul Iman Tanjung Morawa has been equipped with comprehensive educational facilities, from laboratories to libraries, comfortable classrooms, sports fields, and various other facilities. This facility not only supports, but also enhances the student learning experience. From classroom equipment such as blackboards, benches, to tables, to educational media used to enrich learning, including books as a source of knowledge. Apart from that, MTs. Private Nurul Iman Tanjung Morawa has offered guidance and counseling programs aimed at helping students deal with personal and academic challenges and guiding students' career steps.

3. Highly Qualified and Experienced Educators

Teachers at MTs. Private Nurul Iman Tanjung Morawa has met the standards as a professional educator. They not only have strong competencies in their fields, but are also recognized as graduates who have skills appropriate to the subjects they teach. Every month, this madrasah holds various activities aimed at improving student development. Apart from focusing on academic activities in class, they also pay attention to non-academic activities such as social actions, blood donations, writing exercises, and other activities. Apart from that, teachers also actively participate in activities that are beneficial for their personal development and that of students, such as training in writing scientific papers, collaborative projects to build involvement, meetings related to the



curriculum, and so on. All of these activities involve participation from all parties involved in the madrasa, with the aim of improving the quality of education provided.

4. Partnership Of Mts Swasta PNurul Iman Tanjung Morawa with Related Parties

Madrasas that have received accreditation generally establish partnerships with various related entities, such as educational institutions or other institutions. This collaboration is able to produce innovative programs that contribute to improving the quality of education. Through partnerships with other madrasas, the goal of madrasas is to support the implementation of educational tasks by designing learning experiences that are relevant to everyday life, as well as encouraging the growth of students' independence, creativity, tolerance and openness in the learning process. It also aims to provide deeper meaning to students' learning, change lives, and address social problems.

a) Weaknesess

5. Maintaining the Quality of Graduates

At MTs. Private Nurul Iman Tanjung Morawa, the learning process uses textbooks as a learning resource. The use of this textbook requires high comprehension skills from the reader, which not all students are able to master well. Students taught by different teachers may face challenges in answering questions due to possible differences in understanding of the material or theory presented to them. In fact, in other classes with different teachers, the completion of learning material is not necessarily in accordance with the expected chapters.

a. Maintain Teacher Quality

Teacher development is also less emphasized, Madrasas only focus on student development and pay less attention to teacher development. One of the characteristics of MTs. Private Nurul Iman Tanjung Morawa is committed to improving the quality of graduates and continuing to improve academic and non-academic performance for students. MTs. Private Nurul Iman Tanjung Morawa is also trying hard to improve the performance of teachers. However, unfortunately, Madrasahs rarely pay attention to developing teacher quality, which causes minimal participation of MTs teachers. Private Nurul Iman Tanjung Morawa in achievement activities.

b. Conflicts often occur between teachers

Even though the preparation of documents required for accreditation has been indirectly carried out long ago, it cannot be denied that there is the possibility of negligence or loss of documents that could occur. This often leads to mutual accusations of blame between team members. When physical evidence or documents that have long been disorganized or even lost, the committee must work together with the madrasah to recover the documents, even though the activity has long passed. What must be avoided is actually manipulating data or documents that actually have no activity.

Strategy to Improve Accreditation Management in MTs Swasta Nurul Iman Tanjung Morawa to Achieve Superior Accreditation

Nevertheless, the researchers' findings are related to the Strategy for Improving Accreditation Management in MTs Swasta Nurul Iman Tanjung Morawa to Achieve Superior Accreditation highlights the essential steps that must be taken by the institution. The initial stage that must be carried out by MTs. Private Nurul Iman Tanjung Morawa is collecting relevant information regarding the accreditation process. The Madrasah Principal ordered all staff and teachers to deepen their understanding of the standards and criteria needed to achieve level A accreditation. This step requires in-depth mastery of the educational structure, teaching quality and management of the madrasah. Furthermore, regular internal audits are carried out. A superior madrasah is always related to a quality curriculum. MTs Swasta Nurul Iman Tanjung Morawa ensures that the Merdeka Curriculum will provide a comprehensive learning experience and suit the needs of various types of learners. Efforts to improve the quality of teaching are carried out through training for teachers. Collaboration between teachers is the key to developing teaching by integrating various subjects, thereby helping students to see connections between fields of study and understand real-world contexts. Parental involvement can increase student motivation and provide solid support for the school. The role of parents in children's education includes assisting in the learning process, providing



learning facilities, open communication between parents and children, monitoring children's activities, and establishing good relationships between parents and school.

By following these steps, educators and educational institutions can move towards better educational excellence. The quality of education that obtains A level accreditation does not just reach standards, but also provides a memorable learning experience for every student. With steadfast commitment and solid cooperation, teachers and educational institutions can form a generation that is superior and ready to face future challenges with confidence.

Accreditation in Efforts to Improve Quality at Private MTs Nurul Iman Tanjung Morawa

In the world of education, quality and quality improvement are things that must be implemented by educational units. MTs Nurul Iman Tanjung Morawa has been known for the past five years to be recognized as a quality Madrasah seen from its graduates and accreditation with an A rating. To maintain the quality of the Madrasah, the Madrasah has fully anticipated all reaccreditation needs, as evidenced by the explanation above that all required documents are required for reaccreditation 90% are ready without the hassle of providing them

Quality is a complete concept so it is not easy to define and measure. The quality of education at MTs Swasta Nurul Iman Tanjung Morawat is seen from several points of view: 1) Quality in terms of learning achievement, 2). Quality in terms of the process, 3). Quality in terms of input, 4) Quality in terms of effectiveness and efficiency of management of educational institutions, 5). Quality in terms of relevance to the world of work.

Guided by applicable laws and existing government regulations, in fact accreditation of educational units is a step that has the essence of providing quality educational services and the position of accreditation is as a measuring tool for self-regulation. So accreditation is a tool for measuring the quality of educational units in an area, so that we get an idea of the quality of the educational units we have (Azizah & Witri, 2021).

According to MTs Swasta Nurul Iman Tanjung Morawa, accreditation is a process of providing a professional and objective assessment of whether the educational unit meets educational standards or not. The implementation of accreditation must be interpreted as a process of providing an assessment of quality using quality criteria in the educational unit. In this case, MTs Nurul Iman Tanjung Morawa provides information that can be used as a reference, source and guide in making decisions.

MTs Swasta Nurul Iman Tanjung Morawa will continue to strive to improve the quality of education currently being undertaken which includes the 4 IASP components. Of course, various preparations have been made by MTs Nurul Iman Tanjung Morawa to maintain the quality of the educational unit, and the Madrasah will continue to provide guidance and guidance to teachers to make continuous improvements to the learning process.

4. CONCLUSION

From the results of this research, it can be concluded that the implementation of madrasa accreditation requires effective management to ensure the process runs smoothly and achieves the desired targets. Accreditation management must include planning, organizing, implementing, as well as monitoring and evaluation stages. Through the accreditation process, madrasahs continue to develop educational programs and services by analyzing strengths and weaknesses, and designing strategies to increase accreditation scores. This will ultimately produce educational units that meet quality standards and contribute to the formation of quality human resources nationally.

REFERENCES

- Azizah, L., & Witri, S. (2021). Peningkatan mutu pendidikan melalui penerapan total quality management dalam program akreditasi sekolah. *Dawuh Guru: Jurnal Pendidikan MI/SD*, 1(1), 69-78.
- Latri, I. K. (2020). Efektivitas pembimbingan sekolah melalui bedah instrumen dan simulasi akreditasi dalam upaya membantu mempersiapkan Kreditasi SMP Negeri 2 Bebandem Tahun 2019. *Inovasi Jurnal Guru*, 6(12), 7-16.



- Nawaroni, K. A., Riyantini, S., Hasri, S., & Sohiron, S. (2022). Peran akreditasi sekolah dalam upaya meningkatkan mutu pendidikan di kota batam. *Jurnal Ilmu Multidisplin*, 1(2), 408-421.
- Sidiq & Choiri, M. M. (2019). *Metode penelitian kualitatif di bidang pendidikan*. Ponorogo: CV. Nata Karya, 2019.,13
- Sholihin, E. N. C., Bafadal, I., & Sunandar, A. (2018). Pengelolaan persiapan akreditasi sekolah. *Jurnal Administrasi Dan Manajemen Pendidikan*, 1(2), 171–178.
- Sugiyono. (2017). *Metode penelitian kuantitatif, kualitatif, Dan R&D*. Bandung: Alfabeta. 9
- Thobi, M., & Sucitra, D. A. (2022). Upaya peningkatan mutu pendidikan melalui manajemen Akreditasi. *Jurnal Manajemen Mutu Pendidikan*, 10(2), 64–78.
- Utiahman, P. (2017). Manajemen program akreditasi pada sekolah menengah pertama negeri di kabupaten Boalemo. *Jurnal Pascasarjana*, 2(1).
- Wahiddin. (2019). Pembinaan 8 standar Pendidikan SD dengan menggunakan metode sasambo dalam mempersiapkan akreditasi sekolah di kabupaten sumbawa barat tahun 2018. *Jurnal LENTERA: Jurnal Studi Pendidikan*, 1(2), 1–20.



APPLICATION OF ENVIRONMENTALLY BASED EXPERIMENTAL METHODS TO IMPROVE LEARNING OUTCOMES IN ACID-BASE SOLUTION

Sri Ismulyati ¹, Rauzatur Rahmi ², Dessi Nur Adiska ^{3*}, Syarifah Yanti Astryana ⁴
Pendidikan Kimia, Universitas Serambi Mekkah, Aceh, Indonesia
*sri.ismulyati@serambimekkah.ac.id

ABSTRACT

Based on the data obtained, the chemistry learning process still uses lecture and question-and-answer methods. Because of that the students are less active and the learning atmosphere is less enjoyable. It showed that there are still many students who are not happy when starting to learn. Students play around in learning activities; they experience difficulties and obstacles in learning, and do not understand the material presented by the teacher. The aim of this research was to determine whether environmental-based experimental methods can improve student learning outcomes in acid-based solution material in class VII of SMPN.2 Alafan, Simeulue Regency. This research method is descriptive-qualitative, which uses direct observation data on the classroom learning process. The research subjects were 19 students, consisting of 9 males and 10 females. The test was given in the form of multiple-choice questions with 20 questions. The research results showed that the completeness of student learning outcomes was 94.74%. This shows the results of learning using environmental-based experimental methods, especially on acid-based solution material.

Keywords: problem-based learning models, videos, learning outcomes, virus material

1. INTRODUCTION

Chemistry is a natural science that studies matter which includes the structure, properties and changes in matter and the energy that accompanies it. So, with the many chemical concepts and structures that must be studied, most students think that studying chemistry is difficult (Johari & Rahmawati, 2006). The chemistry learning process still uses lecture and question- and- answer methods. So, it makes students less active, and the learning atmosphere is less enjoyable. It can be seen that there are still many students who are not happy when starting learning, most of them play around in learning activities, experience difficulties and obstacles in learning. So, they cannot fully understand the material.

The environment is a learning medium that is very useful for students in forming knowledge. Students can learn knowledge based on the environment around them. Lessons using the natural environment allow students to develop their potential like humans who have reason (Rahmawati, 2006). This approach emphasizes learning activities that are linked to the natural environment around students' lives and the real world, so that apart from being able to open up diverse thinking insights, students can learn various concepts and how to relate them to real life problems. In this way, students' learning outcomes are more meaningful for their lives, as creatures of God, social creatures, and their own integrity.

The experimental method is a method of providing opportunities for individual or group students to be trained in carrying out a process or experiment. Through the experimental method, students will be invited to learn in a more comfortable and enjoyable atmosphere, so that students will be freer to discover various new experiences in their learning (Djamarah, 2000). With this method, it is hoped that various student learning activities can grow in connection with student learning activities. In other words, educational interactions are created, while students act as recipients or being guided. The experimental method is a learning procedure that allows students to carry out experiments to prove for themselves a question or hypothesis being studied (Anggraini, 2010).



2. METHODS

This type of research is descriptive qualitative. The research subjects were 19 students in class VII-2 SMP in the odd semester, consisting of 9 boys and 10 girls. The instrument used is a written test consisting of 20 multiple choice questions. This research was carried out in 2 meetings, where each meeting consisted of 3x40 minutes. At the first meeting, the teacher conveys the material to be studied, then they are given worksheets so that students get as much information as possible regarding the material provided and the assignment to see their understanding using environmental-based experimental methods. In the second meeting, students were asked to present the results of discussions held at the previous meeting and were given a pretest at the end of the lesson.

3. RESULTS & DISCUSSION

Based on the results of class VII-2 students' complete learning in acid-base solutions, a learning outcome score of 94.74% was obtained. This shows that the learning outcomes using environmental-based experimental methods, especially on individual acid-based solution material, have reached the level of completeness. So, the alternative hypothesis (H_a) which states "The application of environmentally based experimental methods on class VII acid base solution material at SMPN 2 Alafan achieved completeness" can be accepted, namely classical completeness of $94.74\% \geq 85\%$, so that the classical completeness obtained is greater than specified completion. When students carry out learning using the experimental method, students carry out the experimental steps themselves and obtain the results that have been carried out from the existing experiments. So that the learning process makes students able to understand the material being taught and can remember it for a longer period of time so that students do not easily forget the material taught by the teacher.

The students' average scores also experienced a better increase from the initial conditions when the researcher made observations. The learning outcomes obtained by students in class VII of SMP Negeri 2 Alafan, Simeulue Regency were 94.74%. An increase in student learning outcomes can be recorded because the ongoing learning process is able to increase student motivation in learning. Students are trained to carry out experiments well. Students are given the opportunity to find answers to the questions given on the student worksheet by conducting experiments with friends in their group so that students can work together to solve existing problems. This is in accordance with previous research, showing that the application of environmentally based experimental methods can improve students' chemistry learning outcomes on the concept of colloidal systems. The average post-test score increased from 61.87 with a KKM of 22.58% in cycle I to 81.12 with a KKM of 90.32% in cycle II (Muslim, 2013).

4. CONCLUSION

The completeness of learning outcomes for class VII students at SMPN 2 Alafan, Simeulue Regency using environmentally based experimental methods on acid base solution material was 94.74%, which shows that learning outcomes using environmentally based experimental methods have achieved individual completeness.

REFERENCES

- Anggraini. (2010). *Media Pembelajaran*, PT. Raja Grafindo Persada, Jakarta.
- Djamarah, S. B. (2002). *Psikologi Belajar*, PT. Rineka Cipta, Jakarta.
- Johari, J. M. C., & Rachmawati, M. (2006). *Kimia SMA dan MA untuk Kelas X*. Erlangga: PT. Gelora Aksara Pratama.
- Muslim, B. (2013). Penerapan metode eksperimen berbasis lingkungan dalam meningkatkan hasil belajar kimia siswa pada konsep sistem koloid (PTK di kelas XI IPA MAN 2 Kota Tangerang). *Seminar Nasional Pendidikan IPA-Biologi FITK UIN Syarif Hidayatullah Jakarta*.



COMPARISON OF PHYSICS CONCEPT UNDERSTANDING ABILITY OF STUDENTS USING PHET *SOFTWARE* WITH NI MULTISIM *SOFTWARE*

Nurulwati^{1*}, A. Halim², Mailizar³, Muhammad Syukri⁴, Mawarni Saputri⁵.
^{1,2,3,4,5}Universitas Syiah Kuala, Indonesia
*nurulwati@usk.ac.id

ABSTRACT

The lack of practical equipment for physics in schools is a contributing factor to the absence of practical. This study aims to determine the differences in understanding of the concepts of students in the control class and experimental class 1 and for differences in understanding the concepts of students in experimental class 1 and experimental class 2. The research methodology involves a quasi-experimental approach employing a nonequivalent control group design. The target population consists of all students at XII IPA SMA Negeri 8 Banda Aceh. The sample for the study is derived using purposive sampling technique. Data collection is accomplished by employing essay test instruments. The independent sample t-test is utilized to assess the difference in concept understanding ability among the three classes, with a significance level of 0.05 after meeting the prerequisite test. The study findings reveal a significant disparity in concept understanding between the control class and experimental class 1, with a t_{count} value of 12.049 > t_{table} 2.068. Additionally, there is a notable difference in concept understanding between the control class and experimental class 2, with a t count value of 13.931 > t_{table} 2.068.

Keywords: PhET Software, NI multisim software, understanding concepts

1. INTRODUCTION

One of the problems facing education in Indonesia is the weak learning process (Barjum, 2022). Students only record, listen, are passive, and memorize the concepts of the material being taught. Whereas concept understanding is very important with the aim that students are able to remember the concepts of the material studied (Magdalena, 2023).

The low concept understanding ability is caused by several things, one of which is the learning process in the classroom that still applies direct learning, where teachers tend to convey information using the lecture method alone and do not use adequate learning models and media (Lisma et al., 2021). Teachers only teach abstract physics through classroom learning, not equipped with a practicum process in the laboratory (Swandi et al., 2020), even though this practicum activity must be carried out (Aria, 2022) because one of the objectives of practicum is to improve students' understanding of concepts (Mohyeden, 2021). Practical activities in the laboratory are rarely carried out even in schools that are categorized as good. This is due to the unavailability of adequate laboratories or lack of facilities in the form of practicum equipment, and so on (Yennita et al., 2022). However, along with the rapid development of technology, the limitations of practicum tools are not a problem. Because there are many supporting software that can be used as a substitute practicum tool for conducting experiments.

Software that can be used as learning support is PhET software. PhET is an interactive simulation developed by a team from the University of Colorado, USA. PhET has developed a series of interactive simulations that are very beneficial in integrating computer technology into learning (Perkins et al., 2020). In line with research (Theasy et al., 2021) which shows the results that the use of PhET software in learning can improve concept understanding, this can be seen from the results of data analysis which has increased learning outcomes with high criteria for the N-gain score of 0.732.

In addition to PhET, there is NI Multisim software that can also be used as learning support. Unlike PhET which provides several sub-materials, NI Multisim can only be used to simulate how an electronic circuit works (Amiruddin, 2021). This software can also model a variety of circuit designs with the completeness of the available components so that almost unlimited combinations of circuit designs can be made. Based on the results of observations and interviews with students and Physics teachers at SMA Negeri 8 Banda Aceh, information was



obtained that students at the high school had a relatively low average score of 45 on Dynamic Electricity material. The low learning outcomes of students indicate that students lack mastery of the concepts in the material taught. This study aims to determine the differences in understanding of the concepts of students in the control class and experimental class 1 and for differences in understanding the concepts of students in experimental class 1 and experimental class 2.

Therefore, the use of PhET software and NI Multisim software is expected to support practicum activities on dynamic electricity material so that students can understand the concepts in the material taught. Based on these problems, researchers are interested in conducting research on Comparison Of Physics Concept Understanding Ability Of Students Using Phet *Software* With Ni Multisim *Software*.

2. METHODS

This research is a quantitative approach and the type of research used in this research is a quasi experiment. This quasi experimental design has a nonequivalent control group design. The sample in this study consisted of three classes, namely class XII IPA 1 as an experimental class taught using PhET software, class XII IPA 2 as an experimental class taught using NI Multisim software and class XII IPA 3 SMA Negeri 8 Banda Aceh as a control class. Sampling in this study was done by purposive sampling technique.

The research instrument used for data collection in this study was a written test, which consists of 10 items of essay test). Data collection in this study through written tests in the form of description test questions. The test was prepared based on indicators of concept understanding developed by Anderson & Krathwohl which were then modified and adjusted to the learning objectives. The data in this study are the results of students' answers to the concept understanding test results before and after the experiment which will be analyzed the Independent sample t-test calculated using SPSS significant level of 0.05 and also N gain test. N gain test was conducted to know the increase on students' concept understanding while t test was conducted to examine whether there was a difference in the understanding of the concept of students on the material of electrical resistance circuits in experimental class 1, experimental class 2 and control class.

3. RESULTS & DISCUSSION

N-gain Concept Understanding Test

The comparison of the increase in students' concept understanding can be seen through the N-gain score graph of the three classes presented in Figure 1.

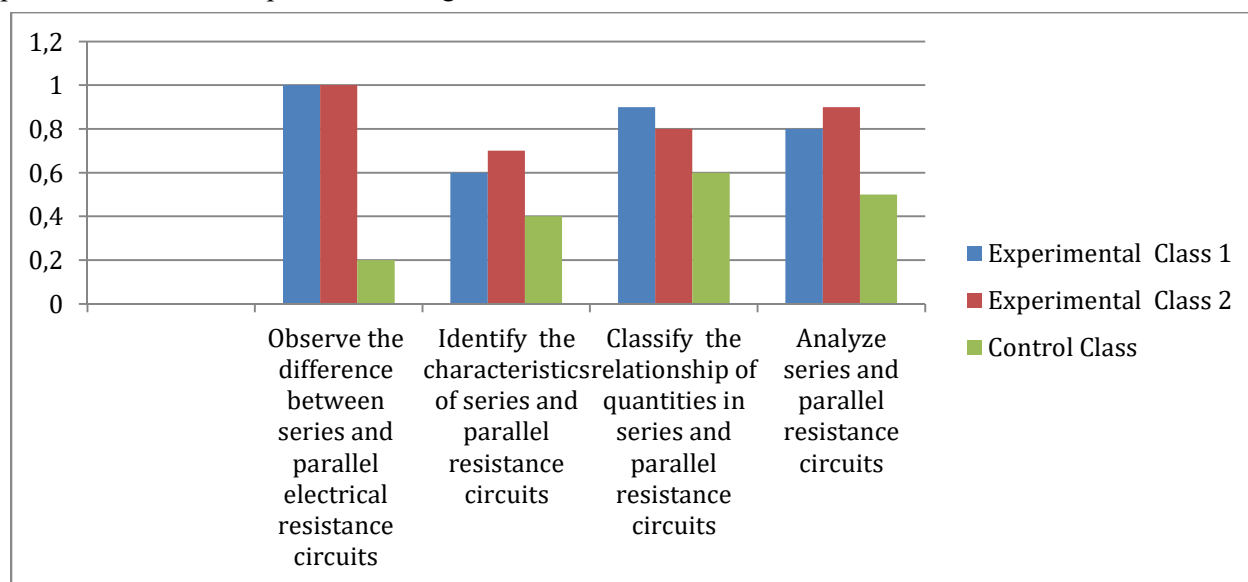


Figure 1. N-Gain Graph Of Experimental Class 1, Experimental Class 2 And Control Class



Based on Figure 1, it can be seen that there are differences in the increase in students' concept understanding in each indicator in each class, where the highest N-gain score on the first indicator is observing the difference in series and parallel electrical resistance circuits with an N-gain score of 1 in experimental class 1 and experimental class 2, and the lowest N-gain score is also found in the first indicator with an N-gain score of 0.2 in the control class.

Hypothesis Test

Hypothesis test results are presented in table 1.

Table 1. Hypothesis Tested

Hypothesis tested	t_{count}	t_{table}	Decision
Control class- experimental class 1	12,049	2,068	H_1 accepted
Control class- experimental class 2	13,931	2,068	H_1 accepted
experimental class 1- experimental class 2	4,369	2,048	H_1 accepted

Based on the results of data analysis, it is obtained that the t_{count} value in the independent sample t-test test in the control class and experimental class 1 is 12.049. Where the t_{count} value is $12.049 > t_{\text{table}} 2.068$, then hypothesis 1 is accepted, so it is known that there is a difference in understanding the concept of students in the control class and experimental class 1.

The t_{count} value in the independent sample t-test in control class and experimental class 2 is 13.931. Where the t_{count} value is $13.931 > t_{\text{table}} 2.068$, then hypothesis accepted, so it is known that there is a difference in understanding the concept of students in control class and experimental class 2.

Furthermore, the results obtained show that the t_{count} value in the independent sample t-test in experimental class 1 and experimental class 2 is 4.369. Where the t_{count} value is $4.369 > t_{\text{table}} 2.048$, then hypothesis accepted, so it is known that there is a difference in understanding the concept of students in experimental class 1 and experimental class 2.

The results of the data analysis above, show that the use of NI Multisim software can also improve the ability to understand the physics concepts of students in each indicator of concept understanding. This is because when using NI Multisim software in learning, students are more emphasized to make electronic circuits so that students are able to analyze each element used. In addition, NI Multisim software has more complete electronic measuring instruments compared to PhET software so it is suitable for conducting virtual experiments on electronics material. This is supported by research conducted by (Putri, et al 2022) which states that the use of NI Multisim software in learning is effective in improving understanding of dynamic electricity concepts with a percentage of 80%. In addition, based on research conducted by (Septianto, 2020) it was found that there was an effect of using NI Multisim software on students' concept understanding. Based on the explanation above, it is found that the use of PhET software and NI Multisim software in learning can have a significant impact on students' understanding of concepts in electrical resistance circuit material. This is reinforced by the results of hypothesis testing; it was found that the value of $t_{\text{table}} > t_{\text{count}}$ in the control class with experimental class 1 and experimental class 1 with experimental class 2.

4. CONCLUSION

Based on the results of research and data analysis that has been done, it can be concluded that

1. There is a difference in the understanding of the concept of students in the control class and experimental class 1 on the material of the electrical resistance circuit at SMA Negeri 8 Banda Aceh, this can be seen from the t_{count} value of $12.049 > t_{\text{table}} 2.068$ stating that there is a significant difference (real) between the average understanding of the concept of students in the control class and experimental class 1.



2. There is a difference in the understanding of the concept of students in experimental class 1 and experimental class 2 on the material of electrical resistance circuits at SMA Negeri 8 Banda Aceh, this can be seen from the tcount value of 4.369> ttable 2.048 which states that there is a significant difference (real) between the average understanding of the concept of students in experimental class 1 and experimental class 2.

5. ACKNOWLEDGMENTS

We would like to thank the research team lecturers, the Principal and Physics teachers at SMA Negeri 8, and all parties who have been involved and participated in this research.

REFERENCES

- Amiruddin, A. (2017). Pengembangan media pembelajaran fisika dengan camtasia studio dan multisim pada pokok bahasan listrik dinamis. *Jurnal Pendidikan MIPA I*, 7(1), 22-29
- Barjum, D. (2022). PDIA for systems change: *tackling the learning crisis in indonesia*. RISE Insight Series. Foreign, Commonwealth & Development Office. Published 15 September 2022.
- Lisma, L., Kurniawan, Y., & Sulistri, E. (2021). Penerapan model learning cycle (LC) 7E sebagai upaya peningkatan pemahaman konsep aspek menafsirkan dan menyimpulkan materi kalor kelas X SMA. *JIPF (Jurnal Ilmu Pendidikan Fisika)*, 2(2), 35.
- Magdalena, I., Nurchayati, A., Uyun, N., & Rean, G. T. (2023). Implikasi teori psikologi kognitif dalam proses belajar dan pembelajaran. *Al-DYAS*, 2(3).
- Mohyeden, J. (2021). Meningkatkan pemahaman konsep cahaya melalui penerapan metode praktikum pada siswa kelas V SDI Paupanda 3. *Ekspektasi: Jurnal Pendidikan Ekonomi*, 6(2), 143-147.
- Ningrum, A. S., Muslim, S., & Siregar, E. (2022). Multimedia simulation model on basic electrical and electronics subjects for vocational secondary school. *Journal of Education Research and Evaluation*, 6(1), 72-79.
- Perkins, K., Adams, W., Dubson, M., Finkelstein, N., Reid, S., Wieman, C., & LeMaster, R. (2020). PhET: Interactive simulations for teaching and learning physics. *The physics teacher*, 44(1), 18-23
- Putri, D. R., Hariani, L. S., & Walipah, W. (2022). Pengembangan media pembelajaran berbasis camtasia studio pada mata pelajaran ilmu pengetahuan sosial (IPS). *Jurnal Riset Pendidikan Ekonomi*, 7(1), 62-70.
- Septianto, F. B., & Kholis, N. (2015). "Pengaruh model pembelajaran kooperatif tipe stad dengan software multisim terhadap hasil belajar siswa pada mata pembelajaran mengukur besaran-besaran listrik dalam rangkaian elektronika di kelas x smk sunan drajat paciran Lamongan. *Tersedia pada* <http://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-teknikelektro/article/view/11427/4436> (Accessed on 5 November).
- Swandi, N., & Irsan. (2015). Pengembangan media pembelajaran laboratorium virtual untuk mengatasi miskonsepsi pada materi fisika Inti di SMAN 1 binamu. *Jurnal Fisika Indonesia*. 18(52), 20-24
- Theasy, Y., Bustan, A., & Nawir, M. (2021). Penggunaan media laboratorium virtual PhET simulation untuk meningkatkan pemahaman konsep fisika mahasiswa pada mata kuliah eksperimen fisika sekolah. *Variabel*, 4(2), 39
- Yennita, Sukmawati, M., & Zulirfan. (2012). Hambatan pelaksanaan praktikum IPA fisika yang dihadapi guru SMP negeri di kota pekanbaru. *Jurnal Pendidikan*, 3(1), 1-11.



Yusuf, I., Widyaningsih, S. W., & Purwati, D. (2022). Pengembangan perangkat pembelajaran Fisika Modern berbasis media laboratorium virtual berdasarkan paradigma pembelajaran abad 21 dan Kurikulum 2013. Jakarta: Pancaran Pendidikan



ARTIFICIAL INTELEGEENCE TRENDS IN EDUCATION AMONG SCHOOL ADMINISTRATORS IN MALAYSIA.

Shanti Ramalingam¹, Mahendran Maniam^{2*}

¹Department of e-Learning, National Institute of Educational Management & Leadership Genting Highlands, Malaysia

²Faculty Of Languages and Communication, Universiti Pendidikan Sultan Idris (UPSI), Perak, Malaysia.

*mahendran@fbk.upsi.edu.my

ABSTRACT

In recent years, artificial intelligence (AI) has gained significant attention in the education sector in Malaysia. With the rapid advancement of technology, school administrators are recognizing the potential of AI to improve student learning outcomes and streamline administrative processes. In this narrative overview, we will discuss some of the AI trends in education that are currently being implemented or considered by school administrators in Malaysia. The awareness of the importance of digital learning are very much needed to be emphasize because without it, students will be left behind in terms of education. The main objective of this research is to identify the prospective impact of artificial technologies among school administrators in Malaysian schools with personalized learning, chatbots, predictive analytics, intelligent tutoring systems, and automated grading. This study also conducted to examine the level of competence of school administrators on the technology management and instructional technology using artificial technologies. The respondents of this study consisted of 40 secondary schools from Malaysia. Using the method of questionnaire survey and interview this study takes the entire education system of Malaysia as an example to explore the effect of AI on role cognition in the education system to streamline administrative processes. The findings of the study show that the level of competence among school administrators in technology management and instructional technology in leveraging AI to improve student outcomes and streamline administrative processes to the study process and to predict possible changes in educational landscape is at a moderate level. Therefore, school administrators need to give their full commitment to the use of instructional technology in order to increase productivity in teaching and learning as well as school management with the impact of artificial intelligence. This research will provide appropriate knowledge for all school administrators to adopt technology leadership features to enhance the school administration system and teacher teaching implementation at a higher level.

Keywords: Artificial intelligence, personalized learning, chatbots, predictive analytics, intelligent tutoring systems, and automated grading.

1. INTRODUCTION

In recent years, the integration of Artificial Intelligence (AI) has become a transformative trend in the education sector, and school administrators are at the forefront of embracing this technological revolution. AI's potential to enhance the learning experience and streamline administrative tasks has caught the attention of educational institutions worldwide. One prominent trend among school administrators is the adoption of AI-powered personalized learning platforms. These platforms leverage machine learning algorithms to analyse students' individual learning patterns, preferences, and strengths, enabling educators to tailor educational content and activities accordingly (Reiss, 2021). This personalization not only fosters better student engagement but also facilitates a more inclusive and effective learning environment.

Another key AI trend among school administrators is the implementation of AI-driven data analytics and predictive modelling. By harnessing the power of AI, administrators can collect and analyse vast amounts of data on student performance, attendance, and behaviour. This data-driven approach allows them to identify early warning signs of academic challenges or potential dropouts, enabling timely interventions and targeted support to at-risk students. Furthermore, AI-powered virtual tutors and educational chatbots are gaining popularity as essential tools in modern classrooms (Southgate, 2020). These virtual assistants can respond to students' questions, provide real-time feedback, and offer additional learning resources, fostering a more self-directed and interactive learning experience. School administrators recognize the potential of such AI tools to alleviate the workload on teachers and empower students to take ownership of their learning journey.



As AI trends continue to evolve in education, school administrators are also addressing concerns related to data privacy, security, and ethics. They are actively collaborating with experts in the field to ensure that AI applications comply with legal regulations and prioritize the protection of students' sensitive information. AI trends in education are captivating school administrators by promising improved learning outcomes, data-driven decision-making, and increased administrative efficiency. The adoption of AI technologies in educational institutions is undoubtedly set to reshape the landscape of modern learning and equip students with the skills needed to thrive in the ever-evolving world (Picciano, 2019).

The prospective impact of artificial technologies among school administrators in Malaysian schools holds great promise for revolutionizing the education landscape. With the integration of artificial intelligence (AI) and automation, school administrators can streamline administrative tasks and improve overall efficiency (Karsenti, 2018). AI-powered systems can handle routine administrative duties such as scheduling, data management, and student records, enabling administrators to focus more on strategic decision-making and fostering a conducive learning environment.

AI-driven analytics can provide valuable insights into student performance and learning trends, allowing administrators to identify areas of improvement and tailor educational programs to meet individual student needs. Predictive analytics can also help identify at-risk students, enabling early intervention strategies to address learning difficulties. Furthermore, the implementation of AI chatbots can enhance communication between administrators, teachers, parents, and students. These chatbots can provide instant responses to common queries, reducing the burden on administrative staff and enhancing the overall user experience (Korn, 2016).

The adoption of artificial technologies in Malaysian schools also raises certain challenges. Data privacy and security concerns must be addressed to safeguard sensitive student information. Moreover, there may be resistance to change from traditional administrative practices, requiring comprehensive training and support to ensure successful integration. The potential impact of artificial technologies among school administrators in Malaysian schools is vast, with the capacity to streamline administrative processes, promote personalized learning, and improve overall educational outcomes. By embracing AI responsibly and addressing potential challenges, schools can empower their administrators to become more effective and responsive in shaping a brighter future for their students.

2. LITERATURE REVIEW

Many other publications highlight opportunities of using AI to conduct online teaching. For example (Ouyang & Jiao, 2021) proposed that AI could facilitate teachers' generation of repetitive questions, and offer students learner-instruction connections, just-in-time personalized support and meaningful automatic communication for classmates. Torda (2020) used AI, an artificial intelligence system, as an example to reach larger audiences easily and enable more condensed access to experts. The AI-driven system could enhance instructor or machine-student interaction through the chat features. Moreover, AI elements provide high computational power, which simulates authentic environments. Zhao & Liu, (2019) "Artificial technology has brought many positive changes in various fields, including in the education sector. Among school administrators in Malaysian schools, artificial technology has had a significant prospective impact. Here are some examples of how artificial technology has influenced school administrators in Malaysia in the context of personalized learning, chatbots, predictive analytics, smart tutoring systems, and automated grading S. Jaskarn (2018).

Figure 1 shows The DigCompEdu framework, which stands for "Digital Competence Framework for Educators," is an initiative by the European Commission that aims to promote digital competence in education. It was designed to empower educators with the necessary skills and competencies to effectively integrate digital technologies into their teaching practices and enhance students' digital literacy (Iqbal, 2018). As AI (Artificial Intelligence) continues to play an increasingly significant role in various aspects of our lives, including education, it's reasonable to assume that the DigCompEdu framework for teachers' AI competency would focus on how educators can effectively use AI tools and applications in their teaching practices. The specific details of the

framework would likely include guidelines, examples, and training materials to help teachers understand AI concepts, identify appropriate AI-based tools for education, integrate AI technologies into their teaching, and ensure responsible and ethical use of AI in the classroom.

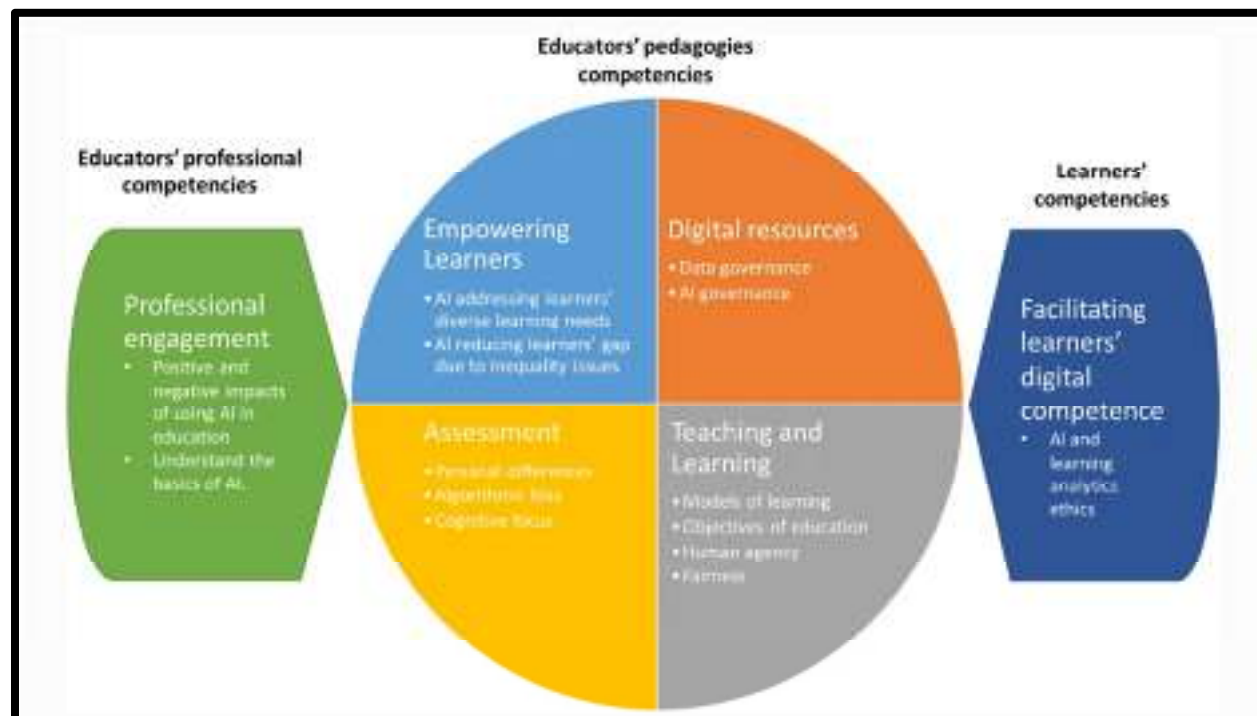


Figure 1: Digcompedu Framework for Teachers' AI Competency (European Commission, 2022)

Personal Learning

Artificial technology allows school administrators to provide a more personalized learning experience to each student. By using data collected through analytics and artificial intelligence, the learning system can identify the strengths and weaknesses of each individual student. This allows school administrators to tailor instruction, offer learning materials tailored to each student's needs, and strengthen their abilities to achieve higher levels of achievement (Stuart & Peter, 1995).

Chatbots

The use of chatbots among school administrators in Malaysia can help provide information and support to students, parents, and teachers immediately. Chatbots equipped with artificial intelligence can provide quick responses to routine inquiries and provide relevant guidance to students on various academic and non-academic issues, (Chandra & Prihastomo, 2012). This helps reduce the workload of school administrators and speeds up the process of getting the desired information.

Predictive Analytics

According to Murphy (2019), by collecting data on student attendance, academic achievement, and behaviour, predictive analytics using artificial intelligence can help school administrators identify trends and patterns in student behaviour. By understanding this data, school administrators can take proactive steps to overcome problems that may arise in school control and achieve better academic achievement.

Smart Tutoring System



Artificial technology enables the development of intelligent tutoring systems that can monitor student performance as they access digital learning materials. This system can identify difficulties faced by students and provide additional support in the form of guidance or recommendations for appropriate learning materials. In addition, smart tutoring systems can also provide feedback to teachers on ways to improve their teaching to be more effective (2019).

Automatic Grading

Artificial technology has made possible the development of automated grading for exams and assignments. Automated grading uses artificial intelligence algorithms to evaluate student answers objectively and consistently. This can reduce the teacher's workload in grading many assignments and exams, as well as ensure that grading is fair and accurate, Zhang, K., & Aslan, A. B. (2021). Overall, artificial technology has given a great prospective effect among school administrators in Malaysian schools. It opens up opportunities to optimize the learning process and improve academic performance as well as strengthen the country's education system. However, it is also necessary to note data privacy issues and ethical concerns related to the use of artificial technology in the education sector.

3. METHODS

The study will explore how these technologies have influenced administrative processes, decision-making, and overall school management. A mixed-methods approach will be employed, involving surveys and interviews with school administrators, as well as data analysis of relevant educational indicators. The research will involve collecting data from educational institutions that have implemented artificial technologies among school administrators in Malaysian schools with personalized learning, chatbots, predictive analytics, intelligent tutoring systems, and automated grading. This study also conducted to examine the level of competence of school administrators on the technology management and instructional technology using artificial technologies. The questionnaire sorted out a total of 40 descriptions and thematic analysis for interview sessions with personalized learning, chatbots, predictive analytics, intelligent tutoring systems, and automated grading. The feedback received is dependent on sincerity or the honesty of the study respondents answering the study questions.

Analysis

Semi-structured interviews will be conducted with a subset of school administrators to gain a deeper understanding of their experiences with these technologies. The interviews explore specific instances where these technologies have been utilized and their impact on decision-making processes, resource allocation, and student engagement. Quantitative data obtained from the survey was analysed using descriptive statistics and inferential methods. This analysis provides a comprehensive overview of administrators' perspectives on each technology, highlighting their perceived impact on efficiency, student outcomes, and administrative decision-making.

4. RESULTS & DISCUSSION

The results were presented, analyzing the statistical data, and identifying trends and patterns among the various artificial technologies. Additionally, the qualitative insights from interviews will be incorporated to provide a more comprehensive understanding of the technologies' impact. The findings will highlight the strengths and limitations of each technology as perceived by school administrators, addressing the extent to which they enhance administrative tasks, improve student performance, and contribute to a more efficient education system.

Table 1. AI Applications Trends in Education Among School Administrators in Malaysia.

	Min	SD	Percentage
Personalized learning	71.4	4.43	76



Predictive analytics	66.2	3.72	55
Intelligent tutoring systems	61.8	3.05	67
Automated grading	66.5	3.81	71
Chatbots	70.1	4.36	73

Referring to Table 1, Artificial intelligence applications trends in education among school administrators in Malaysia in education carries significant implications in four main aspects. Personalized learning shows highest rate of 76%. However, one of the main limitations is the loss of human interaction between teachers and students as well as among students.

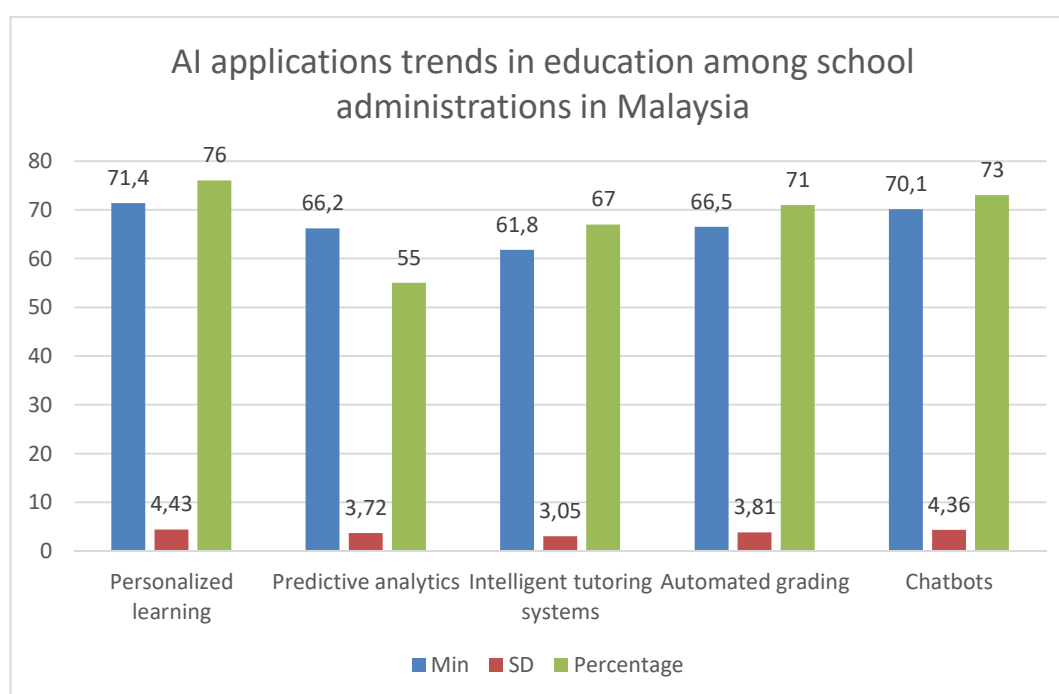


Figure 2: AI Applications Trends in Education Among School Administrators in Malaysia

Based on the study's outcomes, implications for educational policymakers and school administrators will be discussed, focusing on areas that require attention for successful implementation. Recommendations will be provided to optimize the integration of these technologies and maximize their potential benefits, Xu, B. (2021).

In Malaysia, the adoption of AI applications in education carries significant implications and recommendations for school administrators. As AI-driven technologies gain traction, administrators can leverage them to enhance personalized learning experiences, streamline administrative tasks, and gather insights into student performance. However, successful integration requires careful planning, professional development for educators, and robust data privacy measures. School administrators should prioritize investing in AI tools that align with their institution's specific needs and goals. Regular assessment and adaptation of AI strategies are essential to ensure continuous improvement and alignment with educational objectives. By embracing these



recommendations, Malaysian school administrators can harness the potential of AI to create a more efficient, effective, and student-centered learning environment.

5. CONCLUSION

This statistical analysis will offer valuable insights into the impact of personalized learning, chatbots, predictive analytics, intelligent tutoring systems, and automated grading on school administrators in Malaysian schools. By understanding the experiences and perspectives of administrators, this study aims to inform future decisions regarding the adoption and utilization of artificial technologies in the Malaysian education system. There is also a growing emphasis on personalized learning, where AI algorithms provide tailored educational content based on individual student needs and learning styles. This approach is proving beneficial in addressing diverse learning abilities and bridging educational gaps. Furthermore, Malaysian school administrators are exploring AI in enhancing teacher professional development, using AI-driven platforms for training and skill enhancement.

The trend also reflects a proactive stance towards preparing students for a future dominated by AI and technology. Schools are incorporating AI-related subjects and skills into their curricula, emphasizing critical thinking, problem-solving, and digital literacy. However, challenges such as ensuring equitable access to technology, addressing privacy concerns, and providing adequate training for educators in AI utilization remain. Despite these challenges, the trend indicates a positive movement towards a more innovative, efficient, and personalized educational system in Malaysia, driven by AI advancements.

REFERENCES

- Chandra, R., & Prihastomo, Y. (2012). Artificial intelligence definition: A review. *Computer Science*. URL: <https://www.semanticscholar.org/paper/Artificial-Intelligence-Definition-%3A-A-Review-Chandra-Prihastomo/d959ad041acca7570a7229e51c18a297bb7ca0b2> [in English].
- Iqbal, R., Doctor, F., More, B., Mahmud, S., & Yousuf, U. (2020). Big data analytics: Computational intelligence techniques and application areas. *Technological Forecasting and Social Change*, 153, 119253.
- Jaskarn, S. (2018) "Research article artificial intelligence in teaching and learning scenario," *Asian J. of Sci. Technol.*, 9 (5), 8256–8261.
- Korn, M. (2016). Imagine discovering that your teaching assistant really is a robot. *The Wall Street Journal*, 6.
- Karsenti, T. (2018) "AI's huge potential to transform education", 12. 2–3.
- Murphy, R. F. (2019). Artificial intelligence applications to support K-12 teachers and teaching. *Rand Corporation*, 10.
- Ouyang, F., & Jiao, P. (2021). Artificial intelligence in education: The three paradigms. *Computers and Education: Artificial Intelligence*, 2, 100020
- Picciano, A.G. (2019). Artificial intelligence and the academy's loss of purpose. *Online Learning (Newburyport, Mass.)*, 23(3), 270–. <https://doi.org/10.24059/olj.v23i3>.
- Reiss, M. J. (2021). The use of AI in education: Practicalities and ethical considerations. *London Review of Education*, 19(1). <https://doi.org/10.14324/LRE.19.1.05>



- Shafie, H., Majid, F. A., & Ismail, I. S. (2019). Technological pedagogical content knowledge (TPACK) in teaching 21st century skills in the 21st century classroom. *Asian Journal of University Education*, 15(3), 24-33.
- Southgate, E. (2020). Artificial intelligence, ethics, equity, and higher education: A 'beginning-of-the-discussion' paper.
- Stuart, R., & Peter, N. (1995). Artificial intelligence: a modern approach. <https://ec.europa.eu/jrc/digcomp>
- Torda, A. (2020). How COVID-19 has pushed us into a medical education revolution. *Internal Medicine Journal*, 50(9), 1150–1153.
- Xu, B. (2021). Artificial intelligence teaching system and data processing method based on big data. *Complexity*, 2021, 1-11.
- Zhang, K., & Aslan, A. B. (2021). AI technologies for education: recent research & future directions. *Computers and Education: Artificial Intelligence*, 2, 100025.
- Zhao, Y., & Liu, G. (2019, January). How do teachers face educational changes in the artificial intelligence era. *In 2018 International Workshop on Education Reform and Social Sciences (ERSS 2018)* (pp. 47-50). Atlantis Press.



ENHANCING STUDENT PERFORMANCE IN STEAM THROUGH GAMIFICATION: A SWOT ANALYSIS

Rizqiya Windy Saputra^{1*}, Yusrizal Hasja², Khairul Ismi³

¹Onedigit Research and Development & STAI Teungku Chik Pante Kulu, Indonesia

²Serambi Mekkah University, Indonesia

³Iskandar Muda University, Indonesia

*rizqiya@pantekulu.ac.id

ABSTRACT

Teungku Chik Pante Kulu Secondary School examines how well gamification-based education strategies can be incorporated into STEAM (science, technology, engineering, arts, and mathematics) education. The teacher uses Scratch to assess how gamified learning affects student performance and engagement in this particular educational setting using a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis approach. The study highlights the potential benefits of gamification in STEAM education, including increased student engagement, improved problem-solving abilities, and collaborative learning opportunities catered to the needs of Teungku Chik Pante Kulu students. It does, however, also recognize the difficulties, such as the necessity for teachers to have proper training and resources, as well as any potential issues with sustainability and long-term effects. Furthermore, by taking into account the particular cultural and contextual characteristics of Teungku Chik Pante Kulu Secondary School, the analysis identifies chances for utilizing gamification to satisfy particular learning goals and curriculum requirements. On the other hand, risks like technology limitations and the requirement for ongoing assistance and assessment systems are also covered concerning the educational setting. Through an examination of gamification in the unique context of Teungku Chik Pante Kulu Secondary School, this study provides insightful information for teachers and administrators looking to improve student engagement and performance in STEAM subjects through creative teaching strategies. With the ultimate goal of enabling educators to design engaging learning experiences, this study adds to the expanding corpus of research on successful teaching tactics catered to varied learning settings.

Keywords: gamification, steam education, swot analysis, secondary school, Scratch

1. INTRODUCTION

Education development is a principal aspect of student growth processes, plays a crucial role in shaping the future of individuals and societies, and delivers a good impact on the sustainability of schools (Saputra et al., 2019; Saputra et al., 2024). Advancements in education not only enhance knowledge and skills but also foster critical thinking, creativity, and innovation (Gupron et al., 2021; Saputra & Siregar, 2022). Many schools implemented STEAM (Science, Technology, Engineering, Art, and Math) concepts in their curriculum to improve and enhance student knowledge and skills. This is, of course, aligned with the Indonesian government's demand that every educational unit utilize the Merdeka curriculum (named Kurikulum Merdeka) in its education system, which 143,265 have already implemented (Isaeni, N. & Nugraha, A., 2022) with more than 10.2 million users of digital educational platforms in 2022 (Madrim, 2022). The implementation of STEAM is also in high-level demand where the high school is dominated with 42.2% in Figure 1 (Farwati et al., 2021). This became a reason also carried out by Teungku Chik Pantekulu Darussalam Secondary School, which uses the same approach in its curriculum, even though as an educational unit that was only established in 2020, it does not yet use the Merdeka Curriculum.

Gamification is the use of game design elements, tools, methods, or principles in non-game contexts, such as education, to increase motivation, participation, and enjoyment to generate better impact for users/students (Arlinwibowo et al., 2023; Saputra et al., 2024). Gamification can contain many elements such as points, badges, leaderboards, levels, rewards, feedback, challenges, and narratives. Gamification can also involve applying game



mechanics, such as rules, goals, competition, cooperation, and interactivity, to create a more immersive and fun learning experience (Prieto, 2022; Smartico.Ai, 2023). The process of adding games or game-like elements to encourage participation has become an effective way for teachers to engage their students. For STEAM (Science, Technology, Engineering, Art, And Mathematics) education, this type of pedagogy is uniquely suited to create an environment that subverts the traditional classroom setting, transforming it into a space that encourages interaction and exploration (Asigigan & Samur, 2021). The classroom becomes more interactive and the students get many new experiences in their project sciences and art.

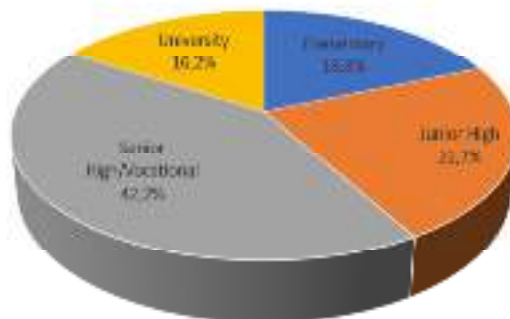


Figure 1: Implementation of STEM Learning Based on Participant Education Unit (Farwati et al., 2021)

Teungku Chik Pantekulu Darussalam Secondary School is part of Islamic Boarding School of Teungku Chik Pantekulu (Mts Teungku Chik Pante Kulu) established in 2020 (Saputra, 2021). During the education process, the school implemented a common curriculum with integration of some courses that related to science and technology. The regular time for study is taking place from Monday to Friday from 07.30 AM to 04.10 PM with a combination of Islamics and common school subjects. On Saturday, they have STEAM Classes. The classes are compulsory and classified for students based on their interests, skills, and test results. The students will be tested from class one (first year) and in the next year, the students are allowed to take another test if they want another STEAM class or they want to change it.

The implementation of learning STEAM Classes at the MTs Teungku Chik Pantekulu is still finding many problems and spaces for enhancement. There are many ways to measure the level of success of implementing a system or technology within the scope of our activities. This measurement can also be assessed from several assessment points of view which will provide an overview of which important points are strengths and important points are weaknesses (Saputra, 2022). This research is trying to explore the potential development and escalation of the process using one of the measurement methods by analyzing using SWOT analysis method. A SWOT analysis for schools can be described as a tool that provides prompts to the school directors, management teachers, and staff involved in the study of what is practical and less effective in the schools' systems and procedures that are often used in preparation for a plan of some form (that could be an audit, assessments, and quality checks (Mike Morrison, 2018).

Therefore, based on the introduction above, this research aims to take an approach of SWOT analysis to measure the level of effectiveness of using gamification in STEAM learning and education through the use of Scratch (Yamamori, 2019; Oh et al., 2013). This research is also expected to be able to describe recommendations for other applications or digital media used so that it can be a reference for other schools for implementation. This research itself is divided into several parts and the first part contains an introduction that tells the background of this research. In the second part, the discussion will be about the research methodology used in taking data samples and the process of extracting information. The third part tells about the results and discussion of this study and the last part contains the conclusions of the research. Ultimately, this research objective would aim to



provide valuable insights into the most successful approaches to incorporating gamification into the STEAM curriculum to improve student outcomes.

2. METHODS

This research utilizes a quantitative and qualitative research methodology approach, which is considered the best way to get maximum results and observe many potential issues related to this research. The first phase begins with the identification process to clearly state what you want to achieve with this study, such as identifying strengths, weaknesses, opportunities, and threats related to STEM subjects. The next step, this research determine who is involved or affected by the use of gamification in STEAM education, including students, teachers, parents, administrators, etc. After that, the research reviews existing studies and articles on gamification in education, focusing specifically on its impact on STEAM subject areas before identifying and producing survey questions. Then, successively, this research analyzes the results of the survey aimed at respondents and adds SWOT analysis to it before analyzing the final results which are under the research limitations. Completely, the flowchart of the research method can be shown in Figure 2.



Figure 2: Research Methodology

3. RESULTS & DISCUSSION

A SWOT analysis generally requires decision-makers to first specify the objective they hope to achieve for the business, organization, initiative, or individual (Bigelow et al., 2023). From there, the decision-makers list the strengths and weaknesses as well as opportunities and threats. SWOT analysis usually is used for a company to examine four elements which is the first one is internal attributes and resources that support a successful outcome, such as a diverse product line, loyal customers, or strong customer service, this is called strength. The second one is called weakness described as internal factors and resources that make success more difficult to attain, such as a weak brand, excessive debt, or inadequate staffing or training. There are two other examinations related to external factors that the organization can capitalize on or take advantage of, such as favorable export tariffs, tax incentives, or new enabling technologies, which are described as opportunities. Later on, the last one called threat, is described as external factors that could jeopardize the entity's success, such as increasing competition, weakening demand, or an uncertain supply chain. The main important thing related to the area of education is the value of solving localized issues and challenges.

In this research, the four elements of SWOT analysis are defined as the main objectives of the research. The objective of this research is to assess the strengths, weaknesses, opportunities, and threats associated with implementing gamification strategies in STEAM education. By conducting a SWOT analysis, the study aims to identify the internal strengths and weaknesses of using gamification in STEAM subjects, as well as external opportunities and threats that may impact its effectiveness. investigate the relationship between gamification



techniques and student motivation and engagement levels in STEAM subjects. The goal would be to determine if there is a positive correlation between the implementation of gamification methods and increased interest, enthusiasm, and participation among students in STEAM courses. Additionally, the research could explore whether certain types of gamification strategies are more effective than others at promoting student motivation and engagement in STEAM fields.

Students of MTs Teungku Chik Pantekulu are directly affected by the implementation of gamification strategies in STEAM classes, so they have an important perspective to share on the effectiveness of these methods. The process of implementation of gamification in this research is using Scratch. Scratch is the world's largest coding community for children and a coding language with a simple visual interface that allows young people to create digital stories, games, and animations (Scratch, 2024). Scratch is designed, developed, and moderated by the Scratch Foundation, a nonprofit organization. Scratch promotes computational thinking and problem-solving skills, creative teaching and learning, self-expression and collaboration, and equity in computing (Yamamori, 2019). As mentioned in the introduction section, students have to learn every Saturday in the specified class. In the Scratch class or section, they will be taught how to create simple computer programs that use the STEAM approach. The case that was created as a project in this section uses using classic pong game which is modified with some instructions (Figure 3). Teachers are responsible for designing and delivering STEAM curriculum, so they must understand the pros and cons of integrating gamification into their lessons. Both groups have a vested interest in ensuring that gamification improves student performance in STEAM subjects, so it is essential to involve them in the research process to ensure that the findings are relevant and useful to all parties involved.



Figure 3: Classic Pong Game modified for STEAM Class. Can be tested at <https://scratch.mit.edu/projects/964647381>

Gamification in learning STEAM subjects using game-based platforms like Scratch offers both advantages and disadvantages. Scratch, as mentioned before is a visual programming language, that can make learning STEAM concepts more engaging and interactive for students. By gamifying the learning process through Scratch, students can develop computational thinking skills, creativity, and problem-solving abilities in a fun and hands-on way. They start to think about what to do at the beginning of creating a pong game, discuss the concept, and finalize the idea. During the class, to reduce the gaps between students, the teacher is making a group for final project. These stages help them to talk and discuss more about the idea of the game. These approaches can enhance their motivation and interest in STEAM subjects, leading to improved learning outcomes.



In a classic Pong game created using Scratch, the STEAM elements are evident in various aspects of the game design and development process. The game involves a ball and a paddle, where the paddle hits the ball to bounce it off a wall before it returns towards the paddle. This simple yet engaging gameplay incorporates elements of physics (Science) in terms of ball movement and collision dynamics. The interactive nature of the game encourages problem-solving and critical thinking (Technology) as players strategize to hit the ball effectively. The visual and creative aspects of designing the game, such as choosing backgrounds, colors, and sprites, involve elements of art and design (Arts). Additionally, the coding and programming required to create the game emphasize mathematical concepts (Mathematics) like coordinates, angles, and speed calculations.

In the modification stages, the game offers more about critical thinking. The game added stage 2 where the condition describes as the ball successfully hit the paddle 10 times, the player will move to level 2. In level 2, the difficulties were made more difficult in moving the ball. The ball will move 3 times faster than level 1. Another modification made is a condition that informed students about losing or winning the game. The condition was made during the winning or losing condition is the user will get a notification and a short music about losing or winning. However, there are also drawbacks to using gamification with Scratch in STEAM education. One potential disadvantage is the risk of students focusing more on the game-like elements rather than the actual educational content. The teachers are feeling this condition. This may lead to a superficial understanding of concepts or a lack of depth in learning. Additionally, designing effective gamified activities using Scratch requires time and expertise from teachers, which can be a challenge for teachers who are not familiar with the platform or game design principles at MTs Teungku Chik Pantekulu. Despite these challenges, the school director hopes that this curriculum can be implemented thoughtfully and that gamification with Scratch can be a powerful tool for enhancing STEAM education by making learning more interactive and enjoyable for students.

The next phase of the research is formulating the right question for identification SWOT Analysis. There are different aspects with several research processes using SWOT analysis which takes research objects at MTs Teungku Chik Pantekulu. This analysis is devoted to finding the strengths, weaknesses, opportunities, and threads of the gamification in STEAM class implementation. The questions along with the percentage of the results of the answers submitted in this analysis. The survey questions are separated into two types of stakeholders as mentioned above which are students and teachers. The number of respondents who took part in this research involved all students and teachers consisting of 15 teachers and 25 students. The answers to survey results are identified with Yes (pointed with 80-100), Uncertain (pointed with 40-79), and No (pointed with 0-39). The percentage value is calculated using the formula below,

$$p = f/n \times 100 \quad \dots\dots\dots (1)$$

p : Percentage

f : Frequency of each questionnaire answer

n : Number of respondents

The results of the survey questions are figured in Table 1.

Table 1. SWOT Analysis on Gamification using Scratch for STEAM Lesson in Students Perceptions

No.	SWOT Analysis	Questions	Percentages
1.	Strengths	The classic Pong game in Scratch is a helpful tool for learning STEAM concepts	80%
		Playing the classic Pong game improved your understanding of physics principles in motion and collision.	86%
		The classic Pong game has enhanced your problem-solving skills in a STEAM context.	78%



2.	Weakness	Have you encountered any challenges or limitations while playing the classic Pong game in Scratch related to learning STEAM subjects?	60%
		The classic Pong game that you find confusing or difficult to grasp in terms of STEAM concepts.	60%
		The classic Pong game adequately represents all the relevant STEAM elements it aims to teach.	60%
3.	Opportunities	The classic Pong game could be further developed to better support learning in STEAM subjects	80%
		Can you suggest any additional features or modifications to the classic Pong game that would enhance its educational value in STEAM education?	75%
		Playing the classic Pong game could be integrated into other STEAM topics for a more comprehensive learning experience	75%
4.	Threats	Are there any risks associated with relying too heavily on the classic Pong game as a learning tool for STEAM subjects?	75%
		Do you see any potential drawbacks or negative consequences of using gamified elements like the classic Pong game in Scratch for teaching STEAM concepts?	75%
		How concerned are you about the possibility of students becoming overly focused on gaming aspects rather than educational outcomes when using the classic Pong game in a STEAM context?	84%

From Table 1, you can see several important points identified through the 4 main SWOT analysis points. The respondents who were students gave answers that tended to be the same. This is shown by their perception value towards the classic Pong Game which tends to be on average >70% agree. This also proves the initial assumption of this research that students tend to prefer and understand learning more easily if they find unique and new learning media. They state the high point in question about how playing the classic Pong game improved their understanding of physics principles in motion and collision. For the survey questions related to teachers perceptions can be figured in Tabel 2,

Table 2. SWOT Analysis on Gamification using Scratch for STEAM Lesson in Teachers Perceptions

No.	SWOT Analysis	Questions	Percentages
1.	Strengths	You perceive the classic Pong game in Scratch as an effective tool for teaching STEAM concepts to students	85%
		You believe the classic Pong game enhances student engagement and understanding of STEAM principles compared to traditional teaching methods	85%
		Have you observed any improvements in student performance or motivation when using the classic Pong game as a gamified learning tool in STEAM subjects?	85%
2.	Weakness	You encounter challenges when integrating the classic Pong game into your STEAM curriculum for educational purposes	90%
		There are any limitations or drawbacks associated with using the classic Pong game that hinder student learning or comprehension of STEAM concepts	70%
		You find it difficult to align the educational objectives of teaching STEAM subjects with the gaming elements present in the classic Pong game	90%
3.	Opportunities	You envision expanding or modifying the classic Pong game to better support student learning and engagement across various STEAM topics	85%



		You can suggest any new features or enhancements that could be incorporated into the classic Pong game to improve its effectiveness as a teaching tool in STEAM education	80%
		You believe in some way that gamified elements like the classic Pong game could be integrated into other areas of your STEAM curriculum to enhance student outcomes	85%
4.	Threats	You have potential risks or challenges foresee in using gamified elements such as the classic Pong game extensively in teaching STEAM subjects	90
		There are some concerns about students becoming overly focused on gaming aspects rather than mastering essential STEAM concepts when using the classic Pong game in your lessons	85
		Do you worry about maintaining a balance between educational content delivery and gaming elements when incorporating the classic Pong game into your STEAM teaching practices?	85

From Table 2, we can identify that You believe the classic Pong game enhances student engagement and understanding of STEAM principles compared to traditional teaching methods is a strong point in the SWOT analysis. The classic Pong game, when used as a gamified learning tool, can make STEAM subjects more interactive and enjoyable for students. The survey gives this point of the question the highest number of positive aspects. On the negative aspects involving weaknesses and threats, the survey in this study showed high scores, especially in the points of developing learning objects and challenges in developing new gamification materials. This can happen because to prepare new gamification material, teachers need time and the process takes quite a long time. From the results of direct interviews, to modify the pong classing game being tested, one of the teachers took more than one day to complete it. Finally, this research identifies the final purposes of SWOT analysis in enhancing students' performance in STEAM Courses using the gamification approach in the infographic in Figure 4.

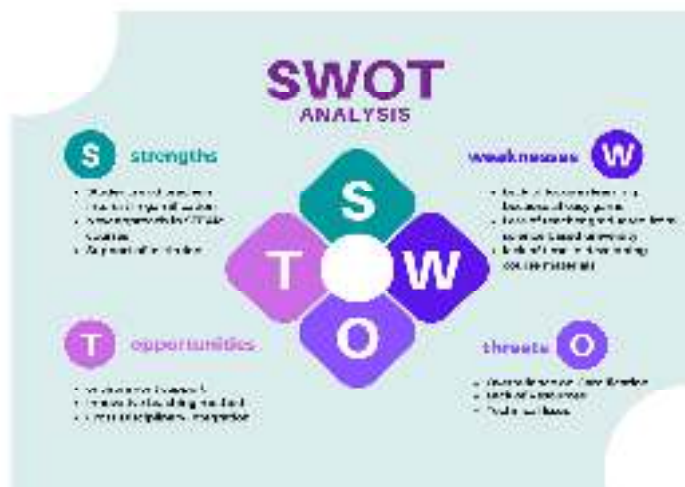


Figure 4: Infographic of SWOT Analysis in Enhancing Students Performance of STEAM Courses using Gamification Approach

Some key points can be highlighted for future development courses from the infographic above. Innovative Teaching Methods can be the opportunity to leverage gamification, such as the classic Pong game in



Scratch, which presents a chance for educators to adopt innovative teaching methods that cater to diverse learning styles. By incorporating gamified elements into STEAM education, teachers can create a more dynamic and interactive learning environment that resonates with students, potentially leading to increased academic performance and engagement. Cross-disciplinary integration can be the use of gamification like the classic Pong game offers an opportunity to seamlessly integrate various STEAM disciplines. Educators can design gamified activities that bridge concepts from science, technology, engineering, arts, and mathematics, fostering a holistic understanding of interconnected subjects. This integration can enhance students' ability to apply knowledge across different domains and develop a well-rounded skill set. Personalized Learning Experiences in gamification provide an opportunity for personalized learning experiences tailored to individual student needs and preferences. Through the classic Pong game and similar gamified approaches, educators can adapt content delivery, challenges, and feedback to suit each student's pace and learning style. This personalized approach can optimize student engagement, motivation, and comprehension of STEAM concepts, ultimately enhancing overall performance in these subjects.

Besides the good opportunities mentioned above, several threats should be a concern for school management or directors. Three potential threats in the SWOT analysis for Student Performance in STEAM through Gamification are projected in an infographic. Overreliance on Gamification, if gamification becomes overly reliant on gaming elements rather than educational objectives, it could lead to a lack of focus on the core STEAM principles, potentially hindering student learning and performance. The second one is lack of resources, If resources such as time, money, and personnel are not adequately allocated to support the gamification of STEAM education, it could lead to a lack of effective implementation, potentially affecting student performance. The last one is technical issues, which can arise with the gamification tools or platforms used in STEAM education, it could lead to disruptions in the learning process, potentially affecting student performance.

4. CONCLUSION

In conclusion, the research highlights the potential of gamified approaches, such as the classic Pong game in Scratch, to positively impact student engagement, understanding of STEAM principles, and problem-solving skills. By leveraging innovative teaching methods and integrating gamification into STEAM education, educators have the opportunity to create personalized learning experiences that cater to diverse student needs and foster cross-disciplinary integration. However, it is essential to be mindful of potential threats such as overreliance on gamification, resource limitations, and technical issues that could impact the effectiveness of these approaches. Moving forward, further exploration and careful implementation of gamified strategies in STEAM education can lead to enhanced student performance and a more dynamic learning environment that prepares students for success in an increasingly complex and interconnected world.

Future research could delve deeper into the long-term effects of gamified learning approaches on student outcomes, retention of knowledge, and transferability of skills beyond the classroom. Exploring the sustainability and scalability of gamification in STEAM education, as well as investigating the impact on students' intrinsic motivation and self-directed learning abilities, could provide valuable insights for educators and policymakers. Additionally, research focusing on the development of more advanced gamification tools and platforms tailored to specific STEAM disciplines could further optimize the effectiveness of gamified learning experiences. Furthermore, collaboration among educators, researchers, and developers is essential to drive innovation in gamification tools and ensure their alignment with educational objectives. By staying informed about best practices and emerging trends in gamified learning, educators can empower students to thrive in STEAM disciplines and cultivate a lifelong passion for learning.

5. ACKNOWLEDGMENTS

Acknowledgment of Onedigit Technology Research and Development is paramount for their invaluable support in facilitating and advancing the research. Their dedication to innovation and commitment to educational



excellence have been instrumental in shaping the trajectory of this study. The expertise, resources, and collaborative spirit provided have significantly contributed to the exploration of gamified learning approaches. Their partnership has been pivotal in driving forward this research endeavor and fostering a culture of continuous improvement and advancement in educational practices.

REFERENCES

- Arlinwibowo, J., Ishartono, N., Linguistika, Y., Purwoko, D., & Suprpto, S. (2023). Gamification in the STEM domain subject: The prospective method to strengthen teaching and learning. *Jurnal Pendidikan IPA Indonesia*, 12(4), Article 4. <https://doi.org/10.15294/jpii.v12i4.48388>
- Asigigan, S. I., & Samur, Y. (2021). The effect of gamified stem practices on students' intrinsic motivation, critical thinking disposition levels, and perception of problem-solving skills. *International Journal of Education in Mathematics, Science and Technology*, 9(2), 332–352. <https://doi.org/10.46328/ijemst.1157>
- Bigelow, Stephen J., Mary K. Pratt, & Linda Tucci. (2023). What is a SWOT analysis? definition, examples, and how to tech target. *CIO*. <https://www.techtarget.com/searchcio/definition/SWOT-analysis-strengths-weaknesses-opportunities-and-threats-analysis>
- Farwati, R. K., Sari, I., Sitinjak, D. S., Solikha, D. F., & Solfarina, S. (2021). STEM education implementation in Indonesia: a scoping review. *International Journal of STEM Education for Sustainability*, 1(1), 11–32. <https://doi.org/10.53889/ijses.v1i1.2>
- Gamification in STEM education—smartico.ai. (2023). <https://smartico.ai/gamification-in-stem-education/>
- Gupron, A. K., Saputra, R. W., & Rizkiah, P. (2021). Prototype development of onboard training monitoring system for merchant marine polytechnic students. *2021 International Conference on ICT for Smart Society (ICISS)*, 1–5. <https://ieeexplore.ieee.org/abstract/document/9532499/>
- Isaeni, N. & Nugraha, A. (2022). Teknologi dalam transformasi pembelajaran kurikulum merdeka. *Gurudikdas Kemdikbud*. <https://gurudikdas.kemdikbud.go.id/news/teknologi-dalam-transformasi-pembelajaran-kurikulum-merdeka>
- Madrim, S. (2022). Mendikbud: 10.2 juta pengguna pakai platform pendidikan. *VOA Indonesia*. <https://www.voaindonesia.com/a/mendikbud-10-2-juta-pengguna-pakai-platform-pendidikan/6828882.html>
- Mike, Morrison. (2018). SWOT analysis for schools education colleges universities. *RapidBI*. <https://rapidbi.com/swot-analysis-for-schools-and-education/>
- Oh, J., Lee, J., & Kim, J. (2013). Development and application of steam based education program using scratch: focus on 6th graders' science in elementary school. *Multimedia and Ubiquitous Engineering. Lecture Notes in Electrical Engineering*, vol 240. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-6738-6_60
- Prieto, C. (2022). Gamification experience in STEM learning environments for higher education students. *International Academic Conference on Education*.
- Saputra, R. W. (2024). Selayang pandang: Tentang dayah modern terpadu teungku chik pantekulu. *Website of Dayah Modern Terpadu Tgk. Chik Pante Kulu*. Retrieved February 28, 2024, from <https://pantekulu.ac.id/selayang-pandang/>
- Saputra, R.W, Rizkiah, P., & Kurniawan, D. (2019). Smart boarding school framework based on service system engineering. *Conference: International Conference on Maritime Education and Training*. <https://doi.org/10.13140/RG.2.2.19954.66240>



- Saputra, R. W. (2022). SWOT analysis on implementing project management tool for digitalization media of education management. *Jurnal Pendidikan Multimedia (Edsence)*, 4(2), Article 2. <https://doi.org/10.17509/edsence.v4i2.52098>
- Saputra, R. W., Nurmala, E., Siregar, M. S., & Vitaloka, D. (2024). Pengaruh persepsi taruna pada penggunaan media pembelajaran gamifikasi dengan pendekatan analisa grounded theory. *Jurnal Maritim Malahayati*, 5(1), 136–143.
- Scratch. (2024). Scratch—about. <https://scratch.mit.edu/>
- Yamamori, K. (2019). Classroom practices of low-cost STEM education using scratch. *Journal of Advanced Research in Social Sciences and Humanities*, 4(6). <https://doi.org/10.26500/JARSSH-04-2019-0601>



TRANSFORMATION OF THE VALUE OF LOCAL WISDOM OF *AMARASI IKAT* WEAVING IN TECHNOLOGY-BASED SOCIAL STUDIES LEARNING

Maria Magdalena Beatrice Sogen¹, Sapriya², Nana Supriatna³, Kokom Komalasari⁴
^{1,2,3,4}Universitas Pendidikan Indonesia
*beatricesogen11@gmail.com

ABSTRACT

The rapid development of information technology in the current era of globalization cannot be avoided anymore with its influence on the world of education. The influence of globalization is not infrequent and also often neglects local wisdom and causes the erosion of national values. The value of local wisdom which is then side by side with technology certainly provides a new color in the implementation of education. Integrating Amarasi ikat weaving in technology-based learning media materials is very important to ensure that the use of technology in learning not only focuses on technical and academic aspects but also on building the character of learners. This study aims to describe the transformation of the value of local wisdom of technology-based Amarasi ikat weaving in social studies learning. This study aims to 1) examine the values of local wisdom of Amarasi ikat weaving, and 2) describe the transformation of Amarasi ikat weaving local wisdom values in technology-based social studies learning. This research was conducted through a qualitative descriptive approach using data collection techniques in the form of observation, interviews, and documentation in Teunbaun Village, West Amarasi District, Kupang Regency, East Nusa Tenggara. Based on the results of the research obtained: 1) the values of local wisdom of Amarasi ikat weaving, 2) the transformation of the values of local wisdom of Amarasi ikat weaving in technology-based social studies learning can provide new colors in the implementation of education to help students better know and love the local wisdom of their region.

Keywords: Transformation, Local Wisdom, Ikat Weaving, Social Studies learning, Technology

1. INTRODUCTION

Today the value of local wisdom has transformed along with technological developments. The value of local wisdom which is then side by side with technology certainly provides a new color in the implementation of education. This means that we must be open with information from the outside world but we must also be strong with the cultural roots of the Indonesian nation. Various challenges began to emerge, both external and internal challenges. These challenges include 1) moral degradation; 2) lack of character cultivation; 3) social shifts; and 4) processes and systems of expansion of transnational free market economies that have penetrated various areas of life such as politics, religion, socio-culture, and economics, including education (Zusmelia et al., 2020; Irwan, 2020; Achmad, 2021).

Transformation is the movement or shift of a thing in another or new direction without changing the structure contained in it, even though in its new form it has changed. The framework of cultural transformation is structure and culture. This cultural transformation is a form of preservation of local wisdom (local genius) in a particular community with the main aim that the culture is not extinct or eroded by global cultural currents (Ali, 2017; Supriatna, 2016; Siska & Supriatna, 2021). As a cultural transformation, education is defined as cultural inheritance activities from one generation to another as a process of personal formation, education is defined as the activity of a systematic and systemic activity directed at the formation of the personality of students (Munawir & Dwi, 2019). Efendi, (2014) revealing the importance of implementing local cultural values in social studies learning can be studied from the underlying educational philosophy, namely Perennialism. Perennialism views education as a very important process in the inheritance of cultural values to students. Cultural values owned by the community are very important to be transformed in education, so that they are known, accepted, and can be lived by students. Instilling the values of local wisdom to students can be combined in the form of innovative



strategies, techniques, models, teaching materials, and learning media (Hurri & Widiyanto, 2018; Siska et al., 2021)

Learning that is integrated with local wisdom will become more meaningful, because students not only understand learning limited to remembering and memorizing or mastering theory, but students can implement it in everyday life (Jati, 2022). In addition, learning that is integrated with local wisdom can foster a sense of nationalism, maintain its culture, and shape character, mindset, and behavior following the national identity of the Indonesian nation (Siska et al., 2021; Siska & Supriatna, 2021). The advantages of local wisdom-based education according to (Sholeh et al., 2022) Among others: (1) Local wisdom helps maximize learning objectives because children can easily recognize, understand, and develop elements in their environment, (2) Local wisdom helps to create a natural children's environment so that children can easy to accept learning, (3) Local wisdom becomes capital for educators to get closer to the child's environment. Social studies learning, which has been guided more by the presentation of textbook material without being followed by material development efforts, such as raising local cultural values in the community, needs to be reviewed immediately. Local culture that is available and close to the process of education is something that deserves to be empowered and utilized as well as possible. Social studies subject matter presented by teachers should be contextual.

Ikat weaving is an indigenous craft in East Nusa Tenggara, especially in Teunbaun Village, West Amarasi District, Kupang Regency. Each area in *Amarasi* displays different patterns and ornamental varieties and colors. The diversity of *Amarasi ikat* weaving is not only limited to art creations, but the making of this weaving also symbolizes the value of life, religious values, and social values. Some motifs are made through contemplation and special concentration because the motifs contain philosophical values, their use is intended for things related to customs and culture and makes them a tradition that has been inherited to this day (Nikolas, 2023).

Amarasi ikat weaving can be used as a learning resource for students. Therefore, the achievement indicator of integrating *Amarasi ikat* weaving into social studies learning is to make students able to understand the love for local culture, especially in the regions, knowing the variety of *Amarasi ikat* weaving motifs and the values contained in them. Social studies teaching must transform into interesting and fun teaching, therefore the role of teachers is very important to make many changes ranging from changing mindsets, learning media, teaching methods, updating information, mastering technology, mastering literacy, and so on (Nursyifa, 2019). Social studies education is a means to socialize social values for the younger generation so that later that generation will become good and democratic citizens in Indonesia. The main purpose of social studies education is to prepare them to be a good citizen so that they can make decisions and participate actively in society, the nation, and the world (Sapriya, 2012; Siska et al., 2021).

The development and transformation of *Amarasi ikat* weaving is interesting to study because it can provide valuable lessons that culture needs to be transformed to continue to be sustainable and have an impact on society. As well the shift in the function of *Amarasi ikat* weaving increases not only as a means of body protection and daily clothing but can be a means of strengthening the identity of a nation that is integrated in social studies learning. Integrating *Amarasi ikat* weaving in the packaging of technology-based learning media materials is very important to ensure that the use of technology in learning not only focuses on technical and academic aspects but also on building the character of students. By using learning media effectively, teachers can create a more engaging, interactive, and relevant learning experience for students. Better interaction between teachers and students, as well as between students and the learning environment, can increase learning effectiveness and have a positive impact on the quality of education (Widyawati & Sukadari, 2023).

Some similar writings about the transformation of local wisdom values such as research conducted by Achmad, (2021) discussed the transformation of technology-based local wisdom values where the results of his research on the transformation of local wisdom values of *Tudang Sipulung* contribute to learning. In addition, Ali, (2017) revealed the transformation of local genius values in the learning process as an effort to build the nation's character in high schools throughout the Simeulue district discusses the transformation of local genius values in learning is needed to reduce global influences that can damage the character of students. The results of the research are a mental revolution of students with local wisdom values. The focus of this research is transforming



the values of the local wisdom of technology-based *Amarasi ikat* weaving which is integrated into social studies learning.

The objectives of this study, namely: 1) describe the form of local wisdom values of *Amarasi ikat* weaving and 2) describe the transformation of *Amarasi ikat* weaving local wisdom values in technology-based social studies learning.

2. METHODS

The research approach used descriptive qualitative. According to Arikunto (2013), descriptive research is a study intended to investigate activities, circumstances, situations, conditions, events, and others. This research will describe, reveal, and decrypt the transformation of local wisdom values of *Amarasi ikat* weaving in technology-based social studies learning. The place of this research was conducted in Teunbaun village, Kupang Regency. The study was conducted in January 2023. The object of this research is the values of local wisdom in *Amarasi ikat* weaving in Amarasi District, Kupang Regency, East Nusa Tenggara.

The data collection technique is carried out in the following ways:

- a. Method of observation (observation)
In this study, observations were made on *Amarasi ikat* weaving craftsmen in Teunbaun sub-district, Amarasi District, Kupang Regency, East Nusa Tenggara, about the variety of *Amarasi ikat* weaving ornaments.
- b. Interview Method
Researchers used a type of unstructured interview guideline. The resource person for this data collection is the maker of the *Amarasi ikat* Weaving motif related to the meaning of each Amarasi motif.
- c. Documentation Method
This study uses records of data related to the object of research as well as photos and recordings of *Amarasi ikat* weaving.

The research instruments used in this study are:

- a. Observation Guidelines
Observance or observation contained instructions in outline about the things observed, this was done through observation of various motives and values of local wisdom in *Amarasi ikat* weaving.
- b. Interview Guidelines
In this study, researchers used a type of unstructured interview guideline. The resource person for this data collection was the maker of the *Amarasi ikat* Weaving motif related to the meaning of various *Amarasi ikat* weaving motifs.
- c. Documentation Guidelines
Documentation techniques in this study were in the form of photographs at the time of data collection, images of *Amarasi ikat* weaving motifs, and other documents related to the value of local wisdom of *Amarasi ikat* weaving.

Data analysis used in this study was using source triangulation and triangulation methods. These methods were used to compare and recheck information obtained by data collection techniques on several data sources. The data source was the result of data collection with observation techniques, interviews, and documents.

3. RESULTS & DISCUSSION

Local Wisdom Values of *Amarasi Ikat* Weaving

Amarasi ikat woven fabric, Kupang Regency, East Nusa Tenggara is a cultural heritage left by ancestors that is made traditionally, has artistic value, and is rich in local wisdom values so that it must be maintained and preserved so as not to become extinct. Weaving is part of Indonesia's cultural heritage that has socio-cultural



significance. In some areas, there are also distinctive woven fabrics that characterize and identify the area. The heritage must be maintained so that it is not lost and can be learned and preserved by future generations (Mahardhani & Cahyo, 2017). Weaving culture is part of a variety of cultures that must be preserved because it can enrich the characteristics of the Indonesian nation with its diverse motifs and patterns, where this woven fabric not only produces textile products, but each motif of this woven fabric has a symbolic meaning, even in the royal era it was also a marker of traditional and social status (Octaviani & Komalasari, 2020).

Hakam and Nurdin, (2016) explain that values are the ideas of a person or group about a value that is considered good, true, beautiful, and wise so that the idea is valuable and qualified to be used as a guide or guide in behaving and acting. When values are in a person's mind, they become important concepts in life, so they become standards of behavior, that is, standards for displaying beauty, efficiency, or meaningfulness that he supports and maintains, although not always conscious. After a person touches and knows a value, the value will gradually affect his beliefs, so that values become the basis of thought and even become the basis of his actions.

Local wisdom is the result of community experience within a certain area and is not necessarily used by people in other regions. These values will be attached very strongly to the life principles of a particular society, its existence has gone through a long passage of time, throughout the existence of that society (Sukron et al., 2020). Local wisdom according to (Supriatna, 2016) is the identity of a nation and the ability to absorb and process culture that comes from outside into its character and ability.

The existence of ikat weaving as a hereditary heritage of the Amarasi community is a form of effort to preserve and develop local culture. *Amarasi ikat* weaving has 64 motifs, including a variety of geometric ornaments, flora, and fauna. The diversity of *Amarasi ikat* weaving motifs is not only limited to art creations, but the patterns and ornamental varieties are taken from stories about the kingdom, customs daily life, and culture of Amarasi. Some decorative varieties of *Amarasi ikat* weaving motifs are *Kaimanfafa*, *Noe Riu*, *Kai Ne'e*, *Panbuat Ana*, *Kret No Tenu*, *Esi*, *Korkase*, *Kaun Tub Hitu*, *Kornak Matanab*, and *Bauneki* (Utami & Yulistiana, 2018). Nikolas, (2023) revealed that the *Amarasi ikat* weaving ornamental variety has experienced the development of as many as 68 motifs, this is influenced by globalization, many things will change starting from the way people think, following modern culture and the emergence of interest in changing new motifs. The woven fabric produced does not solely serve to protect from heat and cold, more than that the woven fabric produced is religious, customary cultural, ethical, and aesthetic (Sonbay, 2018). Various ways are carried out by weaving craftsmen in Teunbaun village to maintain the cultural heritage. As a cultural heritage, *ikat* weaving was born from the mind and creativity of the art of motif makers and weaving craftsmen, especially mothers, which was later passed down from generation to generation as a work of art to fill the spare time of Amarasi women. The artwork passed down from generation to generation can also be said to be local wisdom. Indeed, weavers not only weave a piece of cloth with economic selling value, but they also weave and weave historical motifs, culture, life values, village identity, moral and social messages, and their distinctiveness as women; gentleness, patience, sense of belonging and sharing (Fernandez et al., 2018).

In *Amarasi ikat* weaving, there are good values that can be implemented as a guideline for life. The values in question include the following.

a) Religious Values

The religious meaning of the life of the Amarasi people is expressed in the *korkase* motif, weaving in the form of a bird whose wings are open or flapping (Figure 1). This illustrates the beliefs about *Uis Neno* (God of the Sky), *Uis Pah* (god of the earth), and *Nitu* (ancestral spirits). The picture of belief in *Uis Neno*, *Uis Pah*, and *Nitu* is like a triangle that is not separated or intertwined. *Uis Neno* (Lord of Heaven) occupies the highest place because he is the giver of life. In all matters of people's lives, Amarasi puts forward the God of life. *Uis Pah* was given trust, given trust as a leader (king), and gave welfare to his people. *Nitu* was entrusted by *Uis Neno* to guard and give instructions to humans, in this case, his surviving relatives (Namah, 2020). The *korkase* motif is contained in religious values, because this motif is made as a form or form of the Amarasi community in thanking God and his ancestors. Then, the Amarasi people were taught to respect and respect their ancestors, because they



believed that the spirits of the ancestors influenced their lives so disaster could come if they did not respect and respect the spirits of their ancestors.



Figure 1. Korkase Motif

b) Cultural Values

Cultural values pertain to the self-identity of a society or ethnic group. Motifs and colors, and the process of making *ikat* weaving can reflect the richness and diversity of cultural heritage. In this case, it means that *Amarasi ikat* weaving describes the lifestyle of the Amarasi people who live in simplicity and honor the values that have been passed on from previous ancestors. From *Amarasi ikat* weaving, people can recognize their identity and all the potential of their area. As a cultural heritage, ikat weaving was born from the mind and creativity of the art of motif makers and weaving craftsmen, especially mothers. Which was later passed down from generation to generation as a work of art to fill the spare time of Amarasi women. The artwork passed down from generation to generation can also be said to be local wisdom.

c) Social Values

Social values for the life of the Amarasi people are expressed in the *Kaimanfafa* motif. A weaving with a motif hand in hand. For the Amarasi community, this motif illustrates concern and an attitude of cooperation with fellow humans. Thus, broadly speaking, the social values that exist in *Amarasi ikat* weaving manifest in social solidarity, such as cooperation, friendship cord, please help, harmony, tolerance, and respect for others. Thus, the meaning of value here forms the attitudes and actions of the community in carrying out their social interactions.



Figure 2. Kaimanfafa Motif

d) The Value of Love

The value of love for the lives of the Amarasi people is expressed in *Kaine'e's* motif. This motif means six *Temukung* symbols ((*Uim Ne'e*- 6 houses) that surround the Amarasi Kingdom. For the Amarasi community, this motif teaches love for fellow humans as a bond of brotherhood passed down by ancestors to the next generation wherever they are. The Amarasi community is taught to always help, and not to discriminate against others.



Figure 3. *Kaine'e* Motif

Transformation of Local Wisdom Value of *Amarasi ikat* Weaving in Technology-Based Social Studies Learning

In the era of globalization marked by the rapid development of technology and the internet as it is today, it can easily affect the sustainability of local wisdom. The influence of globalization is not infrequently also often makes local wisdom neglected and causes the erosion of national values. Children are more proud of foreign cultures than of their own. Therefore, local wisdom must be maintained and also preserved (Sartini, 2004). Avoiding the entry of foreign cultures into Indonesia is quite a challenge today. The spread of foreign cultural phenomena often occurs through popular platforms such as YouTube, TV, Instagram, TikTok, and other social channels. The real phenomenon that occurs with the rapid process of globalization is the birth of the gadget generation, a term used to mark the emergence of the millennial generation era. The millennial generations are intended as a generation that in their lives makes information and its devices a part that is always attached to their lives, even inseparable from their lives in any conditions and situations (Wahana, 2019). Heryani et al. (2022) called the era a high-tech high-touch era which made various high-technology tools an important part of life.

The integration of technology in social studies education can facilitate a more interactive, engaging, and relevant learning experience for students. By utilizing technology, students can gain access to a wide and varied variety of learning resources (Widyawati & Sukadari, 2023). By utilizing technology wisely, teachers help students develop a deep understanding of social studies and help them become active, critical-thinking citizens (Utami et al., 2022). The use of this media changes the learning paradigm that previously tended to be saturated and textual to be more interesting and interactive. Teachers can package social studies materials more attractively, increase the efficiency of the teaching process, and encourage students to learn independently. The use of technology in social studies learning creates a positive learning climate, and has a major influence on student motivation and participation, as well as the efficiency of teaching by teachers (Heryani et al., 2022).

Teachers in conducting learning strive to utilize the values of local wisdom as a source of learning for students. The values of local wisdom that exist in the area around the school and students are integrated into learning. Efforts to bring students closer to the distinctiveness of the local culture where they live will not succeed well if teachers are less or even unable to convey it. Therefore, teachers are needed who have an adequate understanding of local cultural values, in addition to their ability to understand the subject matter they are responsible for (Kariadi, 2017). From the student's perspective: the Social Science material is too much and the demands are memorized; the scope of the material is too wide; in learning, students feel tense, and tend to be scared; many students are sleepy when learning social studies because the learning done by the teacher is less exciting and tends to be boring; The materials taught are not related to the environment or students' daily lives. The weakness of Social Science learning is that the learning process is not supported by the development and use of learning media in the form of various socio-cultural cases that grow in the environment of students such as those that are institutionalized in local wisdom (Kariadi et al., 2021).

The values of local wisdom of *Amarasi ikat* weaving can be transformed as a source of learning based on local wisdom. In its use, ikat woven fabric has long been used as daily clothing by the community and is also traded because of its value. At first, weaving was made to meet daily needs as a covering and body armor, then developed for traditional needs (parties, ceremonies, dances, marriages, deaths). Until now it is official and modern clothing designed according to the times. The motif of an *Amarasi ikat* Woven Cloth for the community



can be considered to have a deep value. Thus, teachers can integrate local cultural values so that they continue to be felt until finally able to transform noble traditional values into their students. If it succeeds, it is hoped that the negative cultural influences coming from outside can be minimized (Kariadi, 2017).

The integration of local wisdom content material can be done in integrated learning in elementary schools under 21st-century learning. The material can be integrated into the 2013 curriculum for grade 4 elementary school, for example in theme 1, namely "the beauty of togetherness" with the sub-theme "cultural diversity of my nation". The values of local wisdom can be developed by teachers as models, media, and digital-based teaching materials in social studies learning for example by using YouTube, Canva, Powtoon, Prezi, Sparkol Videoscribe, Lectora, Wondershare Filmora, Flip HTML, Flibook Maker and many other applications and platforms available on the internet. Integrating local wisdom in technology-based social studies learning certainly provides a new color in the implementation of education. This is an effort to maintain and preserve regional culture as the wealth of the Indonesians is very valuable and helps students to better know and love the local wisdom of their region.

4. CONCLUSION

The variety of *Amarasi ikat* weaving culture found in West Amarasi District, Kupang Regency, East Nusa Tenggara consists of several motifs that illustrate the characteristics of Amarasi culture. These cultural characteristics are depicted and expressed through various motifs or varieties of ikat weaving. *Amarasi ikat* weaving has 64 motifs, including a variety of geometric ornaments, flora, and fauna. Some ornamental varieties of *Amarasi ikat* weaving motifs are *Kaimanfafa*, *Noe Riu*, *Kai Ne'e*, *Panbuat*, *Ana*, *Kret No Tenu*, *Esi*, *Korkase*, *Kaun Tub Hitu*, *Kornak Matanab*, and *Bauneki*. The diversity of *Amarasi ikat* weaving motifs is not only limited to art creations, but the patterns and ornamental varieties are taken from stories about the kingdom, customs daily life, and culture of Amarasi. Along with development, many things will change starting from the way people think, following modern culture and the emergence of interest in changing new motifs so that *Amarasi ikat* weaving has developed as many as 68 varieties of ornamental motifs. These motifs have the meaning of the value of local wisdom of the Amarasi community, namely 1) Religious values, expressed in the *korkase* motif of weaving in the form of a bird whose wings are open/flapping. This illustrates the beliefs about *Uis Neno* (God of the Sky), *Uis Pah* (god of the earth), and *Nitu* (ancestral spirits). The *korkase* motif is contained in religious values, because this motif is made as a form or form of the Amarasi community in thanking God and his ancestors. 2) Cultural values pertain to the self-identity of a society or ethnic group. Motifs and colors, and the process of making ikat weaving can reflect the richness and diversity of cultural heritage. *Amarasi ikat* weaving illustrates the lifestyle of the Amarasi people who live in simplicity and honor the values that have been passed on from previous ancestors. 3) Social values for the life of the Amarasi people are expressed in the *Kaimanfafa* motif. A weaving with a motif hand in hand. For the Amarasi community, this motif illustrates concern and an attitude of cooperation with fellow humans. 4) The value of love for the life of the Amarasi people is expressed in the *Kaine'e* motif. This motif means six *Temukung* symbols ((*Uim Ne'e*- 6 houses) that surround the Amarasi Kingdom.

Amarasi ikat weaving can be used as a learning resource for students. Local culture that is available and close to the process of education is something that deserves to be empowered and utilized as well as possible. Social studies subject matter presented by teachers should be contextual. Therefore, the achievement indicator of integrating *Amarasi ikat* weaving into social studies learning is to make students able to understand the love for local culture, especially in the regions, knowing the variety of *Amarasi ikat* weaving motifs and the values contained in them. Social studies teaching must be transformed into interesting and fun teaching, therefore the role of teachers is very important to make many changes ranging from changing mindsets, learning media, teaching methods, updating information, mastering technology, mastering literacy, and so on. By raising the value of local wisdom as an effort to preserve culture which at the same time can improve the quality of learning in schools.



The integration of local wisdom content material can be done in integrated learning in elementary schools under 21st-century learning. The material can be integrated into the 2013 curriculum for grade 4 elementary school, for example in theme 1, namely "the beauty of togetherness" with the sub-theme "cultural diversity of my nation". The values of local wisdom can be developed by teachers as models, media, and digital-based teaching materials in social studies learning for example by using YouTube, Canva, Powtoon, Prezi, Sparkol Videoribe, Lectora, Wondershare Filmora, Flip HTML, Flibook Maker and many other applications and platforms available on the internet. Integrating local wisdom in technology-based social studies learning certainly provides a new color in the implementation of education.

5. ACKNOWLEDGMENTS

The author would like to thank all parties, the West Amarasi Sub-district Office, Kupang Regency, East Nusa Tenggara who have permitted to assist and complete this research.

REFERENCES

- Achmad, W. K. S. (2021). Transformasi nilai kearifan lokal berbasis teknologi. *Prosiding Universitas Kristen*, pp 8–16.
<https://journals.ukitoraja.ac.id/index.php/PROSDING/article/view/1537%0Ahttps://journals.ukitoraja.ac.id/index.php/PROSDING/article/download/1537/1115>
- Ali, H. (2017). Transformasi nilai kearifan lokal (local genius) dalam proses pembelajaran sebagai upaya pembentukan karakter bangsa pada sma se-Kabupaten Simeulue. *PKn Progresif*, 12(1), 528–542.
- Mahardhani, A & Cahyo, H. (2017). Harmoni masyarakat tradisi dalam kerangka multikulturalisme. *Harmoni Masyarakat Tradisi*, 1(1). <https://doi.org/10.30762/ask.v1i1.408>
- Arikunto, S. (2013). Prosedur penelitian suatu pendekatan praktik (edisi revi). *Rineka Cipta*.
- Efendi, A. (2014). Implementasi kearifan budaya lokal pada masyarakat adat kampung kuta sebagai sumber pembelajaran IPS. *Sosio Didaktika*, 1(2), 211–218.
- Fernandez, D., Susanti, E. N., & Nuwa, G. G. (2018). Nilai - nilai kearifan lokal Tenun Ikat Sikka sebagai basis potensi ekonomi kreatif perempuan Sikka. *Prosiding Kolokium Doktor dan Seminar Hasil Penelitian Hibah*, 1(1), 604–623. <https://doi.org/10.22236/psd/1111-1899>
- Heryani, A., Pebriyanti, N., Rustini, T., & Wahyuningsih, Y. (2022). Peran media pembelajaran berbasis teknologi dalam meningkatkan literasi digital pada pembelajaran IPS Di SD kelas tinggi. *Jurnal Pendidikan*, 31(1), 17. <https://doi.org/10.32585/jp.v31i1.1977>
- Hurri, I. & Widiyanto, R. (2018). Pembelajaran IPS berbasis nilai kearifan lokal untuk meningkatkan kepedulian sosial siswa SMP. *Dwija Cendekia: Jurnal Riset Pedagogik*, 2(1), 12–23.
<https://doi.org/10.20961/jdc.v2i1.18338>
- Irwan, I. F. S. (2020). Pelestarian nilai-nilai kearifan lokal mandulang ameh di nagari sisawah sebagai sumber belajar IPS. *Prosiding Seminar Nasional Biologi Edukasi*, 21(1), 1–9. <http://mpoc.org.my/malaysian-palm-oil-industry/>
- Jati, I. M. (2022). Nilai-nilai kearifan lokal sasirangan sebagai sumber belajar IPS. *Jpips*, 14(2), 281–293.
- Hakam, K. A. & Nurdin, E. S. (2016). Metode internalisasi nilai-nilai. *CV Maulana Media Grafika*.
- Kariadi, D. (2017). Pendidikan IPS sebagai wadah penguatan nilai budaya lokal di era globalisasi. *Edunomic Jurnal Pendidikan Ekonomi*, 5(2), 118. <https://doi.org/10.33603/ejpe.v5i2.255>
- Kariadi, D., Kabora, F., & Maryani, E. Sjamsuddin, H., & Ruhimat, M. (2021). Transformasi pengetahuan



- kegempaan berbasis kearifan lokal suku sasak dan aplikasinya dalam pembelajaran ilmu pengetahuan sosial. *Jurnal-PIPSI*, 6, 15–20. <https://journal.stkipsingkawang.ac.id/index.php/JurnalPIPSI/article/view/2254>
- Komalasari, K. D. S. (2017). Pendidikan karakter: konsep dan aplikasi living values education. *Refika Aditama*.
- Munawir, M. & Dwi, E. (2019). Kendala dan tantangan pendidikan berbasis teknologi (technology-based constraints and educational challenges). *Prosiding Seminar Nasional Pendidikan Program Pascasarjana Universitas Pgri Palembang*, 417–427.
- Namah, J. E. (2020). Resistensi simbolik tenun korkase pada masyarakat amarasi. *Jurnal Analisa Sosiologi*, 9(1), 153–168. <https://doi.org/10.20961/jas.v9i1.35420>
- Nursyifa, A. (2019). Transformasi pendidikan ilmu pengetahuan sosial dalam menghadapi era revolusi industri 4.0. *Jurnal Pendidikan Kewarganegaraan*, 6(1), 51. <https://doi.org/10.32493/jpkn.v6i1.y2019.p51-64>
- Octaviani, L. K., & Komalasari, S. A. (2020). Kain tenun ikat sebagai wisata budaya Kabupaten Sikka. *Kepariwisata: Jurnal Ilmiah*, 14(03), 151–159. <https://doi.org/10.47256/kepariwisataan.v14i03.60>
- Sapriya. (2012). Pengembangan kurikulum pendidikan IPS (inovasi pembelajaran IPS). *Rizqi Pres*.
- Sartini. (2004). Menggali kearifan lokal nusantara: sebuah kajian filsafati. *Jurnal Filsafat*, 37(2), 111–120. <https://jurnal.ugm.ac.id/wisdom/article/view/33910/20262>
- Sholeh, K., Setyorini, N., Sukarni, S., Aryanto, A., Sufanti, M., Purworejo, U. M., & Surakarta, U. M. (2022). Pengembangan bahan ajar menulis berbasis kearifan lokal yang mengintegrasikan nilai karakter bangsa di SMK. *Prosiding PIBSI Ke 44*, 131–149.
- Siska, F., Sapriya, S., & Febriani, T. (2021). Local wisdom-based character building through social science learning in elementary schools. *Jurnal Ilmu Sosial Mamangan*, 10(1), 54–59.
- Siska, F., & Supriatna, N. (2021). The urgency of social studies learning through local wisdom approach to the challenge of borderless society. *Proceeding The 6th International On Social Studies and History Education (ISSHE) 2021*, 301–310.
- Sonbay, Y. M. (2018). Faktor-faktor yang mempengaruhi harga kain Tenun Songket (lotis) di Desa Qabikase Kecamatan Insani Barat. *Portal Junior Unimor*, 3(3), 39–41. <https://doi.org/10.32938/ag.v3i3.244>
- Sukron Mazid, Danang Prasetyo, F. (2020). The values of local wisdom as a community character shaper. *Jurnal Pendidikan Karakter*, 10(2), 249–262.
- Supriatna, N. (2016). Local wisdom in constructing students' ecoliteracy through ethnopedagogy and ecopedagogy. *Proceeding 1st UPI International Conference on Sociology Education (UPI ICSE 2015)*.
- Utami, N. A., & Yulistiana. (2018). Tenun ikat amarasi Kabupaten Kupang Nusa Tenggara Timur. *e-Journal Tata Busana Edisi Yudisium Periode Mei 2018*, 07(02), 1–6.
- Utami, S. R., Mukodim, D., Prihantoro, E., Ramadhani, R. W., & Khazim, I. Al. (2022). Ethnographic study of the Marosok Tradition in the Payakumbuh Community using Pierce semiotic analysis. *ETNOSIA : Jurnal Etnografi Indonesia*, 7(2), 105–116. <https://doi.org/10.31947/etnosia.v7i2.22168>
- Wahana, R. (2019). Penerapan model pembelajaran Creative Problem Solving (CPS) untuk meningkatkan kemampuan High Order Thinking Skills (HOTS) dalam pembelajaran bahasa indonesia pada kompetensi teks deskripsi kelas VII. *Seminar Nasional Bulan Bahasa (Semiba)*, 298–305. <https://ejournal.unib.ac.id/index.php/semiba>
- Widyawati, E. R., & Sukadari, S. (2023). Pemanfaatan media pembelajaran berbasis teknologi sebagai alat pembelajaran kekinian bagi guru profesional IPS dalam penerapan pendidikan karakter menyongsong era society 5.0. *Proceedings Series on Social Sciences & Humanities*, 10, 215–225. <https://doi.org/10.30595/pssh.v10i.667>



Zusmelia, Irwan, Putri, Y.E., Rosya,N., & Siska, F. (2020). The meaning of creative economy in the Minangkabu Community in the West Sumatra tourism destination area, Indonesia. *GeoJournal of Tourism & Geosites*, 33.



DYNAMICS OF EDUCATIONAL DIGITALIZATION IN INDONESIA: THE INFLUENCE OF KOREAN CULTURE IN INDONESIA

Isnaini Riska Pratiwi
Sebelas Maret University, Indonesia
isnainiriska@student.uns.ac.id

ABSTRACT

Digitization involves the process of transferring audio, video, and print media into digital form. Digitalization of education is one of the most popular trends in the development of the education system in Indonesia. The digitalization of education in Indonesia is experiencing dynamic changes influenced by cultural factors, including the increasing influence of Korean culture. This article examines the dynamics of digitalization of education in Indonesia in relation to the influence of Korean culture.

With the development of information and communication technology, Korean culture plays an important role in the transformation of education in Indonesia. This article examines how Korean culture influences the use of technology and teaching method strategies in the Indonesian educational environment. Apart from that, it also discusses the negative and positive impacts of the influence of Korean culture on the digitalization of education in Indonesia using the literature study method. This research provides an in-depth view of the interaction between culture and technology in the context of education in Indonesia which continues to develop. In conclusion, it can be said that the influence of Korean culture is an important element to describe Indonesia's increasingly developing digital education journey.

Keywords: digitalization, Korean culture, impact

1. INTRODUCTION

Digitalization has become an integral part of the development of information technology in various areas of life, including education. In Indonesia, the digitalization of education is a significant and growing phenomenon. This is inseparable from the influence of Korean culture which is increasingly expanding into various aspects of Indonesian people's lives, including education. As a result, the dynamics of digitalization of education in Indonesia are becoming increasingly complex and influenced by diverse cultural factors.

In a study by Choi et al. (2018), stated that Korean culture has had a significant influence on the use of technology and teaching method strategies in the Indonesian educational environment. For example, the popularity of K-Pop and Korean dramas has influenced Indonesian teenagers' preferences in choosing educational content and learning styles. This shows how Korean culture has become an important factor in shaping the thinking patterns and learning behavior of Indonesia's young generation.

However, the influence of Korean culture on the digitalization of education in Indonesia is also not free from negative impacts. According to Kim (2019), the tendency to adopt the mindset and lifestyle promoted by Korean culture can lead to neglect of local Indonesian cultural values. This raises concerns about the loss of local cultural identity in globalization which is dominated by Korean culture.

In this context, this research aims to provide a deeper understanding of the interaction between culture and technology in the context of education in Indonesia. By analyzing the influence of Korean culture on the digitalization of education, it is hoped that conclusions can be found that can become the basis for developing more holistic and sustainable education policies.

Thus, this article will review how Korean culture influences the use of technology and teaching method strategies in the Indonesian educational environment as well as its positive and negative impacts on the digitalization of education in Indonesia. Through the literature study method, it is hoped that this research can provide an in-depth and comprehensive view of the digitalization journey of Indonesian education which is increasingly influenced by Korean culture.



2. METHODS

The method used in this article is a literature study. Literary studies is a research approach that involves in-depth analysis of literary works and other writings to understand the meaning, writing style, themes, and cultural context in which the works were produced. The data sources used are primary and secondary data originating from written materials that are relevant to the topic discussed. Primary data consists of research articles regarding Korean culture. Secondary data was taken from mass media reports regarding Korean culture. In this research, after the data was collected, the data was analyzed to reach conclusions. Data analysis is the most important stage of writing. Because at this stage it can be worked on and utilized in such a way as to produce a delivery that can be used to answer the problems that have been formulated (Achmadi, 2013).

3. RESULTS & DISCUSSION

Indonesia is considered one of the important countries that is a target for the spread of Korean culture. One of the reasons is that many Indonesian workers work in Korea and many Koreans invest and live in Indonesia (Darmista, 2015). The incessant spread (diffusion) of Korean culture fostered a love for Korean culture and was followed by the formation of Korean cultural acculturation in Indonesia.

Recently, the influence of Korean culture has spread in many Asian countries, including Indonesia. Perhaps many people from several levels of society do not or have not realized that Indonesian teenagers are so strongly influenced by Korean culture. The following are the forms of Korean influence that are transforming Indonesia.

a) Korean drama

The success of Korean dramas in winning the hearts of Indonesian people was proven by the high level of audience interest in the Korean drama that was first broadcast at that time, namely *Endless Love*.

b) Korean language

Korean dramas and songs arouse their curiosity about Korean culture and language, which makes them want to know and learn Korean culture and language. They are even willing to take Korean language courses so they can learn Hangeul letters and Korean. It is not uncommon for Indonesian students majoring in Korean to admit that they chose this major because they like Korean dramas and want to study the language and culture in depth.

c) K-pop music

Slowly but surely that is what Korea is doing to dominate the world music industry, including Indonesia. It can be seen from the increasing number of girl bands and boy bands in Indonesia who are oriented towards K-pop music.

d) Food and cosmetics

Korean dramas and TV shows have popularized Korean food and cosmetics. Therefore, Korean people pay attention to healthy food that is cooked and eaten hot, as well as beauty care.

The dynamics of digitalization of Korean culture in education in Indonesia have had positive and negative impacts that need to be considered in depth. One of the positive impacts of Korean culture is that Indonesian teenagers can learn about the culture of other countries. The negative impact of the entry of Korean culture into Indonesia is that several Korean habits cannot be applied in Indonesia, which are imitated by Indonesian teenagers. Some of the positive impacts that we can see are:

- a) The influence of Korean culture through entertainment media such as K-pop and Korean dramas has increased students' interest in learning the Korean language and Korean culture as a whole. This is reflected in research by Choi et al. (2018) which shows that the popularity of Korean culture has had a positive impact on Indonesian students' motivation to learn Korean. Passion for Korean cultural content spurs interest in learning Korean and creates an environment that stimulates the development of linguistic competence among Indonesian students.



- b) The dynamics of digitalization of Korean culture have also driven innovation in teaching and learning methods in Indonesia. Teachers and educational institutions can take advantage of the popularity of Korean culture to develop engaging and interactive learning strategies.

In responding to this positive impact, educational institutions and the government need to develop a framework that supports the integration of Korean culture into the overall education curriculum. This can be done by providing training and resources for teachers to develop curricula that are relevant to the Korean cultural context and utilizing technology as an innovative and inclusive learning tool.

The negative impacts of the influence of Korean culture on education in Indonesia are as follows:

- a) The dynamics of digitalization of Korean culture can also have a negative impact, the strong influence of Korean culture, especially through the entertainment industry such as K-pop and Korean dramas, can cause neglect of local Indonesian culture. The popularity of Korean culture can shift students' attention from traditional Indonesian cultural values, which can threaten the sustainability and preservation of local cultural heritage. Kim (2019) highlights that the popularity of Korean culture in Indonesia can lead to a decline in interest in local culture, which has the potential to eliminate Indonesia's cultural identity amidst the flow of globalization which is dominated by Korean culture. This could threaten the sustainability of Indonesia's local cultural heritage and national identity.
- b) The dynamics of the digitalization of Korean culture can also create social gaps in access and understanding of Korean culture among Indonesian students. Students from lower economic backgrounds may not have the same access to technology and educational resources related to Korean culture as students from higher economic backgrounds. This can increase educational inequality and social inequality between students, which can exacerbate the problem of educational inequality in Indonesia. This negative impact needs serious attention from related parties so that education remains inclusive and equitable for all levels of Indonesian society.

Overall, the dynamics of the digitalization of Korean culture in education in Indonesia is a complex phenomenon and requires a balanced approach. While providing opportunities to enhance cross-cultural understanding and enrich learning experiences, we also need to consider the challenges associated with preserving local culture and the judicious use of technology in learning. The interaction between Korean culture and technology in education in Indonesia shows a significant impact on various aspects of learning. Korean culture, especially through the entertainment industry such as K-Pop, dramas, and films, has become one of the main factors influencing Indonesian teenagers' preferences for using digital technology in the teaching and learning process (Lee et al., 2020). For example, technology-based learning applications such as online learning platforms and educational content that use visually and audio-attractive styles tend to be more popular with Indonesian students who are influenced by Korean culture. Furthermore, this interaction also includes the use of technology to support Korean language learning in Indonesia. The increasing popularity of the Korean language among Indonesia's young generation, largely influenced by the Korean cultural phenomenon, has encouraged the development of online learning applications and platforms that provide Korean language learning materials with an interactive and interesting approach (Choi et al., 2018). This reflects how Korean culture has driven innovation in the use of technology to support foreign language learning in Indonesia.

However, the interaction between Korean culture and technology in education in Indonesia also poses challenges, especially related to the sustainability of local culture and assessment of educational content. The strong influence of Korean culture in the use of technology and learning styles can shift attention from local cultural values and traditional Indonesian knowledge (Kim, 2019). Therefore, it is important to consider the balance between the use of technology and the cultivation of local cultural values in the educational context in Indonesia. Addressing the various impacts of Korean cultural influence on education in Indonesia due to the dynamics of digitalization requires a holistic and balanced approach. First, it is important to strengthen understanding of Indonesia's local cultural values and encourage appreciation of its rich cultural heritage. This can



be done through the integration of local content into the educational curriculum and the promotion of extracurricular activities that strengthen Indonesian cultural identity (Kim, 2019). Second, a wise approach is needed in the use of technology in learning. Although technology has the potential to improve access and quality of education, it is important to ensure that its use does not replace social interactions and context-based learning experiences (Choi et al., 2018). Teachers and educational institutions need to develop balanced learning strategies, integrating technology with student-centered learning methods and social skills building. Lastly, cooperation between educational institutions, government, and society is key in responding to the impact of Korean cultural influences on education in Indonesia. Through open dialogue and active collaboration, we can identify challenges and opportunities related to the dynamics of the digitalization of Korean culture and formulate appropriate solutions to optimize its impact in supporting inclusive and sustainable education in Indonesia.

4. CONCLUSION

The interaction between Korean culture and technology in education in Indonesia shows that digitalization has become an integral part of the development of the education system in Indonesia, with the influence of Korean culture further deepening the complexity of digitalization dynamics. The digitalization of education has had a positive impact in increasing accessibility to educational resources related to Korean culture, as well as expanding cross-cultural understanding among students. However, this interaction also raises challenges related to preserving local Indonesian culture and the wise use of technology in the learning process. Therefore, to address the various impacts of Korean cultural influences on education in Indonesia due to the dynamics of digitalization, a holistic approach is needed that strengthens understanding of local cultural values, balanced use of technology, as well as cooperation between educational institutions, government, and society to formulate the right solution to support inclusive and sustainable education in Indonesia. So it can be said that the influence of Korean culture is an important element in describing the digital journey of Indonesian education which is increasingly developing.

5. ACKNOWLEDGMENTS

Thank you sincerely to all parties who have contributed to this research. Without their support and assistance, my achievements would not have been possible. Furthermore, I appreciate the input and advice from colleagues and reviewers who have provided valuable insights to improve the quality of this paper.

REFERENCES

- Ajeng, D. (2015). Agresi budaya Korea melalui K-pop di Indonesia. *Periklanan*. Universitas Yogyakarta.
- Choi, Y., Park, S., & Lee, J. (2018). The influence of Korean wave on Indonesian students' Korean language learning motivation. *The Journal of Studies in Language*, 36(1), 65-86.
- Cindrakasih, R. (2021). Dinamika globalisasi budaya Korea di Indonesia dan pola konsumsi remaja "Korean Wave" di media sosial instagram. *Jurnal Public Relations (J-PR)*, 2(1), 17-28.
- Kim, S. (2019). The impact of Korean wave on the globalization of Korean culture: a study of Korean wave contents in Indonesia. *Journal of International and Area Studies*, 26(2), 135-154.
- Lee, J., Park, S., & Choi, Y. (2020). The influence of Korean wave on Indonesian students' perception and preference of Korean language and culture: a case study of Universitas Indonesia students. *Jurnal Ilmiah Langue and Parole*, 4(1), 49-62.
- Narbuko, Cholid H., & Achmadi, A. (2013). Metodologi penelitian. *Bumi Aksara*.



- Prasanti, R. P. & Dewi, A. I. N. (2020). Dampak drama Korea (Korean wave) terhadap pendidikan remaja. *Lectura: Jurnal Pendidikan*, 11(2), 256-269.
- Yenti, N. S., Syamsir, M. S., Mairiza, N., Anggraini, N., Febriani, E., & Fadilla, P. (2022). Dampak budaya Korea pop (K-pop) terhadap tingkat motivasi belajar mahasiswa Universitas Negeri Padang. *ENGANG: Jurnal Pendidikan, Bahasa, Sastra, Seni, dan Budaya*, 2(2), 176-191.
- Zakiah, K., Putri, D. W., Nurlimah, N., Mulyana, D., & Nurhastuti, N. (2019). Menjadi Korean di Indonesia: mekanisme perubahan budaya Indonesia-Korea. *Mediator: Jurnal Komunikasi*, 12(1), 90-101.



DEVELOPMENT OF CREATIVE THINKING SKILL INSTRUMENTS IN HIGHER EDUCATION

Nuraini Sirajudin^{1*}, Ismail Tolla², dan Muharram³

¹Universitas Khairun, Indonesia

^{2,3}Universitas Negeri Makassar, Indonesia

* nurainisirajudin@gmail.com

ABSTRACT

This study aims to describe the item analysis of creative science thinking skills instruments in environmental education courses. The characteristics of creativity in the context of higher education are the benchmark for this study, namely fluency, originality, elaboration, and flexibility. The method of research was research and development. The validity study of the instrument was carried out by two experts, and the instrument was tested on 26 students. According to the First Expert, the instrument can be used with little revision and the Second Expert states that the instrument can be used without revision. Therefore, the researchers concluded that the instrument can be used with little revision. Based on the trial data on the 12 questions developed, it was found that 5 of the questions needed to be revised before data collection, 6 questions had to be corrected, and 1 question item was not used/discarded. The revision includes the affirmation of question sentences or commands for questions with a status of accepted but needing to be corrected. Indicators of creativity that concern this study are fluency, originality, elaboration, and flexibility. Therefore, from the 5 question items, one question was chosen for each that represented the four indicators of creativity.

Keywords: *Creative thinking, science, higher education*

1. INTRODUCTION

A creative Indonesia is one of the visions of the Ministry of Education and Culture. Creativity has been identified as an increasingly important graduate trait for employment in the 21st century (Georgiou et al., 2022). Creative performance attracted much research in its infancy in the Arab world (Alzghoul et al., 2023). Creativity is an important goal for higher education (Rae, 2023). Fostering creativity in higher education is concerned with improving students' professional competence and personal development (Catarino et al., 2019). Higher Education should also promote creative, and critical students (Vilarinho-Pereira & Fleith, 2021). Most educators and researchers would agree that creativity in higher education is relevant in terms of identifying the right problems (Jahnke & Liebscher, 2020). Creativity plays a role in human development (Sun et al., 2020).

The word creative is an adjective that means to have inventiveness or to (contain) inventiveness. The word creativity is a noun that means the ability to create, inventiveness, or about creating (Depdiknas, 2017). (Plucker & Makel, 2010) stated that the word creativity is the same as, *overlaps*, and is likely synonymous with the terms imagination, ingenuity, *innovation*, inspiration, *inventiveness*, *musings*, novelty, *originality*, serendipity, talent, and uniqueness. According to Peterson (1993), creativity is related to a person's ability to know the usefulness of new unusual, or original construct shapes. Many people do creative activities by combining them with other activities, one of which is intuition. Molefe and Brodie (2010) state that creativity and intuition are natural abilities that belief and understanding need not come from formal, deductive, or analytical proof.

Barron and Harrington (1981) state that the term creativity can have various meanings according to the existing context. We can say that a person can be said to be creative if he can create a product or good that is socially valuable. Creativity can also be viewed in terms of the skills needed to be creative, such as difficulties in understanding and solving problems. In addition, there is also a distinction between creativity as achievement, creativity as ability, and creativity as disposition or attitude. Someone who does creation or creativity will certainly do several stages in carrying out these activities. This stage is a well-structured process. Some experts have their own opinions about the process of creativity. According to Wallas (1993), the creative process has four stages, namely preparation, incubation, making something easier to understand (illumination), and verification. In addition, there are five steps in the creation process, namely: preparation,



incubation, understanding or ability to understand (insight), evaluation, and elaboration (Csikszentmihalyi, 1996).

In addition to the several stages of creativity mentioned above, several components need to be considered in creativity. According to Sharp (2004), there are several components related to the creative process including imagination; originality, namely the ability to produce new and uncommon ideas and products; productivity, which is the ability to generate different ideas through different ways of thinking; problem-solving, namely the application of knowledge and imagination into a given situation; and the ability to produce output in the form of value or something useful. The question that arises is whether the process of creativity or creativity can be taught by teachers to their students. The London-based National Advisory Committee on Creative and Cultural Education (NACCCE) argues that creativity can be taught to students. Teachers can be creative in classroom learning. They can also improve the creative abilities of their students. The role of the teacher is to recognize the creative abilities of his students and provide certain conditions for that creativity to emerge (NACCCE, 1999).

There are several types of creativity. First, creativity can be a form of problem-solving. If so, creativity may occur in conjunction with a goal or set of goals. Second, creativity may differ depending on who people focus on. For example, what people think creatively may not be the same as what someone thinks. Third, if we assume that creation is a process, is the final product part of creativity? If the final form is part of creativity, what criteria should be used to judge whether the product is creative? Novelty or authenticity is often considered an indicator of creativity. But if novelty is used as a criterion, it will leave a problem because a product can be said to be new in a different dimension and vice versa, and a product that has the same value in a dimension may not be perceived as a whole as creative. Fourth, is creativity according to scientists (art experts and others) the same as our idea of creativity? These things cause difficulties in defining the term creativity (Roskos-Ewoldson et al., 1993).

Another opinion regarding the characteristics of creativity comes from the European University Association. According to the European University Association (2007), there are four characteristics of creativity in the context of further education, namely originality, appropriateness, future-oriented, and problem-solving ability. Creativity is not about reproduction but requires new development and requires a breakthrough in ideas and concepts. In addition, not every new one is creative but creativity indicates a new approach that suits the problem at the time. Creativity is also not a setback but focuses on what happens in the future. Creativity is related to problem-solving ability is related to the ability to identify new solutions. It is about the ability to think outside the box, see things from a new point of view, and speculate and be ready for failure.

Creativity in the field of science, especially the field of biology will be developed in this study. Most instruments used to measure creativity are the same from primary to higher education. Not every new thing is creative, but something must match the problem at hand. Fluency, originality, elaboration, and flexibility are the main characteristics developed in this research report. The preparation of instruments will be better if done through development research. The research and development process was carried out to see if the instrument was valid and whether it needed to be revised after the trial.

2. METHODS

The main product of research is the instrument of creative thinking skills. To get quality instruments, these instruments will be developed through the curriculum product development process. The first step is to analyze the initial activity, then conduct a formative evaluation many times aimed at improving the quality of the unfinished product, and continue with a summative evaluation at the end of the process which aims to assess the effectiveness of the final product. This research and development procedure uses the Four-D Model (4D Model), which includes the stages of Define, Design, Develop, and Disseminate (Thiagarajan, Semmel, & Semmel, 1974).

This research was carried out in February 2024 and the research place was carried out at the Makassar State University Postgraduate Program and the Biology Education Study Program, Faculty of Teacher Training and Education, Khairun University. Expert Validators come from Makassar State University and the



subjects of the research are biology education students. The subjects of the research trial amounted to 26 students.

The instrument to determine the validity of question items is the validation sheet. This validation sheet is used to assess the quality of critical thinking skills instruments covering aspects of material, construction, and language. Data on the quality of critical thinking skills instruments obtained with instruments in the form of checklists on the *Likert* scale are then analyzed into quantitative data. The data will be analyzed with descriptive statistics. Descriptive analysis is done only to obtain a score about the quality of the critical thinking skills instrument. Furthermore, it is classified based on the following Table 1.

Table 1. Critical Thinking Skills Instrument Quality Criteria

Skor (X)	Criterion
$3,25 < X$	Excellent
$2,50 < X \leq 3,25$	Good
$1,75 < X \leq 2,50$	Average
$X \leq 1,75$	Poor

3. RESULT & DISCUSSION

The Creative Thinking Skills Instrument will be used to determine the ability of creative thinking skills of biology education students. Indicators or characteristics of students' creative skills are determined to consist of fluency, originality, elaboration, and flexibility from environmental education courses. In the early stages of development, researchers make one question each on each creative indicator.

After the initial creative thinking skills instrument has been developed, the next stage is to ask for expert responses to the instrument. The members who evaluated the number of 2 experts. The assessment includes the suitability of the question items according to the indicators; The boundaries of the questions and expected answers are clear; The content of the material is in accordance with the purpose; The material asked is according to the level; The content of the material is precisely measuring one of the indicators of creative thinking; The content of the material is in accordance with the problem-based; The formulation of sentences in the form of question sentences or commands that demand an unraveled answer; There are clear instructions on how to do/complete; There are scoring guidelines; Meaningful case (clearly the description or has something to do with the problem in question); The question item does not depend on the previous question item; Formulation of communicative sentences; Sentences use good and correct language; The formulation of sentences does not give rise to double interpretation or misunderstanding; Use a common language/word (not the local language); The formulation of the question does not contain words that can offend students; and Between grains are independent of each other. Based on the assessment of these aspects, data on the assessment results from two experts were obtained which are shown in Table 2.

Table 2. Results of Expert Assessment of Critical Thinking Instruments

	Average	Criterion	Notes
First Expert	3,06	Good	Worth using with minor revisions
Second Expert	4,00	Excellent	Worth using without revision
Total	3,53	Excellent	

Based on Table 2, it can be seen that according to the First Expert, the instrument can be used with little revision and the Second Expert states that the instrument can be used without revision. Therefore, the researchers concluded that the instrument can be used with little revision. Revision of the focus of the material, namely environmental issues, conservation, and environmental health, and the addition of question items, namely each creative indicator made three questions based on the three materials in the environmental education course.



After the revision of the instrument, the instrument was tested. The trial was carried out on 4th semester students and 6th semester students. The selection of semester 4th students and semester 6th students as instrument test subjects is based on the assumption that semester 4th students and semester 6th students have received environmental education course materials. The number of students who participated in this trial was 26 students. The results of the analysis of the level of difficulty and difference using Excel are shown in Table 3.

Table 3. Analysis Results of Mathematical Discovery Ability Test

Question No.	Difficulty Level			Discriminatory Power	
	Index	Category		Index	Category
1	0,46	Moderate		0,35	Accepted But Needs to Be Fixed
2	0,48	Moderate		0,35	Accepted But Needs to Be Fixed
3	0,42	Moderate		0,33	Accepted But Needs to Be Fixed
4	0,48	Moderate		0,14	Not Worn/ Discarded
5	0,59	Moderate		0,28	Fixed
6	0,38	Moderate		0,28	Fixed
7	0,47	Moderate		0,34	Accepted But Needs to Be Fixed
8	0,38	Moderate		0,27	Fixed
9	0,29	Difficult		0,21	Fixed
10	0,34	Moderate		0,22	Fixed
11	0,58	Moderate		0,26	Fixed
12	0,40	Moderate		0,36	Accepted But Needs to Be Fixed

The table above shows that 5 questions need to be revised before data collection is carried out, 6 questions must be corrected, and 1 question item is not used/discarded. The revision includes the affirmation of question sentences or commands for questions with a status of accepted but needing to be corrected. Indicators of creativity that concern this study are fluency, originality, elaboration, and flexibility. Therefore, from the 5 question items, one question was chosen for each that represented the four indicators of creativity.

Question point number 1 is used to measure the fluency indicator and has a difficulty level of 0.46, so it can be classified as medium and has a difference power index of 0.35, so this question item is categorized as an acceptable question but needs to be improved. This problem will be corrected for data collection in further research. Question point number 2 is used to measure the originality indicator and has a difficulty level of 0.48, so it can be classified as medium and has a difference power index of 0.35, so this question item is categorized as an acceptable question but needs improvement. Similar to question number 1, this question will be corrected for data collection in further research. Question point number 3 is used to measure the flexibility indicator and has a difficulty level of 0.42, so it can be classified as medium and has a difference power index of 0.33, so this question item is categorized as an acceptable question but needs to be improved. This problem will be corrected for data collection in further research. Question point number 4 is used to measure the flexibility indicator and has a difficulty level of 0.48, so it can be classified as medium and has a difference power index of 0.14, so this question item is categorized as a question that needs improvement. This question will not be used for data collection in further research.

Question point number 5 is used to measure fluency elaboration and has a difficulty level of 0.59, so it can be classified as medium and has a difference power index of 0.28, so this question item is categorized as a question that needs improvement. This question will not be used for data collection in further research. Question point number 6 is used to measure the originality indicator and has a difficulty level of 0.38, so it can be classified as medium and has a difference power index of 0.28, so this question item is categorized as a question that needs improvement. This question will not be used for data collection in further research. Question point number 7 is used to measure the elaboration indicator and has a difficulty level of 0.47, so it



can be classified as medium and has a difference power index of 0.34, so this question item is categorized as an acceptable question but needs improvement. This problem will be corrected for data collection in further research. Question point number 8 is used to measure the flexibility indicator and has a difficulty level of 0.38, so it can be classified as medium and has a power difference index of 0.27, so this question item is categorized as a question that needs improvement. This question will not be used for data collection in further research.

Question point number 9 is used to measure the fluency indicator and has a difficulty level of 0.29, so it can be classified as difficult and has a difference power index of 0.21, so this question item is categorized as a question that needs improvement. This question will not be used for data collection in further research. Question point number 10 is used to measure the originality indicator and has a difficulty level of 0.34, so it can be classified as difficult and has a difference power index of 0.22, so this question item is categorized as a question that needs improvement. This question will not be used for data collection in further research. Question point number 11 is used to measure the elaboration indicator and has a difficulty level of 0.58, so it can be classified as difficult and has a power difference index of 0.26, so this question item is categorized as a question that needs improvement. This question will not be used for data collection in further research. Question point number 12 is used to measure the flexibility indicator and has a difficulty level of 0.40, so it can be classified as medium and has a difference power index of 0.36, so this question item is categorized as an acceptable question but needs to be improved. This problem will be corrected for data collection in further research.

4. CONCLUSION

The development of instruments to measure the creative thinking skills of this research aims to obtain viable instruments through the research and development stages. The main characteristics of creativity that are the focus of research are fluency, originality, elaboration, and flexibility. Based on the assessment of experts, data is obtained that the instrument developed is included in the criteria of very good with a note that the instrument requires a little improvement. After revision, a trial was carried out. Based on the trial data on the 12 questions developed, it was found that 5 of the questions needed to be revised before data collection, 6 questions had to be corrected, and 1 question item was not used/discarded. The revision includes the affirmation of question sentences or commands for questions with a status of accepted but needing to be corrected. Indicators of creativity that concern this study are fluency, originality, elaboration, and flexibility. Therefore, from the 5 question items, one question was chosen for each that represented the four indicators of creativity.

REFERENCES

- Alzghoul, A., Algraibeh, K. M., Khawaldeh, K., Khaddam, A. A., & Al-Kasasbeh, O. (2023). Nexus of strategic thinking, knowledge-oriented leadership, and employee creativity in higher education institutes. *International Journal of Professional Business Review*, 8(4). <https://doi.org/10.26668/businessreview/2023.v8i4.1107>
- Barron, F. B., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual Review of Psychology*, 32.
- Catarino, P., Vasco, P., Lopes, J., Silva, H., & Morais, E. (2019). Cooperative learning on promoting creative thinking and mathematical creativity in higher education. *REICE. Revista Iberoamericana Sobre Calidad, Eficacia y Cambio En Educacion*, 17(3), 5–22. <https://doi.org/10.15366/reice2019.17.3.001>
- Csikszentmihalyi, M. (1996). Creativity: Flow and the psychology of discovery and invention. *HarperCollins Publishers, Inc.*



- Depdiknas. (2017). Kamus bahasa Indonesia. *Pusat Bahasa Departemen Pendidikan Nasional*.
- European University Association. (2007). Creativity in higher education: report on the EUA creativity project 2006-2007. *The European University Association*.
- Georgiou, H., Turney, A., Matruglio, E., Jones, P., Gardiner, P., & Edwards-Groves, C. (2022). Creativity in higher education: A qualitative analysis of experts' views in three disciplines. *Education Sciences*, 12(3). <https://doi.org/10.3390/educsci12030154>
- Jahnke, I. & Liebscher, J. (2020). Three types of integrated course designs for using mobile technologies to support creativity in higher education. *Computers and Education*, 146. <https://doi.org/10.1016/j.compedu.2019.103782>
- Molefe, N., & Brodie, K. (2010). Teaching mathematics in the context of curriculum change. *Pythagoras*, 71, 3–12.
- NACCCE. (1999). All our futures: Creativity, culture, and education. *The National Advisory Committee on Creative and Cultural Education*.
- Peterson, M. J. I. (1993). Imagery's role in creativity and discovery. In B. R. Ewoldsen, M. J. I. Peterson, & R. E. Anderson (Eds.), *Imagery, creativity, and discovery: a cognitive perspective* (pp. 1–38). *Elsevier Science Publisher*.
- Plucker, J. A. & Makel, M. C. (2010). Assessment of creativity. In J. C. Kaufman & R. J. Sternberg (Eds.), *The Cambridge handbook of creativity* (pp. 48–73). *Cambridge University Press*.
- Rae, J. (2023). Connecting for creativity in higher education. *Innovative Higher Education*, 48(1), 127–143. <https://doi.org/10.1007/s10755-022-09609-6>
- Roskos-Ewoldson, B., Intons-Peterson, M. J., & Anderson, R. E. (1993). Imagery, creativity, and discovery: conclusions and implication. In B. R. Ewoldsen, M. J. I. Peterson, & R. E. Anderson (Eds.), *Imagery, creativity, and discovery: a cognitive perspective* (pp. 255–286). *Elsevier Science Publisher B. V.*
- Sharp, C. (2004). Developing young children's creativity: what can we learn from research? *Autumn*, 32.
- Sun, M., Wang, M., & Wegerif, R. (2020). Effects of divergent thinking training on students' scientific creativity: The impact of individual creative potential and domain knowledge. *Thinking Skills and Creativity*, 37. <https://doi.org/10.1016/j.tsc.2020.100682>
- Thiagarajan, S., Semmel, D. S., & Semmel, M. I. (1974). *Instructional development for training teachers of exceptional children: a sourcebook*. *Indiana University*, Bloomington, Indiana.
- Vilarinho-Pereira, D. R. & Fleith, D. de S. (2021). Creative use of information and communication technologies according to university professors and students. *Estudos de Psicologia (Campinas)*, 38, 1–12. <https://doi.org/10.1590/1982-0275202138e190164>



A COLLECTION OF JAMBI TRADITIONAL GAMES AS A PROJECT-BASED LEARNING IN PLAYWRITING

Ady Santoso

Program Studi Seni Drama Tari dan Musik, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Jambi, Indonesia

*ady.santoso1987@unja.ac.id

ABSTRACT

The research departs from the rich collections contained in the Siginjei Museum, Jambi Province, where one of the collection groups is a variety of traditional children's games in Jambi Province. Based on this, the collection of traditional children's games at the Siginjei Museum, Jambi Province, was then used as a project source for the playwriting course at the Dance and Music Drama Arts Study Program at Jambi University. The research method applied in this research activity is qualitative research using observation and literature review techniques. The results obtained from research activities are in the form of drama scripts that were successfully created by students from the collection of traditional children's games at the Siginjei Museum, Jambi Province. The number of play scripts that were successfully created were four short children's play scripts entitled Ayu Congklak Dewi, Bedil Akbar (Meriam Bambu), Yang Lagi Viral (Gasingan Lampu), and Main Seru (Ketapel). The conclusion obtained is that the Project Based Learning learning model using the collection of traditional children's games at the Siginjei Museum, Jambi Province as a source of student project activities in creating play scripts has been successfully implemented to support the success of Play Writing courses.

Keywords: Project Based Learning, Play Writing Lectures, Jambi Traditional Games, Siginjei Jambi Museum

1. INTRODUCTION

The activity of creating a drama script is an activity related to searching for ideas from within the drama script writer. This is because ideas for creating drama scripts can come from anything. Similarly, ideas in writing a play script can come from anything, from humans, animals, plants, or inanimate objects (Riantiarno, 2003). From the ideas that have been obtained or determined which are then developed, the writer then chooses them and then puts them into a drama script. Creating a drama script requires creative creativity, which means it requires the ability to act, think, and have the courage to put it into a drama script. All of these things then become the impetus for drama script writers to produce drama script works that have novel value.

In the case of creating drama scripts inspired by inanimate objects, the author will convey more information related to metaphors or symbols as representatives of the inanimate object (Santoso et al., 2023). Traditional game equipment is inanimate objects used in children's games, such as in the traditional game of peg lele which requires equipment in the form of wood or bamboo. Traditional games are games that have existed since ancient times and have been played from generation to generation using traditional game aids which can be made from wood, bamboo, rope, and surrounding objects (Yulita, 2017). Traditional games are a type of game that exists in a particular area and is based on the culture of that area. Traditional games are usually played by people in certain areas with traditional rules and concepts in ancient times (Bariyah, 2022).

Dance and Music Drama Arts Study Program, Department of Art History and Archeology, Faculty of Teacher Training and Education, Jambi University as the organizer of academic activities at the undergraduate level has the responsibility to prepare graduates who have competence in the fields of drama arts, dance arts and music arts. One of the specializations in the Dance and Music Drama Arts Study Program is drama arts, where there is a Playwriting course. The achievement of this course is the student's ability to write realist-style drama plays. Next, to achieve the Play Writing course, a project-based learning strategy (Project Based Learning) is implemented to achieve students' ability to create realist-style drama scripts.

Learning strategies are efforts to fulfill learning standards. Project-based learning is a student-centered learning strategy model that provides meaningful learning experiences for students (Afriana, 2015). The learning experience process that is then carried out by students is built through a concept based on project-based products,



which is then called Project Based Learning. Project Based Learning or project-based learning is a learning model that is centered on students carrying out an in-depth investigation of a topic (Nurhayati et al., 2019). Students in Project Learning constructively explore research-based approaches to problems and questions that are meaningful, real, and relevant.

Based on this, the aim of this research is how to achieve the learning targets of the Play Writing course, namely the ability of students to create realist-style drama scripts. Therefore, to achieve this target, a project-based learning strategy (Project Based Learning) was implemented, namely in the form of a collection of traditional Jambi games located at the Siginjei Museum, Jambi Province as the background for the project, which was then used as a source for writing realist style drama scripts.

2. METHODS

This research used a qualitative method with an observation and literature review approach. The observation method is an observation method that is carried out by carrying out careful observations and systematic recording (Sangadji & Sopiah, 2010). In this research, the students then carried out observation activities related to the Jambi traditional game collection at the Siginjei Museum, Jambi Province. The literature review method is the next step applied in this research. The research stages of this study are visualized in Figure 1.

After the observation method was carried out, it was then continued with a literature review. Literature review research is the result of analyzing various conceptual information from various previously published scientific articles, this method functions as a guide in studying a research problem (review of research) (Mulyadi, 2012). In this research, this literature review was used in the form of articles regarding information related to the collection of Jambi traditional games in the Siginjei Museum, Jambi Province, as well as the history, development, and procedures for playing these Jambi traditional games.

The results of observations and literature review of the research object were then followed by interpreting the data according to the researcher's perspective and understanding. In the next stage, an interpretative approach is applied, namely to interpret the findings of the research object carried out by the researcher based on the results captured from signs that appear or are born which have meaning which the researcher then interprets for further research action (Farida, 2017).

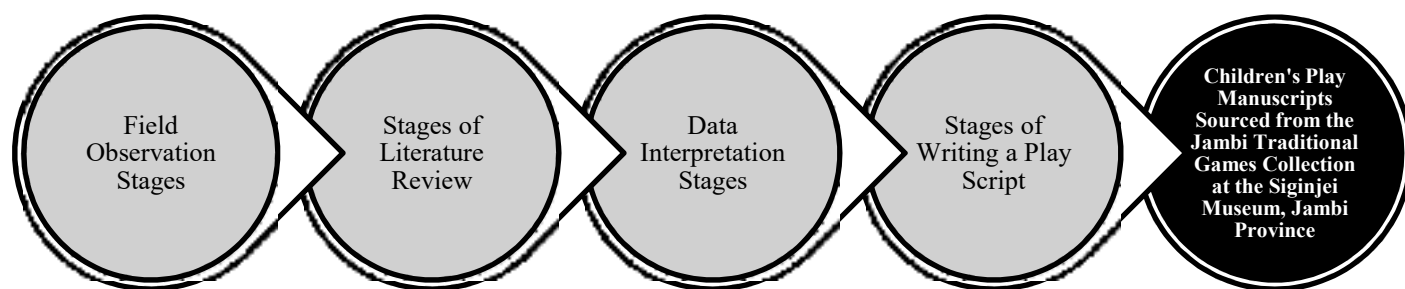


Figure 1. Research Stages

The research stages of this study are visualized in Figure 1. The stages of the research method then carried out by the researcher consisted of (1) the field observation stage, in this stage the researcher visited the Siginjei



Museum, Jambi Province to see firsthand the collection of Jambi traditional games; (2) the literature review stage, in the form of collecting various data related to traditional games that have been determined to then be developed into a realist style drama script; (3) the interpretation stage, in which the researcher begins to interpret the data that has been obtained to create children's play scripts based on traditional games; (4) stages of writing a play script based on traditional Jambi games.

3. RESULTS & DISCUSSION

Research activities have been carried out at the Siginjei Museum, Jambi Province, with the research object being a collection of Jambi traditional children's games. There are nine collections of Jambi traditional games in the exhibition hall, including (1) Chess and chess pieces; (2) *Congklak*; (3) *Meriam bambu/Bedilan bambu*; (4) *Patok lele*; (5) *Kitiran/Baling-baling bambu*; (6) *Taji*; (7) *Casing*; (8) *Celetoran/ Pistol bambu*; and (9) *Umban tali*. From the nine collections of Jambi traditional games in the Siginjei Museum exhibition room, the students then selected four collections that would later be used as children's short drama scripts. The four collections of Jambi traditional games are (1) *Congklak*; (2) *Meriam bambu/Bedilan bambu*; (3) *Casing*; and (4) *Umban tali*.




Figure 2. Field observations with students

An explanation of the selection of collections which were then translated into short children's drama scripts is presented in the table below. The table below is a description of the Jambi traditional game collection which was used as a source of creation, accompanied by photos from the collection, as well as the title of the script, the name of the playwright, as well as the script of his children's plays which are contained in this table. The table below consists of four tables containing descriptions of each children's drama script.



Table 1. Children's Drama Script 1

Manuscript Title	Screenwriter	Source of Traditional Game Collection	Game Collection Photos
Maen Seru (Ketapel)	Prety Kumala Sari	This text is based on the traditional Jambi game "Umban Tali" which is found in the Siginjei Jambi Museum Traditional Games Collection.	 <p>Figure 3. Traditional Jambi game <i>Umban Tali</i></p>

Children's Drama Script Maen Seru (Ketapel)

Cast

1. "Emak" (An elderly woman over the age of 50)
2. "Lia" (A young girl, aged 10 to 15 years)
3. "Irul" (A young boy, aged 10 to 15 years)
4. "Alep" (A young boy, aged 10 to 15 years)

Latar depan rumah panggung bergaya Melayu Jambi, dengan sebagaimana rumah-rumah panggung Melayu Jambi lainnya, rumah yang sangat asri, dinding dari papan yang di cat berwarna coklat tua, di kelilingi tanaman bunga dan 1 pohon yang rindang, ada beberapa dedaunan yang jatuh di bawah pohon yang telah kering, serta halaman yang dipenuhi oleh rumput gajah, menambah suasana rumah menjadi asri.

Lia masuk dari luar ke arah rumah memakai pakaian sekolah dasarnya dan menggendong tas ransel, terdengar nyanyian kecil dan di kompakan iringan langkah dari Lia, seakan nyanyian itu yang menemaninya berjalan kaki pulang kerumah. Selangkah menaikkan kaki ke tangga.

Lia : Samekom, Samekomm (suara keras) Makkk...

Lia : Oooo maakkkk...

Emak : Ah, Waalaikumsalam nak, haha dak dengar Emak nak. Emak tadi di belakang nengok ayah menceng belut.

Lia membuka sepatu dan kaos kakinya.

Lia : Laok belut lagi kito Mak.

Emak : Iyo belut sambal, pake sayur bayam jugo dan (bahagia) sambal perek kesukaan anak Mak.

Lia : Kesukaan Ayah jugo Mak, hmmm (tertawa kemudian hening) tapi agek lia nak maen keumo yo Mak, samo Abang Irul jugok.

Emak : Maen teros, hari panas kagek demam. Makan la dulu biak enak tedok siang hari ini

Irul lewat depan rumah mak, membawa umban tali ia hendak pergi main.



Emak : Rul, nak kemano tengah hari cak ini. Siang bolong ini agek ado antu banyu. Dak takot kamu ha, merayap teros.
Irul : Cari angin disawah ngah.
Emak : Dak sekolah Irul e, Lia be baru sampe rumah ha.
Irul : Kelas Irul tadi balek cepat ngah.
Emak : Mak ado dirumah dak. Ngah nak kerumah. Pak ngah kau tadi dapat belut banyak nian
Irul : Ado, mak dirumah la, la balek dari umo. Lagi jemur padi bae sekarang.
Emak : Ha iyolah itube.

Irul pergi, Emak dan Lia masuk ke dalam rumah, tidak lama kemudian Lia keluar dari rumah dan mengejar abang sepupunya yaitu Irul yang juga mau main ke sawah, setelah Lia pergi, terdengar suara Mak memanggil dari dalam menuju keluar.

Emak : Liaaa... Liaaaaa... Oiiii... Ya Allah... Tuhan, pegi nianla anak itu. Dak dengar lagi cakap orangtuo.

Mak masuk kedalam, lampu padam. Terdengar suara musik, tak lama kemudian lampu mulai hidup perlahan, Irul dan Lia pulang kerumah. Lia sambil menangis karena kesakitan punggungnya terkena umpan tali yang dimainkan oleh teman Irul yaitu Alep. Mendengar suara Lia yang menangis semakin besar karena telah mendekati rumah, akhirnya mak keluar rumah, Lia tetap menangis.

Emak : Ya Allah... Ngaponii.
Irul : Lia keno umpan tali mak, Alep salah betet nyo, mau nganu burung malah keno adek.
Emak : Mano Alepnyo suruh kesini, Emak nunggu, ngapo Irul yang antar bukan Alep jugo ekot.

Irul kelihatan sangat gelisah, mukanya memerah karena takut Mak nya marah, karena ia telah membuat Lia menangis, sedangkan Mak masih sibuk melihat punggung Lia yang sakit dan mencoba menenangkan, Irul mundur dan berlari sambil teriak.

Irul : Sebentar Makkk.
Emak : (kepada Lia) Lah emak bilang jangan nak main bae gawe, tedokla siang, hari panas, makan belom, pegi main bae, nah tu saket kan.

Irul kembali datang membawa Alep. Alep sangat ketakutan muka nya memerah, tubuh dan suaranya bergetar.

Alep : Mak.
Emak : Heiiii, apo keno ini kamu main pacak anak emak kayak gini, kagek kalo ayah nyo tahu, abes kamuyo.
Irul : Maapin kami yo Mak. Alep tadi baru belajar maen umpan tali itu
Emak : Kato orang tuo siang bolong tu dirumah, jangan nak main teros, apo yang kamu mainkan sampe merah kayak gini, apo cubo tingok mano bendo nyo.
Alep : Ini mak.

Mak menepis dan membawa Lia berdiri.

Emak : Halah sudahlah balek semua, harila nak magreb, besok awas lagi kayak gini yo. Kasih tahu ayah Lia nian.



Alep dan Irul menunduk dan kemudian pergi. Mak masuk ke dalam dengan Li. Lampu mulai padam, bunyi suara ayam berkokok hari sudah pagi, bunyi lagu Melayu dari radio di dalam rumah, tak lama kemudian hari mulai siang dan panas, Emak dan Lia keluar.

Emak : Lah siang hari dek, ekot Mak yasinan yok, agek makan di rumah Wak Lina wang plembang tu biasa makan tekwan.

Lia : Ayok Mak, bentar lagi yo.

Datang Alep dan Irul membawa 4 burung merpati.

Irul : Samekom Mak.

Emak : Ha rul, dari manotu bawak apo.

Alep : Mak ini untuk Mak. Mak maaf yo kemaren itu Alep baru belajar ini, tadi Alep dapat burung dari sawah.

Emak : Aiii, repot-repot nian. Anak Mak ini dak kenapo kenapo dak, Lia ni ah ini udah sembuh ah, mokasi yo lep.

Lia : Hah, iyo bang udah sembuh sembuh nian emang.

Lampu mulai redup, suara ketawa dan diiringi musik yang meriah lampu padam.

Table 2. Children's Drama Script 2


Manuscript Title	Screenwriter	Source of Traditional Game Collection	Game Collection Photos
"Yang Lagi Viral (Gasingan Lampu)"	Prety Kumala Sari	This text is based on the traditional Jambi game "Casing" which is found in the Siginjei Jambi Museum Traditional Games Collection.	

Figure 4. Traditional Jambi game Casing

Children's Drama Script Yang Lagi Viral (Gasingan Lampu)

Cast

1. Nyai (An elderly woman over the age of 50)
2. Ayah (An elderly man, aged 40 to 50 years)
3. Erik (A young boy, aged 10 to 15 years)
4. Arsad (A young boy, aged 10 to 15 years)

Dari dalam rumah kayu panggung bergaya Melayu Jambi, rumah yang terlihat tua dan usang. Papan satu dan papan lainnya yang menjadi dinding rumah tampak renggang termakan rayap, seperti umur rumah hampir satu abad, rumah yang beratap seng ini di penuh sawang yang dibiarkan dari tahun ketahun, kualiti hitam yang bergantung, meja dan 3 kursi makan terbuat dari pohon mahoni hasil buatan ayah 6 bulan lalu.



Erik yang sedang menunggu di meja makan, Nyai yang masih sibuk mondar mandir menyiapkan makan malam, dari balik gorden Nyai membawa rantang yang berisikan gulai nangka dan meletakkan kemeja.

Erik : Wah harum mee
Nyai : *(senyum meletakkan rantang)* Lapar yo cucu nyai
Erik : Wangi nian ikan asin e sampe berasap asap dapur ko buat erik lapar *(ketawa kecil)*
Nyai : *(tersenyum)* Yo makan dulu cung enaak ini, ikan asin.
Erik : Pake sayur gorii Hahahahah.
Nyai : Ini nenek tambahin, namboh namboh.
Erik : Enak nian nek, apo lagi kalo ado ayah.
Nyai : Ayah kan 2 hari lagi balek, emang Erik mau di bawakin apo samo ayah
Erik : Yang lagi viral nek, ado lampu kelap kelip nyoooo.

Lampu mulai padam, suara piring makan masih berlanjut dan perlahan menghilang.

Latar di depan rumah tua bergaya Melayu Jambi, di bawah pohon pinang Erik duduk, disaat bersamaan Arsad sibuk memainkan gasingan yang baru di belikan oleh ibunya, teman teman mengerumumi Arsad, tetapi Erik duduk menjauh seolah tak ingin melihat mainan itu. Arsad menyadari bahwa Erik tak melihat gasing yang ia mainkan.

Arsad : Kau ngapo rik, mau aku pinjamin ini.
Erik : *(berdiri mendekat)* Ini serius yo aku boleh.
Arsad : Nah, hahhaha sorii be,

Teman-teman Arsad dan Erik menertawakan Erik, karena Erik berhasil dipermalukan oleh Arsad, Erik di bully bahkan hampir nangis suara Erik yang seolah tak terima atas perlakuan Arsad membuat nenek datang ke halaman depan.

Nyai : Ngapo nii, hus pergi pergiiii.
Arsad : Nenek nyo datang wei, kaburrrrr.
Nyai : Hei, kurang ajar bocah ingusan.

Teman-teman Arsad berlari mengikuti Arsad, tinggalah hanya Nenek dan Erik.


Erik : *(sedih)* Erik mau punyo gasingan kayak Arsad Nyai, gasingan nyo ado lampu lampu, kawan Erik yang laen jugo punyo kayak gitu.
Nyai : Nyai kauni lah tuo cung, tapi duet dari mano nak beli cak itu.
Erik : Mano Ayah tu nyai, katonyo Ayah balek nak bawain mainan.
Nyai : Sabar dulu cung, mungkin Ayah lagi kejabak macet dijalan, mobil batu bara kan rame waya sore mak ini.
Erik : Pokoknyo kalo Ayah dak balek, Nyai yang harus beliin gasengan, kalo idak berarti Nyai dak sayang samo Erik. Erik malu di ejek samo kawan Erik. Erik dak pernah punyo mainan bagus. Erik jugo dakdo pernah minta hp, padahal kawan-kawan Erik semuanya ado hp, kalo Nyai nak tau cuma Erik yang dak adooo hp, taudak Nyai tuu.

Musik masuk



Nyai	: Ya Allah cung.
Erik	: Erik dak mau ngaji soreko, kalo ayah dakdo balek dan dak bawak mainan untuk Erik.
<p><i>Erik pergi meninggalkan Nenek. Suara gesekan dari alat musik Celo yang besar dan menggema mengikuti langkah dan kepergian Erik. Nenek hanya terdiam mendengar perkataan cucunya tersebut, hatinya seperti teriris, ia tak menyangka bahwa cucu satu satunya yang ia punya berani berkata sekeras itu terhadap dirinya, hanya karena mainan.</i></p> <p><i>Lampu mati perlahan, dan diiringin suara gesekan biola yang panjang (sedih).</i></p> <p><i>Suara ayam berkokok seakan menandakan bahwa sudah pagi. Latar di halaman depan rumah Erik.</i></p> <p><i>Lampu kembali menyala, dari jauh seperti terdengar suara obrolan benar saja Ayah Erik pulang.</i></p>	
Ayah	: Assalamualaikummm.

Table 3. Children's Drama Script 3

Manuscript Title	Screenwriter	Source of Traditional Game Collection	Game Collection Photos
Bedil Akbar (Meriam Bambu)	Prety Kumala Sari	This text is based on the traditional Jambi game "Meriam Bambu" which is found in the Siginjei Jambi Museum Traditional Games Collection.	 <p>Figure 5. Traditional Jambi game Meriam Bambu</p>

Children's Drama Script Bedil Akbar (Meriam Bambu)

Cast

1. Datuk (An elderly over the age of 65 tahun)
2. Ibuk (An elderly woman, aged 40 to 50 years)
3. Ayah (An elderly man, aged 40 to 50 years)
4. Daus (A young boy, aged 10 to 15 years)
5. Teman-teman Daus (young kids, aged 10 to 15 years)

Di dalam rumah (dapur, ruang makan) terdengar suara dari to'a masjid, SAHURRR. SAHUR..... SAHUR.. SAHUR. BANGUNNN BANGUNNN. AYO IBU BAPAK SEMUA NYA BANGUN SAHUR. WAKTU TINGGAL 30 MENIT LAGI (sementara Ibu masih menyiapkan makanan ke atas meja, Ibu mondar mandir mengambil peralatan makan mulai dari piring hingga sendok.

Ibu : Ayokk nak bangun.
Ibu : Daus.



Ibu menoleh ke arah kamar, tangan ibu menuangkan minuman ke gelas-gelas.

Ibu : Daussss bangun nak. Heii anak ini dak jugo bangun. Bangun.

Ibu pergi ke depan kamar daus

Ibu : Daus kau dak dengar suaro to'a masjid tadi ha, Allah huakbar anak ini, ya tuhanku ampunn.

Daus : Iyo bukk, tauu tauuu, ai buk eh.

Ibu : Berdiri la yo, tinggal makan udah ibuk masakini jugo.

Ayah datang dari kamar nya menuju ke meja makan.

Ayah : Wahh, sayur asem seger sekali enak nii (*suara menggoda*).

Ayah : Kau dak mau makan nak, sayur asem plus main mercon agek malam.

Ibuk : Ha dengar mercon tegak dio yah

Daus keluar dari kamar dengan cepat melewati meja makan yang menuju ke arah kamar mandi, setelah keluar dari kamar mandi. Muka daus kelihatan basah dan sudah siap untuk sahur

Daus : Yah iyo nian e agek malam beli mercon yo di simpang.

Ayah : Iyo abesin la dulu nasi tu, agek Ayah beliin mercon yang besak.

Daus : Yeyyy (*menggeleng kepala karena kesenangan*).

Lampu perlahan padam dan diikuti suara azan subuh berkumandang.

Latar di warung jualan mercon.

Ayah : Yang ini berapa mang?

Daus : Yang ini 2 yah (*kepada Ayahnya*)

Mamang : Yang mano bang?

Ayah : Yang ini ah mang, ini jugo.

Mamang : Oh yg ini 40 sikok bang, kalo 2, 70 ambek 3, 100 bae. Yg ini mercon koset 5000 saja isi 20. Larisss manisss sayang anak sayang anak

Lampu padam perlahan, dan terdengar musik Bulan Ramadhan.

Lampu mulai hidup perlahan dan diiringi suara-suara dari to'a masjid, yang terdengar suara orang sedang tadarus, latar tempat di hamparan samping mushola dan dua rumah kayu sederhana. Dengan lampu teras berwarna kuning untuk menerangi rumah tersebut.

(suara mercon meledak, berkali-kali)

Anak-anak sedang bermain petasan. Daus dan teman-teman nya kegirangan, namun saat mercon berhasil dinyalakan kemudian akan dilempar ke bawah, mereka menutup telinga nya sendiri. Permainan mercon pertama kedua hingga ketiga berhasil, tapi naas terjadi. Saat Salah satu teman Daus ingin menghidukan mercon koset yang di pegang Daus, ntah kenapa mercon itu meledak langsung seketika sebelum Daus melemparkannya, suara ledakan itu membuat semua teman nya terkejut dan ketakutan, Daus menangis histeris dan membuat orang di



mushola keluar untuk melihat kondisi nya, mendengar suara teriakan Daus, Ayah pun keluar dari rumah nya, dan melihat kondisi anaknya yang menangis dan di tangan kanan nya terdapat luka bakar.

Ayah : Nakkk. Atagfirullahalazim maafin Ayah nak ngapo jadi kayak ini. Ya Tuhannn. Ayok kito berobat nak.

Ayah menggendong Daus berlari masuk kerumah, dan terdengar suara sahutan memanggil istrinya, lalu lampu mulai padam kembali.

Lampu mulai hidup perlahan. Latar di hamparan sawah yang berbatasan disamping rumah-rumah panggung kayu, pohon pisang yang berjajaran menjadi batas tanah kepemilikan sawah dan rumah, sepotong bambu besar di tengah sawah dan di kelilingi anak anak yang masih sibuk merakit, matahari bersinar terang membuat anak anak berkeringat, namun tak membuat mereka menyerah untuk mengidupkan bedil tersebut.

Anak 1 : Ini udah biso sebentar lagi.

Anak 2 : Ah coba tengok ini benar dak e.

Anak 1 : Jangan di tahan kek gitu.

Datuk : Waiii rame nian, ngapoin ini.

Anak 1 : Ini bedilan yang datuk bilang malam kemarin, kami cobak buat hari ini tuk, tapi belom biso edop.

Datuk : Alhamdulillah kalo kalian dengar in omongan Datuk kemaren, bagusla kito maen maenan tradisi dusun kito dari pada maen mercon keno tangan kayak si Daus.

Teman-teman Daus mengganggu dan saling melihat satu sama lain.

Datuk : Ha, cubola mengger dulu, Datuk nak tengok, aponi hahah wajar bae dak mau hidup cung bedil untuk suaro ujungnya jangan ditutup kayu.

Datuk mencoba menghidupkan dan berbunyi ledakan seperti mercon. Teman Daus semua senang dan kegirangan senyum

Anak 1 : Yeyyy edopp tok.

Semua : Yeayyyy berhasil.

Datuk : Dengar yo semua, mainlah mainan dari daerah kito, karno cuma kito yang biso melestarikan kalo bukan kito siapa lagi yang kenal, tapi ingat main nyo jangan dak ingat waktu, jangan bermain pas orang tarawih, atau di jam tidur siang, karena dapat ganggu orang yang lagi istirahat, kamu jugo taraweh jangan idak, agek sore ngaji datuk tunggu yo, selesai ngaji kito main


Anak-anak : Iyoo tuk.

Anak 1 : Ayok kito lanjut main sekarang.

Lampu mulai padam perlahan diiringin dengan musik Melayu Jambi dan suara bedilan meriam bambu.



Table 4. Children's Drama Script 4

Manuscript Title	Screenwriter	Source of Traditional Game Collection	Game Collection Photos
Ayu Congklak Dewi	M. Ari Habillah	This text is based on the traditional Jambi game "Congklak" which is found in the Siginjei Jambi Museum Traditional Games Collection.	 <p>Figure 6. Traditional Jambi game Congklak</p>

Children's Drama Script Ayu Congklak Dewi

Cast

1. Emak (Usia 65 tahun ke atas)
2. Ayu (Anak Perempuan, Usia 10-15 tahun)
3. Dewi (Anak Perempuan, Usia 10-15 tahun)

RUMAH PANGGUNG YANG SANGAT SEDERHANA, DI TERAS RUMAH ITU TERDAPAT SEPERTI KURSI, MEJA, POT BUNGA, DLL. TERLIHAT DUA ORANG ANAK YANG DUDUK DI KURSI, SALING BERHADAPAN. KEDUANYA SALING BERBINCANG TENTANG PENDAPAT SATU SAMA LAIN. (LIGHTING FADE IN SAAT TEDENGAR KICAUAN BURUNG DAN KESIBUKAN AKTOR DI ATAS PANGGUNG).

Ayu : (SAMBIL SIBUK MEMBAGI BUAH CONGKLAK) Pokoknyo aku hari ini dak boleh kalah lagi, titik.

Dewi : (MENANGGAPI SAMBIL TERTAWA) Apo kato kau tadi, dak boleh kalah? tiap kali kau main samo aku belom pernah menang raso nyo kau ko pik, serius lah dikit main tu. (MENGEJEK AYU)

Ayu : Belom bae. Kau tunggulah kagi kalu aku menang. Segan pulak aku, gek kalu aku lah serius nian main nyo takut pulak kau, dak galak lagi kau main samo aku.

Dewi : Hahahaha ooo yu, bangun kau tu. Hampir setiap hari kayak nyo kau ngomong macam tu. Sampe kini dak menang menang.

Ayu : Aiii pasat dikit kau ko supik? Haa payo lah kalu cam tu, kalu memang nak serius nian. Awas nenges kau kagi eee!

Dewi : Halahhh... kau tu macam ko lah terus, dari mamu ayit aku bekawan samo kau dan hampir setiap hari kito beduo ko main iko be.

Ayu : Ya rabbii eee kau ko dek Dewi! Geram nian aku nganeng cakap kau tu.

Dewi : Makonyo serius lah kau tu, biak dak aku katoi terus hahaha.

Ayu : Payo! Iko nian ndak kau yo. Serius nian aku kini!



Dewi : Nah kan seruuu. Aku jugo serius kalu cam tu.

AYU DAN DEWI AKHIRNYA MEMAINKAN CONGKLAK DENGAN PENUH SEMANGAT. SANGKING FOKUSNYA BERMAIN. MEREKA TIDAK SADAR BAHWA SI EMAK DATANG SAMBIL MEMBAWA MINUMAN DAN CEMILAN UNTUK MEREKA. EMAK TERTAWA MELIHAT TINGKAH MEREKA BERDUA SAAT BERMAIN

Emak : *(SAMBIL DIAM-DIAM MEMPERHATIKAN MEREKA)* Bebenar nian kalian beduo ko main tu, sampe tejongkok-jongkok di buat eee.

Dewi : Iyo mak, kali ko pertaruhan hargo diri.

Emak : Way lah cam nak perang lawan belando be, sampe hargo diri taruhan ee tu.

Ayu : Kan dak lagi wak, iko ko lebih gawat lagi dari lawan belando tu.

Emak : Serah lah piik pik, yang penting kamu beduo ko main yang jujur, seporotip.

Ayu : *(TERTAWA)* Kenyok seporotip wak.

Dewi : Aiii emak ko muat malu be, sportif mak sportif. Kenyok seporotip!

Emak : Yo kurang lebih cam tu lah pik. Pokok ee kaning elok-elok cakap mak tu tadi. Jangan sampe bebala kamu beduo gegara main congklak tu.

Ayu & Dewi : Iyo mak.

EMAK MENINGGALKAN TERAS DAN MASUK KE DALAM RUMAH UNTUK MELANJUTKAN AKTIVITASNYA DI DAPUR. AYU DAN DEWI MENJADI SEMAKIN FOKUS BERMAIN SAMBIL MENIKMATI MAKANAN SERTA MINUMAN YANG DI BUAT OLEH EMAK.

Ayu : Dew?

Dewi : *(SENYAP)*

Ayu : Dew!

Dewi : *(SENYAP)*

Ayu : Kiw-kiw! Ooooy!

Dewi : Hmmm.

Ayu : Wayy, serius nian ruponyo kau ko.

Dewi : Aii kau ko nak main apo idak. Kagi kalah banyak pulak alasan kau. Main lah elok-elok.

Ayu : Idak jok, awak cuma nak nyebot, enak pulak kue mak kau ko, ado lagi dak?

Dewi : Mak ee kau ko, lapar keknyo, nak pake nasi ambek di belakang!

Ayu : Segan awak jok. Kau be yang ambek.

Dewi : Kagi lu, tunggu awak jalanin ko bentar.

Ayu : Kebelakang lah dengar, kalu aku kebelakang kan dak enak pulak dak, enak tu kau lah.

Dewi : Dak percayo aku samo kau tu dak kalu aku tinggal kebelakang, pasti kau sekewet agek.

Ayu : Ai mak eee, takut nian, dak aku apo-apo in punyo kau ko dak.

Dewi : Aii saro nian punyo kanti cam kau ko.

Ayu : Aiii senang nian ati punyo kanti baik dan cantek cam kau ko.

Dewi : Eleh eleh, padek pulak kau ko ngerayu ruponyo.

Ayu : *(MERAYU DEWI MENGGUNAKAN DIALOG YANG PUITIS SAMBIL MENAHAN TAWA)* Tuan putri yang baik nan jelita, nak kan kau membantu ku mengambek kue-kue yang ada di belakang. Aku berjanji, aku tidak akan curang saat kau pergi meninggalkan singgasana mu disini.

Dewi : *(MENDENGARKAN RAYUAN DARI AYU, MEMBUAT DEWI MENJADI GELI DAN TERTAWA)* Ooo mak ee, gilo kau ko dak.

Ayu : *(JUGA IKUT MERASA GELI DENGAN PERKATAANNYA SEHINGGA MEMBUATNYA JUGA TERTAWA)* Laaah cepat lah kau ambek, biak ado tenago aku nglawan kau main koo.



Dewi : Yolah, bentar.
Ayu : Naah cakep!
Dewi : Kalo kau curang, ku doai kau jadi ulek bulu
Ayu : (AYU MENIRUKAN MENJADI ULEK BULU)
Dewi : Alamak mirip nian rupo ee.
Ayu : Lah-lah, ligat lah dikit, gek jadi ulek bulu kelaparan aku ko.
Dewi : Yo yo. Bentar.

DEWI PERGI MENINGGALKAN AYU DAN MASUK KE DALAM RUMAH. TINGGALAH AYU SEORANG DAN DI SAAT ITULAH NIAT LICIK AYU UNTUK BERMAIN CURANG. AYU MEMINDAHKAN BEBERAPA BUAH YANG ADA DI TRMPAT DEWI KE TEMPAT AYU. "DIALOG TOKOH AYU DI BEBASKAN SESUAI KENYAMANAN AKTOR". TAK LAMA KEMUDIAN DEWI KEMBALI KE TERAS SAMBIL MEMBAWA KUE/CEMILAN.

Ayu : Nah, iko baru namoe kanti awak.
Dewi : (SAMBIL MENGASIH KUE KE AYU DAN MEMPERHATIKAN ISI BUAH YANG BERADA DI LOBANG CONGKLAK) Kanta kanti kanta kanti kanta kanti, awas sekewet kau ee.
Ayu : Ku doa'in nian kau ko masuk surgo dew.
Dewi : Samo lah jok, ku doa'in nian kau ko masuk nerako.
Ayu : Yaah, meraaajuk.
Dewi : Lah-lah-lah-laaah, payo cepat dikit kito maen. Kagi mak nak mintak tolong pulak jemur kain samo nyuci piring.
Ayu : Aman, agek biak aku tolong. Selow lah kau.

MEREKA MELANJUTKAN KEMBALI PERMAINANNYA. AYU BERMAIN SAMBIL MENGUNYAH KUE YANG DI BAWAKAN OLEH DEWI, SEDANGKAN SI DEWI MASIH TIDAK MENYADARI KECURANGAN YANG DILAKUKAN OLEH AYU. HINGGA AKHIRNYA AYU PUN BERHASIL MENGALAHKAN DEWI DALAM PERMAINAN CONGKLAK.

Ayu : Nah nah nah naaah kau deek. Menang jugo kk kan.
Dewi : Aiii kok biso. Perasaan betul lah buah yang kujalanani tadi tu. Mustahil kalah aku.
Ayu : Tu lah kau. Akibat nyombong, rungkad kan.
Dewi : Dak dak, kau ko pasti ngebong!
Ayu : Lah masih dak caayo.
Dewi : Oy. Mustahil aku ko kalah main iko dengan kau!
Ayu : Nah, ini kalah buktinyo.
Dewi : Pasti kau sekewet!
Ayu : Dak do dak aku sekewet!
Dewi : Dah lah yuuu yu, mending kau jujur bae! Kau sekewet kan!
Ayu : Idaak dew, dak sekewet dak aku!
Dewi : Aiii malas nian aku main cam ini ni!
Ayu : Dah lah oo, akui be kekalahan tu. Kalah-kalah, menang-menang!
Dewi : Idih, kau kiro bengak aku ni, mustahil aku kalah main congklak. Apo lagi dengan kau.
Ayu : Jadi maksud kau aku bengak?
Dewi : Iyo! Lah bengak, sekewet pulak!
Ayu : Kau lah yang bengak, kalah tu kalah bae. Akuii, jangan malu.
Dewi : Kau tu sekewet ayuuu!
Ayu : Mano buktinyo kalo aku sekewet! Ado dak? Dak tek kan?



Dewi : Memang aku dak ado buktinyo. Tapi aku yakin kau pasti sekewet!
Ayu : Nah, buktinyo be kau dak tek, kek mano nyebut aku sekewet. Kau tau dak, itu fitnah namonyo. Fitnah tu lebih kejam dari pada pembunuhan!
Dewi : Idiih, lah sekewet sok nyeramahi pulak!
Ayu : Idiih, lah kalah tu kalah be lah, akui!
Dewi : Kau tu sekewet ayuu!
Ayu : Kau tu kalah dewii!

DI TENGAH PERDEBATAN MEREKA, TERDENGAR SUARA EMAK DARI DALAM RUMAH MEMANGGIL DEWI. NAMUN PANGGILAN TERSEBUT TIDAK TERDENGAR OLEH DEWI SEHINGGA EMAK PERGI MENGHAMPIRI MEREKA DI TERAS. SAAT TIBA DI TERAS, EMAK TERKEJUT MELIHAT MEREKA BERDUA SEDANG BERANTEM DAN LANGSUNG BERGEGAS UNTUK MELERAI PERKELAHIAN AYU DAN DEWI.

Emak : Apo ni ribut-ribut!
Dewi : Ayu ko ha mak, main curang.
Emak : Benar apo yang di bilangin Dewi tu yu?
Ayu : Idak wak, dak ado awak main curang.
Dewi : Iyo mak, curang Ayu main nyo!
Ayu : Baseng sebut be kau di wii, dak pernah aku main curang, kau be yang su'uzon samo aku!
Dewi : Jujur bae lah yu ee, tau aku tu kalo kau main nyo curang. Aku tu dak lah pulak, enak kau jujur bae.
Emak : Sudah-sudah, jangan ribut lagi. Malu di tengok orang! kini ko wak nak nanyo samo kau yu, apo benar yang dikatoka Dewi tu?!
Dewi : Jujur be yu.
Ayu : Iyo wak.
Dewi : Nah kan, apo aku bilang tadi.
Emak : Sudah wii, jangan menghakimi Ayu lagi.
Dewi : Iyo mak (*MENJAWAB DENGAN KESAL*). Dewi cuman dak senang bae mak main dengan orang curang, dak mau ngaku pulo kalo dio curang.

AYU CUMA BISA DUDUK SAMBIL TERDIAM DAN MENYESALI APA YANG SUDAH DIA LAKUKAN.

Emak : Iyo emak tau, tapi jangan pulo gara-gara main kamu beduo ko jadi beribut. Semuo biso diselesaikan dengan baik-baik. Nah kamu beduo ko dengar baik-baik yo. Untuk Ayu wak cuma bepesan jangan kau ulangi lagi perilaku curang tu, karno perilaku yang macam itu adalah perilaku setan. Dalam agamo jugo menegaskan. “celakalah bagi orang-orang yang curang”. Allah pun membenci orang yang seperti itu, apo lagi bagi kito ni sebagai orang-orang yang bermasyarakat. Jangan sampe perilaku yang dak elok tu, kito di jauhkan orang yang ado di sekitar kito.
Ayu : Iyo wak, ayu paham. Ayu janji dak bakal ngulanin lagi. Sebenar nyo dak ado niatan Ayu nak main curang. Ayu cuman kesal bae wak, setiap main dak pernah menang-menang (*DENGAN RASA BERSALAH AYU MEMINTA MAAF KEPADA DEWI*). Wii, aku minta maaf yo.
Dewi : Iyo aku maafn, lain kali jangan macam tu lagi.
Ayu : Iyo wi.
Emak : Nah kalo macam tu kan enak nengok nyo. Sekarang Dewi, untuk Dewi lagi, jangan pernah meraso sombong dan meraso puas dengan apo yang Dewi biso. mungkin dewi hebat main congklak, mungkin ayu hebat di bidang yang lain nyo. setiap orang mempunyai kelebihan dan kekurangan nyo masing-masing. Karno kesombongan itu jugo sifat nyo setan, dan jangan sampe



jugo karno kesombogan itu orang dak nak main samo kito. Nah sekarang belajar lah mempercayoin satu samo lain, bermain yang sportif, jangan bermain curang.

Ayu & Dewi : iyo mak!

AKHIRNYA MEREKA BERDUA MENERUSKAN BERMAIN DRNGAN SPORTIF, DAN EMAK KEMBALI TRESENYUM MELIHAT MEREKA BERDUA, TAK LAMA KEMUDIAN EMAK KEMBALI KE DAPUR UNTUK MELANJUTKAN PEKERJAANYA.

The results of the application of project-based learning strategies (Project Based Learning) to achieve learning in the Play Writing course, namely that students can create realist-style drama scripts. By using the collection of Jambi traditional games in the Siginjei Museum, Jambi Province as the background for the project, which was then used as a source for writing realist-style drama scripts, it has succeeded in encouraging students to create children's short drama scripts, of which four short children's drama scripts have been created. sourced from a collection of Jambi traditional games in the Siginjei Museum, Jambi Province. This can be proven by the description of the tables above.

4. CONCLUSION

The research that has been carried out with the source of the objects studied is four collections of Jambi traditional games in the Siginjei Museum, Jambi Province, namely Umban Tali, Casing, Bamboo Meriam, and Congklak. The results of the four collections of Jambi traditional games are short children's drama scripts with the titles: (1) Maen Seru (Ketapel); (2) Yang Lagi Viral (Gasingan Lampu); (3) Bedil Akbar (Meriam Bambu), and (4) Ayu Congklak Dewi. The four children's short drama scripts are the result of a project-based learning strategy (Project Based Learning) to achieve learning in the playwriting course. Based on the results of the script that has been created, it can be concluded that the learning process with the project-based learning strategy (Project Based Learning) applied to the Play Writing course has been successful which can be proven by the results of the script creation by the students.

The results of the manuscripts that have been created from the collection of Jambi traditional games in the Siginjei Museum, Jambi Province, must continue to be carried out and followed up in the future. This means that there are still many other collections in the Siginjei Museum, Jambi Province, which can be used as a source of problem background for project-based learning strategies to achieve learning in playwriting courses in the future. Another thing is, if other collections in the Siginjei Museum, Jambi Province are transferred into short drama scripts for children, this will be an effort to present and maintain the proud values of Jambi traditional games which are the result of ancestral creativity.

5. ACKNOWLEDGMENTS

Researchers would like to thank the parties who have assisted in the research. In particular, the researcher would like to express his gratitude to the students of the Play Writing course who have collaborated with the researcher as course lecturers in completing this learning project. The researcher also expressed his thanks to fellow lecturers in the Dance and Music Arts Study Program. The researcher also expressed his gratitude to the Institute for Research and Community Service at Jambi University for funding assistance with innovative Project Based Learning grants.



REFERENCES

- Afriana, J. (2015). Project Based Learning (PjBL). Makalah untuk tugas mata kuliah pembelajaran IPA Terpadu. *Program Studi Pendidikan IPA Sekolah Pascasarjana*. Universitas Pendidikan Indonesia. Bandung.
- Bariyah, K. (2022). Pengaruh permainan tradisional masyarakat Jambi terhadap peningkatan kebugaran jasmani siswa kelas V Sekolah Dasar. *Jurnal Pendidikan Tematik DIKDAS*, 7 (2), 156-165 Retrieved from <https://onlinejournal.unja.ac.id/JPTD/article/view/21544>
- Farida, D. N. (2017). Kritik ekologi sastra puisi perempuan lereng gunung karya Ika Permata Hati dalam antologi puisi perempuan di ujung senja melalui ekofeminisme Susan Griffin. *BASINDO: Jurnal kajian bahasa, sastra Indonesia, dan pembelajarannya*, 1 (2), 48-52.
Retrieved from <http://dx.doi.org/10.17977/um007v1i22017p048>
- Mulyadi, M. (2012). Riset desain dalam metodologi penelitian. *Jurnal Studi Komunikasi dan Media*. 16 (1), 71-80
<https://jurnal.kominfo.go.id/index.php/jskm/article/view/160106>
- Nurhayati, Ai, S., & Harianti, D. (2019). Model pembelajaran project based learning.
<https://sibatik.kemdikbud.go.id/>, Retrieved pada 04 Maret 2024.
- Riantiarno, N. (2003). Menyentuh teater-tanya jawab seputar teater kita. Jakarta: *MU:3 Books*.
- Sangadji, E.M & Sopiah. (2010). Metodologi pendidikan. Yogyakarta: *ANDI*.
- Santoso, A. (2022). Lagu anak anak sebagai sumber penciptaan karya pertunjukan teater anak lakon Fahira di negeri kodok. *Jurnal Cerano Seni*, 1 (1), 58-75 Retrieved from
<https://onlinejournal.unja.ac.id/gurindam/article/view/18419>
- Santoso, A., Leihitu, I., & Tomi, M. (2023). Sarung Siginjai sebagai sumber penciptaan naskah lakon perahu paku. *Prosiding Seminar Nasional Ilmu Pendidikan*, 2 (1). 11-19 Retrieved from <http://ejurnal.fkip.unila.ac.id/index.php/psnip/article/view/261>
- Santoso, A. (2023). Penciptaan naskah drama pendek anak bersumberkan koleksi permainan tradisional anak Jambi di Museum Siginjei Jambi. *Jurnal Cerano Seni*, 2 (2), 1-13 Retrieved from <https://online-journal.unja.ac.id/gurindam/article/view/29811>
- Santoso, A., Leihitu, I., Utama, & Tulus, G. (2023). Dramatic structure strategies in the creation of children's short drama scripts based on Jambi's traditional games collections in Museum Siginjei. *Proceeding International Conference on Malay Identity (ICMI)*, 4. 96-105
<https://www.conference.unja.ac.id/ICMI/article/view/263>
- Santoso, A., Utama, & Tulus G. (2023). Tari Taji penciptaan naskah lakon anak bersumberkan permainan anak tradisional Jambi. *Prosiding Seminar Nasional Humaniora*, 3, 42-52. Retrieved from
<https://www.conference.unja.ac.id/SNH/article/view/240>
- Yulita, R. (2017). Permainan tradisional anak nusantara. Jakarta: *Badan Pengembangan dan Pembinaan Bahasa Kementerian Pendidikan dan Kebudayaan*



PHYSICS TEACHER COMPETENCIES TO DEVELOP EDUCATIONAL LEADERSHIP ROLES

Sabrilla Almas Azzahra¹, Alma Dias Rahmawati^{2*}

^{1,2}Sebelas Maret University, Indonesia

*almadiasrahmawati@student.uns.ac.id

ABSTRACT

The challenges of education in the Merdeka Curriculum era direct teachers to be able to develop good educational leadership, so teachers need to have four main competencies, namely pedagogical, personality, social, and professional competencies. The purpose of this study is to explore the importance of Physics teacher competencies in developing educational leadership roles. The study was conducted at SMA N 4 Surakarta using qualitative research methods including, observation, interview, and literature study. Observations and interviews were used to obtain primary data, while a literature study was used to obtain secondary data. The results of this study indicate that Physics teacher competence plays an important role in directing the learning process, motivating students, and strengthening student learning culture as a form of teacher leadership in the classroom. The implication of this study is the need to develop Physics teachers' leadership competencies through adequate training and support so that Physics teachers can play a more effective role in facing the challenges presented by the Merdeka Curriculum and strengthen the overall educational structure. Therefore, this study emphasizes the urgency of developing Physics teachers' leadership competencies as a strategic step in strengthening education in the Merdeka Curriculum era.

Keywords: Educational Leadership, Teacher Competencies, Educational Challenges, Merdeka Curriculum

1. INTRODUCTION

Teachers are educators with a central role in education (Kusuma, 2021). Teachers are responsible for educating, mentoring, coaching, and examining students at various educational levels and sciences (Rizal et al., 2020). One of the sciences that contribute to achieving educational goals is Natural Sciences within the scope of Physics (Muhajir et al., 2021). Physics teachers have an important role in teaching Physics and shaping a generation that understands and appreciates this science (Essa & Ardaudyah, 2023). Physics teachers are required to continuously develop themselves with their skills to provide professional and quality educational services to students (Isma et al., 2023). Becoming a professional Physics teacher will not materialize just like that without any effort to improve, so a serious effort is needed from Physics teachers to improve their professionalism to achieve qualifications as professional Physics teachers (Atmojo et al., 2021). One way to improve the professionalism of Physics teachers is by developing teacher competencies.

Law of Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers article 10 paragraph (1) states that the body of knowledge, abilities, and behaviors that educators need to possess to fulfill their professional responsibilities is known as teacher competency. A qualified teacher must possess a diverse array of competencies that form the foundation of the educational process, encompassing the multifaceted skills, knowledge, and abilities required to proficiently execute their roles and responsibilities as facilitators of learning to foster an effective learning environment and maximize student growth (Rohman, 2020). Physics teachers must fulfill the nationally recognized requirements for both academic credentials and teacher competencies as stated in Regulation of the Ministry of Education and Culture of the Republic of Indonesia Number 16 of 2007 Article 1. The four competencies that Physics teachers must have include pedagogical competence, personality competence, social competence, and professional competence (Saif et al., 2021). The success of physics teachers is significantly influenced by these essential competencies.

Pedagogical competence is one of the important requirements for a teacher to be called a professional in their field (Angelina et al., 2021). The ability of a teacher to oversee a student's learning process, including understanding the educational foundation, the student, curriculum development, learning design, educational



learning implementation, technology utilization, assessment of learning outcomes, and student potential development, is known as pedagogical competencies (Balulu et al., 2021). Teachers must master learning theories and principles of educational learning, and be able to apply various value approaches and value-based learning to develop students with character, not just carry out formal teaching functions (Hayati et al., 2020). These competencies are very important for Physics teachers to teach Physics professionally and successfully increase students' understanding and interest in learning Physics.

Personality competence is very important for a teacher because a steady and noble teacher personality can be a role model and set a good example for students (Safitri et al., 2021). As stipulated in Government Regulation of the Republic of Indonesia Number 74 of 2008 concerning Teachers, the requisite personality competencies for educators encompass strengthening religious faith and piety, upholding responsibility, fostering self-assurance, cultivating tolerance and openness, embracing democratic principles, exhibiting diligence and perseverance in teaching, embodying the virtues of education, promoting mutual respect, demonstrating self-awareness of strengths and weaknesses, and continuously evolving as innovative and creative professionals. Mature personality competence is very important for Physics teachers so that they can be role models, gain respect from students, and support the success of Physics learning.

Since teachers are expected to serve as role models and mentors for children, their capacity to engage with the environment and society is referred to as social competency (Mazrur et al., 2022). Communication carried out by teachers in learning has a very large role in achieving learning objectives and helping the development of positive behavior in students so the ability of teachers to communicate effectively is the key to successful learning and student development (Putri et al., 2022). Social competence is important for Physics teachers to be able to communicate and associate effectively with various parties to improve the quality of Physics learning.

A teacher's professional competence in their field of expertise is pivotal to cultivating highly competent graduates who excel in their respective disciplines, underscoring the crucial role a teacher's mastery plays in enhancing student outcomes and educational proficiency (Mulhayatiah et al., 2022). The significance of teachers' professional competency is in their capacity to create and master creative materials, as well as use information and communication technologies for learning and self-improvement, especially in the absence of in-person interactions with pupils (Reski & Bawawa, 2022). Professional competence is important so that Physics teachers can carry out Physics learning professionally and be able to produce quality student output according to established standards.

The four teacher competencies, namely pedagogic, personality, social, and professional competencies, must be possessed by every teacher including Physics teachers because professional teachers are characterized by the possession of these four competencies (Mulhayatiah et al., 2021). The four competencies are integrated into the professional teacher and have various indicators or components, but all of these indicators or components are also closely related to one another (Akbar, 2021). These teacher competencies are the basis for Physics teachers to develop their educational leadership roles.

Educational leadership refers to the capacity to guide and inspire those involved in education, fostering an environment where predetermined educational goals can be achieved efficiently and effectively (Utiahman, 2019). Teachers play a leadership role in schools that greatly influences the achievement of the objectives of the learning process (Mansyur, 2021). Educational leadership and teacher integrity affect teacher performance (Rosyati et al., 2020). A teacher must have educational leadership to face the challenges of globalization changes (Ulfah et al., 2022). Globalization changes in the world of education occur in curriculum changes, where Indonesia is currently implementing the Merdeka Curriculum as a curriculum in educational units (Ayu et al., 2022). One of the challenges faced in this implementation is the challenge of improving teacher competence in teaching with the 5.0 approach (Prastiwi & Widodo, 2023). The challenges of education in the Merdeka Curriculum era direct teachers to develop good educational leadership.

Research by Saputra et al. (2022) stated that the basic problems of teachers, including Physics teachers at SMA Negeri 1 Tirawuta, are the low competence and understanding of the implementation of the Merdeka Curriculum. They have not fully adjusted to the new paradigm of learning the Merdeka Curriculum in the classroom. In addition, Physics teachers at SMA Negeri 1 Tirawuta are also not optimal in understanding information technology that can be used in designing the learning process so it has an impact on the low



competence of teachers in the role of developing leadership roles. Problems were also found in research by Aditama et al. (2022) which states that the competence of teachers, including Physics teachers, in implementing classroom learning with the Merdeka Curriculum at Cahaya Al Quran Science High School is still low so their leadership role has not been fully formed.

Research on the role of educational leadership and professionalism of Physics teachers in efforts to improve learning quality by Atmojo et al. (2021) states that teachers must improve their mastery of IT, attend training and seminars, develop effective and efficient learning plans, and evaluate the results of the learning process. According to Hasanah et al. (2020) in their research, stated that leadership competence plays an important role in teachers. Although several studies have shown that teacher leadership contributes to improving the quality of learning and school effectiveness, there is still a gap in the understanding of the specific competencies required by Physics teachers in assuming leadership roles. Therefore, this study aims to explore the importance of Physics teachers' competencies in developing educational leadership roles.

2. METHODS

This qualitative study uses both primary and secondary sources. Primary data was obtained using observation and interview techniques. Direct field observation was used to conduct the observation technique, namely at SMA Negeri 1 and SMA Negeri 4 in Surakarta, however, the interviewing method involved asking questions of an informant, particularly the chairman of the Surakarta Physics Teacher Community at SMA Negeri 4 Surakarta. The instruments used were observation instruments and interview instruments. A literature study was conducted to gather secondary data, and the procedure involved reading, recording, and processing information from those literary resources, among other stages connected to data collecting from several sources. Referring to data analysis by Miles et al., (2014), data analysis in qualitative research is conducted before entering the field, during the field, and following fieldwork completion which includes data reduction, data presentation, and conclusion drawing.

3. RESULTS & DISCUSSION

The findings from interviews with the head of the Physics teacher community in Surakarta provide some information regarding the importance of Physics teachers' competencies in the Merdeka Curriculum to maximize their educational leadership role in the classroom. The Merdeka Curriculum encourages every teacher to play an important role in it, so teachers must be able to implement the curriculum's developments and changes by setting work priorities and skills in using technology (Marsela et al., 2022). This indicates that a teacher must also develop his competencies and skills to keep pace with the implementation of the Merdeka Curriculum.

Most Physics teachers who are members of the Physics teacher community in Surakarta realize the importance of having and developing competencies to improve educational leadership. They believe that a teacher who has good competence will have a good ability to lead the class effectively and motivate students to increase interest and learning outcomes in Physics. This is supported by Langdon, (2021) which concluded that the role of teacher leadership can determine student success in the classroom. Educational leadership in each teacher can be developed through improving teacher performance competencies so that teachers can overcome various challenges that arise in classroom management.

The Surakarta community of Physics teachers has identified several obstacles related to classroom management, such as students' lack of enthusiasm and difficulties with the subject matter. The challenges faced by Physics teachers in managing the classroom highlight the importance of developing leadership competencies through training and coaching. Teachers attempt to address these issues in discussions and daily practice by creating effective classroom management strategies. This includes teachers' ability to analyze classroom dynamics, ways to interact with students, and ways to encourage and help students overcome learning difficulties. Teachers realize that leadership skills are needed to create a conducive learning environment.

Physics teachers employ several leadership tactics, including fostering strong relationships with students, implementing student-centered learning methodologies, and offering timely feedback. The observation results show that Physics teachers with good leadership have positive relationships with their students. They are quick to respond to



students' questions or needs and stay engaged with students during the learning process. These Physics teachers also use a variety of interesting approaches to teaching, such as experiments, group discussions, and the use of technology. According to the results of interviews and observations, the leadership competence of Physics teachers has a positive impact on the learning process and students' learning motivation. Physics teachers with good leadership can create a learning environment that supports students' understanding of Physics concepts. The approach used by successful Physics teachers can be used as a reference for the professional development of Physics teachers. Of course, this needs to be supported by good teacher competencies. These competencies include the four main competencies of a teacher, namely pedagogical competence, personality competence, social competence, and professional competence.

Teachers' pedagogical competence is observed from the teacher's ability to manage the learning process and how to interact with students to understand student characters during teaching and learning activities in the classroom. Teachers do several things to improve their pedagogical abilities, starting from increasing their understanding of learning theory, effective learning principles, and learning techniques, and developing an understanding of the Merdeka Curriculum. In addition, teachers also utilize various technologies in classroom learning, create an interesting learning outcome assessment or evaluation system, and provide responsive feedback to each student. These actions are in line with the teacher's pedagogical competencies listed in Regulation of the Ministry of Education and Culture of the Republic of Indonesia Number 16 of 2007. Teacher pedagogical competence based on Wahyuningsih (2021) affects the learning outcomes achievement and student learning motivation.

Teachers' personality competence is observed from their ability to behave in their daily lives as role models for students. Teachers improve their personality competence by maintaining positive attitudes and behaviors under applicable norms, showing good work ethic and responsibility, and upholding the code of ethics of the teaching profession. Not only that, teachers also evaluate their performance to take appropriate action for continuous improvement and self-development. These actions are in line with the teacher's personality competencies listed in Regulation of the Ministry of Education and Culture of the Republic of Indonesia Number 16 of 2007. Good personality competence based on Zola & Mudjiran (2020) can help teachers increase their credibility and influence student achievement, character, attitudes, and skills because the teacher becomes a role model, inspiration, and motivator for their students.

Teachers' social competence is observed in their ability to communicate and socialize in the school environment with students, fellow teachers, and school staff. Teachers who have good social competence are usually able to communicate well, have a polite attitude, and can adapt well so that students will feel more comfortable learning in the teacher's class. Teachers with good social competence are also able to create a positive work culture and respect fellow teachers. In addition, teachers' social competence is also observed in the way teachers collaborate with parties outside the school, such as collaborating with several lecturers from nearby universities or private parties engaged in education. These actions are in line with the teacher's social competence as stated in Regulation of the Ministry of Education and Culture of the Republic of Indonesia Number 16 of 2007. Good social competence of a teacher based on Wahyuni et al. (2023) has a positive effect on the social caring character of students.

Teachers' professional competence is observed in their ability to master learning materials according to the subject they teach, in this case, Physics. Teachers with good professional competence can understand and master learning objectives, and learning outcomes, and develop learning materials creatively. Teachers also conduct classroom action research to support their professional improvement and utilize the use of information and communication technology to develop themselves. These actions are in line with the professional competencies of teachers listed in the Regulation of the Ministry of Education and Culture of the Republic of Indonesia Number 16 of 2007. A good professional competence of a teacher based on Sopandi (2019) has a positive effect on teacher performance during teaching and learning activities in the classroom.

Every teacher, including Physics teachers, can participate in various training activities, and seminars, conduct research, or join teacher community forums to help improve and develop their competence, pedagogical, personality, social and professional competencies. The results of interviews and observations show that teachers who participate in training activities or teacher communities have better competencies because each teacher has a forum to develop skills and knowledge in managing the classroom through various discussions and collaboration. In addition, the support from each school is also very influential in the development of teacher competence and leadership. This is also supported by



Kilag & Sasan (2023) who concluded that instructional leadership and a school culture that supports collaboration and discussion between teachers play an important role in professional development.

The success of teachers is determined by their commitment to carrying out their profession as professional educators which can be developed and improved through the role of educational leadership Rahmawati et al. (2020). Physics teachers who are members of the Physics teacher community in Surakarta, most of them have roles in their respective schools, such as serving as principals or vice principals. This indicates that the competencies possessed by Physics teachers are good enough to be able to develop educational leadership roles. Shen et al. (2020) also stated that a teacher with a good educational leadership role has a positive influence on student achievement and learning motivation. Overall, based on the results of interviews and observations, shows that good teacher competence affects the teacher's educational leadership role in the classroom to improve student motivation and learning outcomes.

4. CONCLUSION

This study shows that Physics teachers' competencies have an important role in the Merdeka curriculum which gives teachers the freedom and flexibility to manage learning so that teachers can develop educational leadership in the classroom. Physics teachers with good competencies can lead and manage the classroom well, thus having a positive effect on improving the quality of education and student motivation by using technology and effective teaching strategies. The study also found that Physics teachers' competencies consist of four aspects, namely pedagogical, personal, social, and professional, which need to be developed continuously by teachers. This study implies that Physics teachers need to get support from schools, government, and society to improve their competencies through various activities, such as seminars, training, research, and teacher communities. A suggestion from this study is that Physics teachers need to conduct regular reflection and self-evaluation to identify their strengths and weaknesses in teaching. A limitation of this study is that it only involved a limited sample of Physics teachers in a few schools, so the results may not be generalizable to all Physics teachers in Indonesia. This study also did not measure the long-term impact of Physics teachers' competencies on student learning outcomes. Therefore, further studies with larger samples and longer periods are needed to test the hypotheses and findings of this study.

5. ACKNOWLEDGMENTS

The author would like to thank Mr. Shofwan Ridho, S.Pd., the head of the Physics teachers community in Surakarta as a resource person, and all Physics teachers at SMA Negeri 1 Surakarta and SMA Negeri 4 Surakarta who have been willing to be the object of the author's observation.

REFERENCES

- Aditama, M. G., Shofyana, M. H., Muslim, R. I., Pamungkas, I., & Susiati, S. (2022). Peningkatan kompetensi guru dalam project based learning melalui temu pendidik daerah. *Buletin KKN Pendidikan*, 4(1), 90–98. <https://doi.org/10.23917/bkkndik.v4i1.18215>
- Akbar, A. (2021). Pentingnya kompetensi pedagogik guru. *JPG: Jurnal Pendidikan Guru*, 2(1), 23–30. <https://doi.org/10.32832/jpg.v2i1.4099>
- Angelina, P., Kartadinata, S., & Budiman, N. (2021). Kompetensi pedagogis guru di era disrupsi pendidikan dalam pandangan islam. *Ta'dibuna: Jurnal Pendidikan Islam*, 10(2), 305–318. <https://doi.org/10.32832/tadibuna.v10i2.4863>
- Atmojo, H. B. R., Lian, B., & Mulyadi, M. (2021). Peran kepemimpinan dan profesional guru terhadap perbaikan mutu pembelajaran. *Jurnal Educatio FKIP UNMA*, 7(3), 744–752. <https://doi.org/10.31949/educatio.v7i3.1217>
- Ayu, A., Ningsih, W., & Muntahibun, M. (2022). Dialektika pendidik dan perubahan kurikulum di masa pandemi.



- Jurnal Dinamika Penelitian: Media Komunikasi Sosial Keagamaan*, 21(2), 367–384.
<https://ejournal.uinsatu.ac.id/index.php/dinamika/article/view/4922>
- Balulu, N., Masrifah, & Eki, L. (2021). Analisis kompetensi pedagogik guru IPA SMP Kota Ternate dalam pembelajaran literasi sains. *Luminous*, 2(2), 24–29.
<https://doi.org/https://doi.org/10.31851/luminous.v2i2.6279>
- BPK Republik Indonesia. (2007). Peraturan Menteri Pendidikan Nasional Republik Indonesia Nomor 16 Tahun 2007. 2–31. <https://peraturan.bpk.go.id/Details/216104/permendikbud-no-16-tahun-2007>
- BPK Republik Indonesia. (2005). Undang-Undang Republik Indonesia Nomor 14 Tahun 2005 tentang guru dan dosen. *Jakarta: Sekretariat Negara*, 1–14. <https://peraturan.bpk.go.id/Details/40266/uu-no-14-tahun-2005>
- BPK Republik Indonesia. (2008). Peraturan Pemerintah Republik Indonesia Nomor 74 Tahun 2008 tentang Guru. 1–25. <https://peraturan.bpk.go.id/Details/4892/pp-no-74-tahun-2008>
- Essa, A. A., & Ardaayah, R. (2023). Fisika fantastis: Guru-guru yang membawa sains ke kehidupan. *SOKO GURU: Jurnal Ilmu Pendidikan*, 3(3), 66–72. <https://doi.org/10.55606/sokoguru.v3i3.3014>
- Hasanah, A., Utami, I. H., & Kusainun, N. (2020). Pentingnya kompetensi leadership pada guru MI. *Indonesian Journal of Islamic Educational Management*, 3(1), 10–20.
<https://ejournal.uin-suska.ac.id/index.php/IJIEEM/article/view/9147>
- Hayati, S., Aini, I., & Guntara, Y. (2020). Analisis persepsi guru dan calon guru fisika terkait sumber belajar, media pembelajaran, dan bahan ajar. *Prosiding Seminar Nasional Pendidikan Fisika*, 3(1), 295–300.
<https://jurnal.untirta.ac.id/index.php/sendikfi/article/view/9701>
- Isma, A. (2023). Peta permasalahan pendidikan abad 21 di Indonesia. *Jurnal Pendidikan Terapan*, 1(3), 11–28.
<https://doi.org/10.61255/jupiter.v1i3.153>
- Kilag, O. K. T. & Sasan, J. M. (2023). Unpacking the role of instructional leadership in teacher professional development. *Advanced Qualitative Research*, 1(1), 63–73. <https://doi.org/10.31098/aqr.v1i1.1380>
- Kusuma, Y. Y. (2021). Analisis kesiapan guru kelas dalam mengimplementasikan pembelajaran tematik di masa pandemi Covid-19 di SD Pahlawan. *Jurnal Pendidikan Dan Konseling (JPDK)*, 3(2), 50–55.
<https://doi.org/10.31004/jpdk.v3i2.1633>
- Langdon W. L. (2021). The importance of teacher leadership skills in the classroom. *Education Journal*, 10(1), 8.
<https://doi.org/10.11648/j.edu.20211001.12>
- Mansyur, A. R. (2021). Wawasan kepemimpinan guru (teacher leadership) dan konsep guru penggerak. *Education and Learning Journal*, 2(2), 101–109.
<https://doi.org/http://dx.doi.org/10.33096/eljour.v2i2.131>
- Marsela Y, Divana, L.A., Siti N., & Anjani, Putri B. P. (2022). Peran guru dalam mengembangkan kurikulum merdeka. *Jurnal Ilmu Pendidikan dan Sosial*, 1(3), 290–298. <https://doi.org/10.58540/jipsi.v1i3.53>
- Mazrur, Surawan, & Yuliani. (2022). Kontribusi kompetensi sosial guru dalam membentuk karakter siswa. *Attractive : Innovative Education Journal*, 4(2), 281–287.
<https://attractivejournal.com/index.php/aj/article/view/452>
- Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative data analysis* (3rd ed.). *SAGE*.
- Muhajir, S. N., Masara, A., & Ramdani, G. (2021). Literasi sains mahasiswa calon guru fisika. *Jurnal Pendidikan Dan Ilmu Fisika*, 1(1), 24–28. <https://journal.uniga.ac.id/index.php/jpif/article/view/1259/968>
- Mulhayatiah, D., Agnia, L. S., & Suhendi, H. Y. (2021). Analisis Kompetensi Pedagogical Content Knowledge Calon Guru Fisika Berdasarkan Instrumen CoRe dan PaP-eRs Pada Materi Gelombang Bunyi. *Jurnal*



- Penelitian Pembelajaran Fisika*, 12(1), 37–46. <https://doi.org/10.26877/jp2f.v12i1.7912>
- Mulhayatiah, D., Sinaga, P., & Hidayatulloh, R. (2022). Analisis Kebutuhan Pengembangan Bahan Ajar Berbasis Multi Representasi Untuk Meningkatkan Kompetensi Guru Fisika. *SPEKTRA: Jurnal Kajian Pendidikan Sains*, 8(1), 64–73. <https://doi.org/10.32699/spektra.v8i1.229>
- Prastiwi, M. A., & Widodo, A. (2023). Peran kepemimpinan kepala madrasah di era 5.0, pendidikan dan teknologi, pada kompetensi 21st century. *PRIMER: Jurnal Ilmiah Multidisiplin*, 1(5), 536–544. <https://doi.org/10.55681/primer.v1i5.211>
- Putri, V. W., Sulastri, Rifma, & Adi, N. (2022). Persepsi siswa terhadap kompetensi sosial guru di Sekolah Menengah Kejuruan Negeri Kabupaten Padang Pariaman. *Journal of Educational Administration and Leadership (JEAL)*, 2(4), 347–353. <https://doi.org/https://doi.org/10.24036/jeal.v2i4.287>
- Rahmawati, I., Permana, J., Gaffar, M. F., & Prihatin, E. (2020). Role of global leadership and capacity building in increasing teacher's profession commitment. *KnE Social Sciences*, 2020, 472–477. <https://doi.org/10.18502/kss.v4i14.7905>
- Reski, A., & Bawawa, M. (2022). Pelatihan penyusunan bahan ajar online interaktif untuk meningkatkan kompetensi profesional Guru MA Al-Munawwaroh Merauke. *ABDIKAN: Jurnal Pengabdian Masyarakat Bidang Sains Dan Teknologi*, 1(2), 283–288. <https://doi.org/10.55123/abdikan.v1i2.302>
- Rizal, R., Susanti, E., Sulistyaningsih, D., & Budiman, D. M. (2020). Desain evaluasi program pelatihan guru fisika profesional. *Diffraction: Journal for Physics Education and Applied Physics*, 2(1), 30–37. <https://doi.org/10.37058/diffraction.v2i1.1695>
- Rohman, H. (2020). Pengaruh kompetensi guru terhadap kinerja guru. *Jurnal MADINASIKA Manajemen Dan Keguruan*, 1(2), 92–102. <https://ejournal.unma.ac.id/index.php/madinasika/article/view/481>
- Rosyati, T., Saprudin, S., & Alaydrus, A. S. (2020). Kinerja OCB pada guru PAUD ditinjau dari educational leadership dan integritas. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 5(1), 201–200. <https://doi.org/https://doi.org/10.31004/obsesi.v5i1.513>
- Safitri, E., Setiawati, Y. H., & Suryana, A. (2021). Pengaruh kompetensi kepribadian guru terhadap akhlak siswa di SMK Cendekian Muslim Nanggung-Bogor. *Transformasi Manageria: Journal of Islamic Education Management*, 1(1), 30–53. <https://doi.org/10.47467/manageria.v1i1.270>
- Saif, A., Jannah, M., & Rahmati. (2021). Analisis kemampuan mahasiswa PPL pendidikan fisika dalam menerapkan kompetensi pedagogik pada masa covid-19. *The 2nd Education, Sciences and Technology International Conference 2021*, 167–177. <https://jurnal.ar-raniry.ac.id/index.php/estetic/article/view/13964>
- Saputra, I. G. P. E., Sukariasih, L., & Muchlis, N. F. (2022). Penyusunan modul proyek penguatan profil pelajar pancasila (P5) menggunakan flip pdf profesional bagi guru SMA Negeri 1 Tirawuta: Persiapan implementasi kurikulum merdeka. *Prosiding Seminar Nasional UNIMUS*, 5, 1941–1954. <https://prosiding.unimus.ac.id/index.php/semnas/article/view/1165>
- Shen, J., Wu, H., Reeves, P., Zheng, Y., Ryan, L., & Anderson, D. (2020). The association between teacher leadership and student achievement: A meta-analysis. *Educational Research Review*, 31(October 2019), 100357. <https://doi.org/10.1016/j.edurev.2020.100357>
- Sopandi, A. (2019). Pengaruh kompetensi profesional dan kompetensi kepribadian terhadap kinerja guru. *Scientific Journal Of Reflection: Economic, Accounting, Management and Business*, 2(2), 121–130. <https://doi.org/https://doi.org/10.37481/sjr.v2i2.58>
- Ulfah, U., Supriani, Y., & Arifudin, O. (2022). Kepemimpinan pendidikan di era disrupsi. *JiIP - Jurnal Ilmiah Ilmu Pendidikan*, 5(1), 153–161. <https://doi.org/https://doi.org/10.54371/jiip.v5i1.392>



- Utiahman, T. B. (2019). Meningkatkan kompetensi pedagogik guru melalui pelatihan berjenjang. *Aksara: Jurnal Ilmu Pendidikan Nonformal*, 5(3), 215–222. <https://doi.org/10.37905/aksara.5.3.215-222.2019>
- Wahyuni, E., Hambali, & Hardian, M. (2023). Pengaruh kompetensi sosial guru terhadap karakter peduli sosial siswa di SMAN 1Pangean. *Journal on Teacher Education*, 4(3), 443–445.
- Wahyuningsih, R. (2021). Prestasi belajar siswa : kompetensi pedagogik guru dan motivasi belajar siswa. *Jurnal Paedagogy*, 8(2), 117. <https://doi.org/10.33394/jp.v8i2.3472>
- Zola, N. & Mudjiran, M. (2020). Analisis urgensi kompetensi kepribadian guru. *Jurnal EDUCATION: Jurnal Pendidikan Indonesia*, 6(2), 88–93. <https://doi.org/https://doi.org/10.29210/120202701>



RESEARCH ON TEACHING MATERIALS IN SCIENCE EDUCATION: A BIBLIOMETRIC ANALYSIS FROM 2013 TO 2023

Putri Angjelina^{1*}, Sjaeful Anwar²

^{1,2}Universitas Pendidikan Indonesia, Indonesia

* putriangjelinapa@upi.edu

ABSTRACT

The purpose of this study was to investigate the bibliometric properties of teaching materials in science education from 2013 to 2023. The bibliographic references were found in the Scopus databases by utilizing the keywords "teaching materials" AND "science education" (search date: February 22, 2024). For information analysis, the VOSviewer software program and the RStudio package were utilized. The findings verified that 111 journals and 170 papers covering 45 nations had been scanned. There is an increase in the publication of articles on the topic of teaching materials published in 2013-2023.

Germany, the United States of America, and Indonesia were the top three nations in this area. The majority of the publications were released in the Conference Series: Journal of Physics. Barendsen E is the author who has contributed the most. Network map and visualization results related to the relationship between topics discussed there are 4 in addition to the main topics namely teaching, education, curricula, and secondary schools.

Keywords: *Bibliometric analysis, teaching materials, science education, education*

1. INTRODUCTION

The success of the learning process, especially science education, is supported by the main components involved in it. As said by Anwar (2023), there are three main components in the learning process, namely teachers, students, and teaching materials. Teaching materials are one of the learning resources for students. In addition, teaching materials are also a reference in determining learning strategies so that the learning process becomes effective (Anwar, 2023). Teaching materials include various kinds of materials used to support teachers or instructors in the implementation of the learning process (Mudlofar, 2012). So, the characteristics of one teaching material will be different from the characteristics of other teaching materials, each teaching material should be tailored to the needs of students.

Research on teaching materials in science education is very important in this day and age. This is because research related to teaching materials in science education can improve the quality of learning (Sholehah, 2023). In addition, research related to the development of science teaching materials can also increase student interest (Oktiningrum, 2023). Then, how to keep up with the ever-changing developments in science, as well as following trends in research on teaching materials in science education from time to time. This ensures that students get learning that is relevant and in line with the latest developments in science.

In understanding trends, developments, and contributions of research on teaching materials in science education, bibliometric analysis. Bibliometric analysis is an approach in research that uses quantitative methods to analyze scientific publications, especially journal articles and references, to reveal trends, patterns, and relationships within them (Ayu, 2020). Thus, the use of bibliometric analysis can provide an in-depth understanding of the dynamics of teaching materials research in science education, as well as a strong foundation for the development of future educational strategies and policies.

In this research, we conducted a bibliometric analysis from 2013 to 2023 to explore research on teaching materials in science education. Through this approach, the purpose of this study was to investigate the bibliometric properties of this topic. The bibliometric analysis will provide valuable insights for educational practitioners and



researchers in understanding the dynamics and changes in the development of teaching materials in scientific education.

2. METHODS

There are four stages of bibliometric analysis method related to teaching materials. The first stage is using Scopus web data. The second stage is the stage of entering related keywords. The third stage exports data in the form of CSV and RIS. The last stage is analyzing data using the R Studio application and VOSviewer software. The stage is shown in Figure 1.

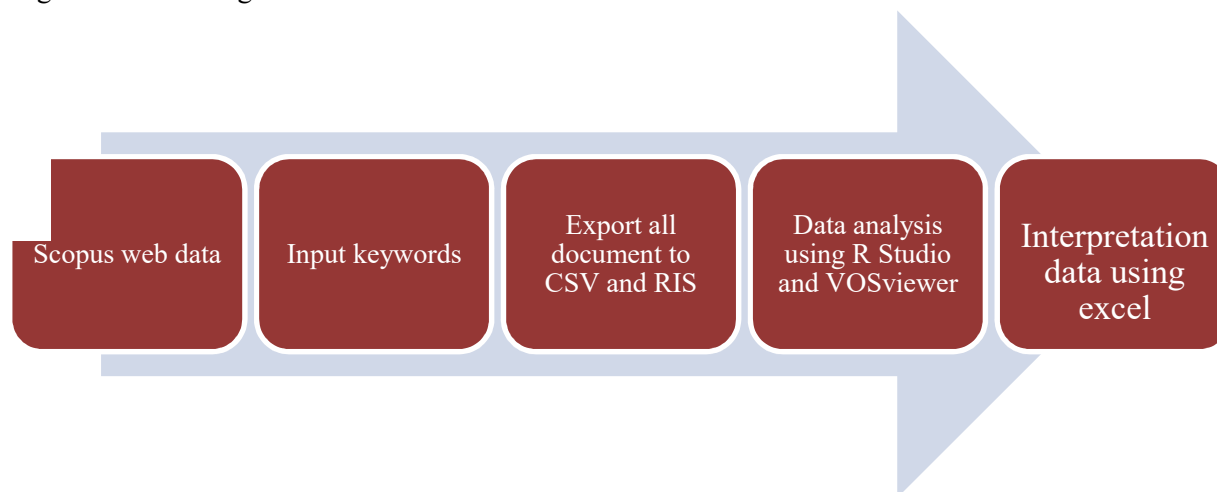


Figure 1. Four Stages of Bibliometric Analysis Method

Scopus, keywords, CSV and RIS, R Studio, and VOSviewer

In the first stage, data related to the present study were retrieved from Scopus on February 22, 2024. Scopus is feasible as a database for bibliometric analysis (AlRyalat, 2019). This is because Scopus has many indexed journals (Singh, 2021). Second, the keyword for searching journal articles was "teaching materials" and "science education". Only publications published from 2013 to 2023 were considered for retrieval as related data. Third, bibliographic data for 170 publications were acquired from the Scopus website and saved as.csv and ris files. The stored data contains citation information, bibliographic information, as well as abstracts, and keywords. Fourth, The.csv file is imported into R Studio. Then, choose the results that you want to research related to teaching materials. Four results will be researched, annual recording, top 10 countries, most relevant journal, and publication author. In addition to csv. files, ris. files are also imported into VOSviewer software to draw network maps and visualize them. As said by Al Husaeni (2022) one of the tools for bibliometric analysis can be the VOSviewer software.

3. RESULTS & DISCUSSION

Annual Recording

As shown in Figure 2, there is an increase in the publication of articles on the topic of teaching materials published in 2013-2023. Although in 2013-2018 the number of articles published was still below 15, the following 5 years experienced an increase above 15. The number increased sharply from 2018 to 2019, with the number of articles from 14 to 22. One possible reason for this is the need for a new approach to teaching materials research. This is in line with Sadeghi's (2019) statement that improving education leads to changes in learning methods.

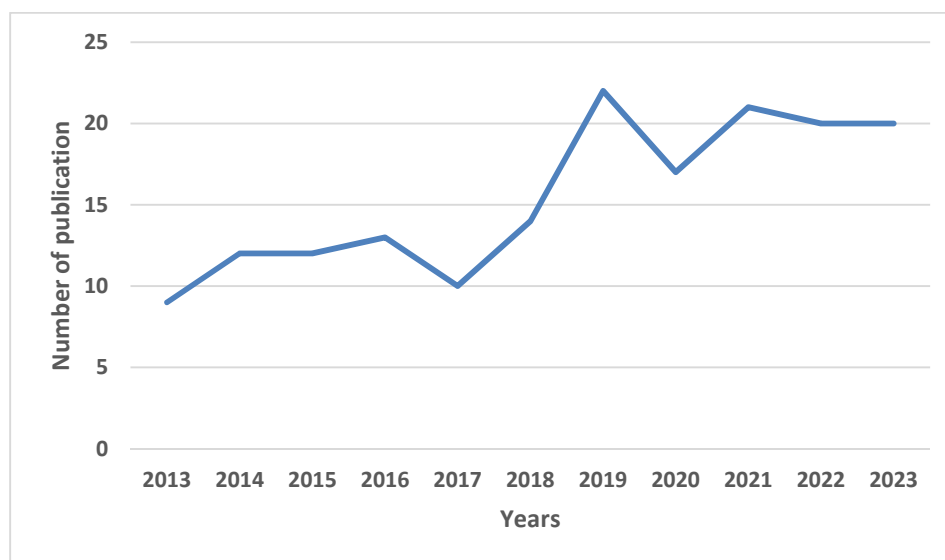


Figure 2. Annual Recording

Top 10 Countries

There were 47 distributions of countries that published on the topic of teaching materials and the top 10 publication countries were taken as shown in Figure 3. Among them, Indonesia published the most articles ($n = 62$), USA was the second with the number of articles ($n = 59$), and Germany was the third with the number of articles ($n = 46$).

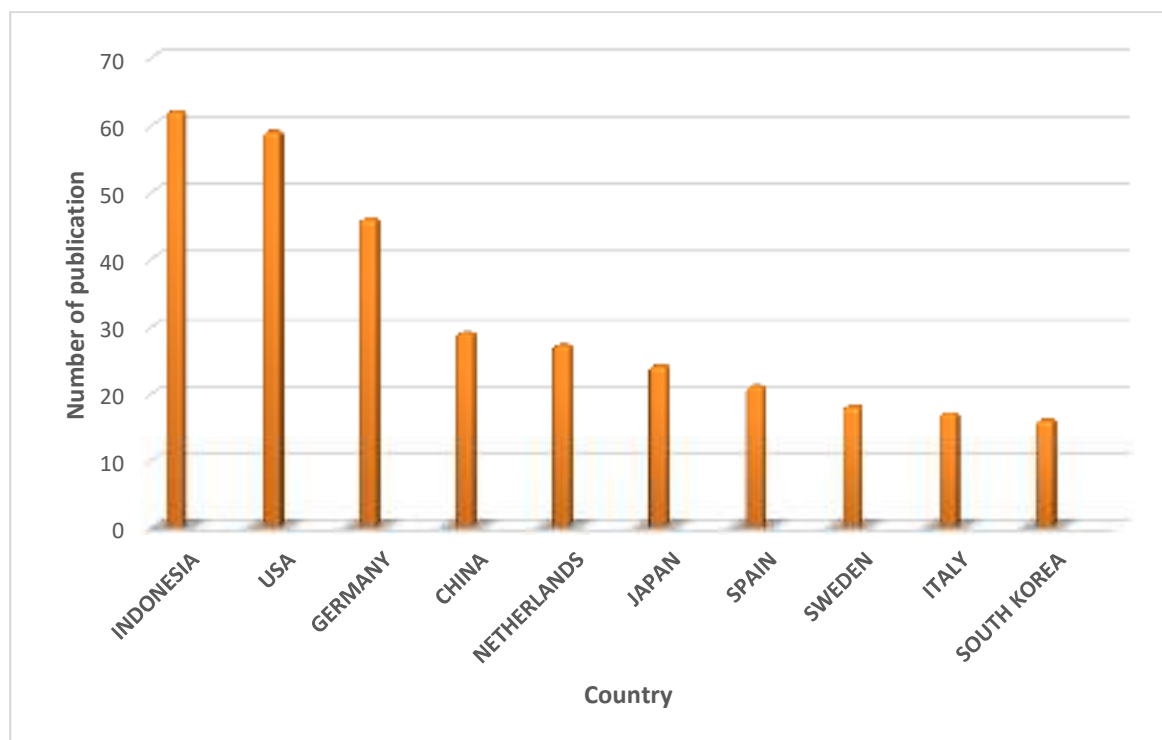


Figure 3. Distribution of top 10 countries



Indonesia is the country that publishes the most articles related to teaching materials because it has an education system that continues to develop and transform. This is evidenced by changes in the education curriculum from time to time (Ananda, 2021). In addition, the availability of literacy infrastructure and access to reading materials has not met the standards (Laksono, 2018). Therefore, research related to teaching materials is needed to support this. Although the quantity of Indonesian publications is the highest, it does not guarantee the quality of the published articles.

Most Relevant Journal

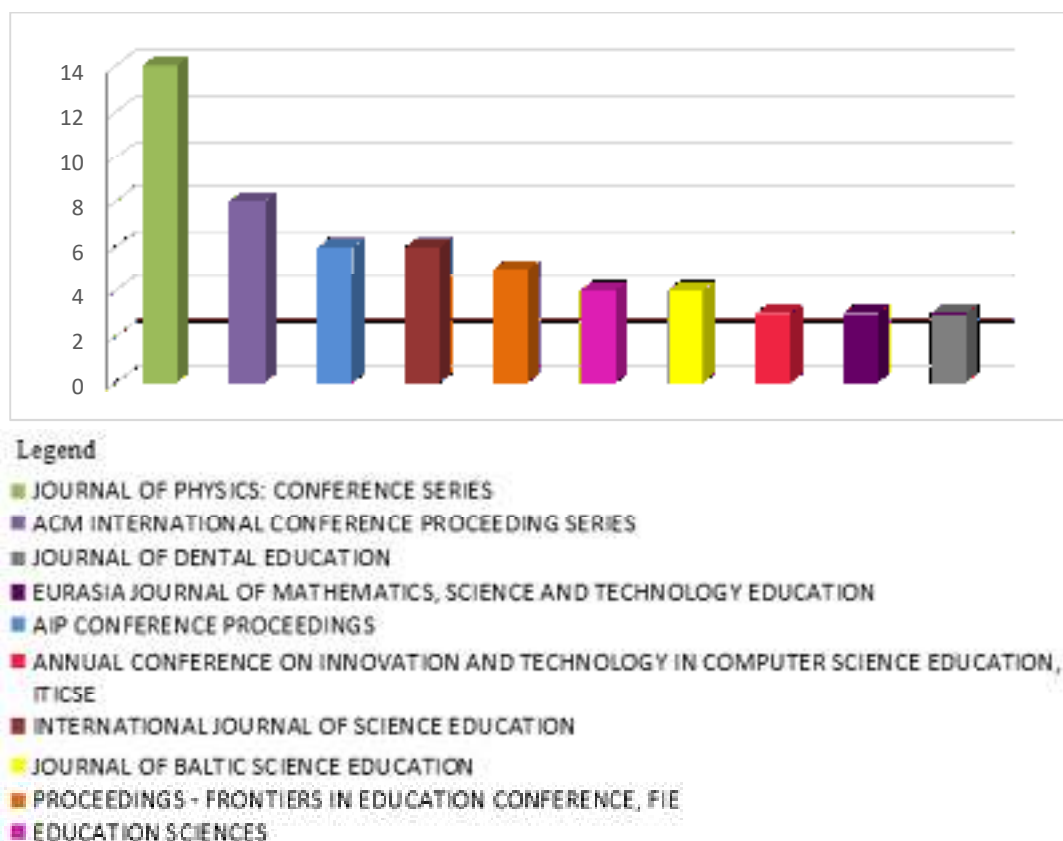


Figure 4. Most Relevant Journal

In Figure 4, there are 10 journals with the most publications out of a total of 111 journals. The top five journals are Journal of Physics: Conference Series (n=14), Acm International Conference Proceeding Series (n=8), AIP Conference Proceedings (n=6), International Journal Of Science Education (n=6), Proceedings - Frontiers In Education Conference, Fie (n=5). The quartile ranges of the top 10 journals are Q1, Q3 and Q4. Journal of Physics: Conference Series ranks first because of its all-encompassing scope.

Publication Author

Figure 5 shows the top 10 publication authors. Divided into two ranks, four authors occupy the first rank, namely Barendsen E, Eilks I, Grgurina N, and Zwaneveld B. The four authors both published three articles. In the second rank, there are six authors, namely Bell T, Brinda T, Deveci T, Fraiman Z, Gal-Ezer J, and Garner N.



Figure 5. Publication Author

Cluster Analysis and Related Topics

The results of the content analysis are shown in Figure 6, which explains the relationship between one topic and another. The topics consist of 5 clusters that can be seen from the different colors of the circles and their connecting lines. The first cluster is marked in red. The second cluster is marked in green the third cluster is marked in blue. The fourth cluster is marked in yellow. Finally, the sixth cluster is marked in purple.

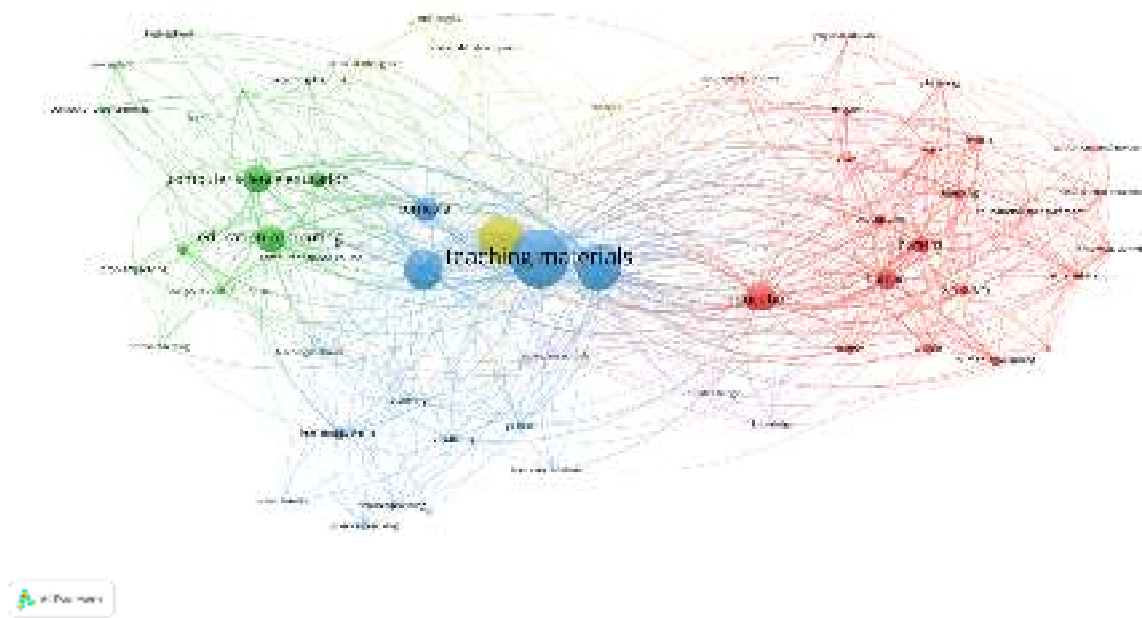


Figure 6. Network visualization of teaching materials



In addition to the topic "teaching materials" and "science education", there are several other topics that are also widely discussed, which is indicated by the size of the circle of the topic. The larger the circle of the topic, the more the topic is most discussed. There are three representatives of the largest circles, which are believed to be closely related to the main topic of teaching materials and science education. Among them are teaching, education, and curricula. Then there is also the smallest circle, namely secondary schools, which indicates that the topic is rarely discussed.

The link between the topics of "teaching" with "teaching materials" and "science education" lies in the role of teaching materials in supporting the process of teaching and science education. Good teaching materials can help teachers convey science concepts more effectively to students (Fatimah, 2014; Wenno, 2010). Thus, teaching, teaching materials, and science education complement and support each other to improve the quality of science education and students' understanding of science education. Education is a process that involves the transfer of knowledge, such as science education, which requires teaching materials. Based on the curricula, teaching materials are organized to support student learning. This is also explained by Anwar & Sumarna (2022) that the development of teaching materials must meet the demands of the applicable curriculum. There should also be a lot of discussion of publications on the topic of secondary schools. Because many publications related to teaching materials in science education in secondary schools are designed to develop various skills (Jannah, 2013; Setiawati, 2023; Wahyuni, 2015). A suggestion from this research is that there should be more publications related to teaching materials in secondary schools indexed by Scopus.

4. CONCLUSION

Research on teaching materials is very important because it can improve the quality of learning. Based on bibliometric analysis, it shows that the annual recording of publications on teaching materials has increased from 2013 to 2023. Indonesia published the most articles. Journal of Physics: Conference Series ranked first because of its comprehensive coverage. four authors ranked first, namely Barendsen E, Eilks I, Grgurina N, and Zwaneveld B. There are three representatives of the largest circles, which are believed to be closely related to the main topic of teaching materials and science education. Among them are teaching, education, and curricula. Then there is also the smallest circle, namely secondary schools, which indicates that the topic is rarely discussed.

REFERENCES

- Al Husaeni, D. F. & Nandiyanto, A. B. D. (2022). Bibliometric using Vosviewer with publish or perish (using Google Scholar data): From step-by-step processing for users to the practical examples in the analysis of digital learning articles in pre and post-Covid-19 pandemic. *ASEAN Journal of Science and Engineering*, 2(1), 19-46.
- Al-Ryalat, S. A. S., Malkawi, L. W., & Momani, S. M. (2019). Comparing bibliometric analysis using PubMed, Scopus, and Web of Science databases. *JoVE (Journal of Visualized Experiments)*, (152), e58494.
- Ananda, A. P. & Hudaidah, H. (2021). Perkembangan kurikulum pendidikan di indonesia dari masa ke masa. *SINDANG: Jurnal Pendidikan Sejarah dan Kajian Sejarah*, 3(2), 102-108.
- Anwar, S. & Sumarna, O. (2022). Pengembangan bahan ajar IPA terpadu berbasis ethnoscience. *Indonesia Emas Group*.
- Anwar, S. (2023). Metode Pengembangan Bahan Ajar Four Steps Teaching Material Development (4STMD). *Indonesia Emas Group*.
- Ayu, F. A. P. (2020). Analisis bibliometrik publikasi ilmiah bidang studi penyakit hepatitis di indonesia Periode 2009-2019 (*Doctoral dissertation*, Universitas Airlangga).



- Fatimah, F. & Widiyatmoko, A. (2014). Pengembangan science comic berbasis problem based learning sebagai media pembelajaran pada tema bunyi dan pendengaran untuk siswa SMP. *Jurnal Pendidikan IPA Indonesia*, 3(2).
- Jannah, L. (2013). Pengembangan bahan ajar IPA untuk meningkatkan pemahaman konsep materi struktur dan fungsi bagian tumbuhan siswa kelas IV berbasis multimedia interaktif di SD Negeri Ponggok 04 Blitar (*Doctoral dissertation*, Universitas Islam Negeri Maulana Malik Ibrahim).
- Laksono, K., & Retnaningdyah, P. (2018). Literacy infrastructure, access to books, and the implementation of the school literacy movement in primary schools in Indonesia. In *IOP Conference Series: Materials Science and Engineering*, Vol. 296, No. 1.
- Mudlofar, A. (2012). Aplikasi pengembangan kurikulum tingkat satuan pendidikan dan bahan ajar dalam pendidikan islam. *Rajawali Pers*.
- Oktiningrum, W., & Putri, A. R. (2023). Pengembangan bahan ajar pocket book berbasis QR Code untuk meningkatkan minat belajar siswa pada materi sistem peredaran darah manusia di kelas V SD. *Cakrawala Jurnal Ilmiah Bidang Sains*, 1(2).
- Sadeghi, M. (2019). A shift from classroom to distance learning: Advantages and limitations. *International Journal of Research in English Education*, 4(1), 80-88.
- Setiawati, P., Muhartati, E., & Sarkity, D. (2023). Pengembangan lembar kerja peserta didik berbasis keterampilan proses sains pada materi pencemaran lingkungan kelas VII SMP (*Doctoral Dissertation*, Universitas Maritim Raja Ali Haji).
- Singh, V. K., Singh, P., Karmakar, M., Leta, J., & Mayr, P. (2021). The journal coverage of Web of Science, Scopus, and dimensions: A comparative analysis. *Scientometrics*, 126, 5113-5142.
- Solehah, U., Amin, A., & Lovisia, E. (2023). Pengembangan bahan ajar berbentuk buku cerita bergambar berbasis saintifik pada mata pelajaran fisika kelas XI IPA SMA Negeri Megang Sakti. *Jurnal Perspektif Pendidikan*, 17(1), 62-70.
- Wahyuni, S. (2015). Pengembangan bahan Ajar IPA untuk meningkatkan kemampuan berpikir kritis siswa SMP. In *Prosiding: Seminar Nasional Fisika Dan Pendidikan Fisika* (Vol. 6, No. 6).
- Wenno, I. H. (2010). Pengembangan model modul IPA berbasis problem solving method berdasarkan karakteristik siswa dalam pembelajaran di SMP/MTs. *Jurnal Cakrawala Pendidikan*, 2(2).



USING PHET SIMULATIONS TO IMPROVE STUDENTS' REPRESENTATION ABILITY ON THE TOPIC OF CHEMICAL REACTIONS

Fitri Meliniasari^{1*}, M. Setyarini²

^{1,2}Department of Science Education, Lampung University, Indonesia

*pipitms81@gmail.com

ABSTRACT

This research aims to determine whether there is an increase in students' representation abilities after using PhET Simulations on the topic of chemical reactions. This type of research was quasi-experimental using a pretest and posttest control group design. This research involved two groups of students, namely the experimental group using PhET Simulations during the learning process while the control group only used conventional worksheets. The data collection technique used a 25-item test that refers to indicators of representational ability. This hypothesis test uses the t-test (Independent Sample t-Test) using the assumption that the data is normally distributed and homogeneous. The results of the analysis show that there was an influence of using PhET Simulation in improving students' representation abilities at MA Al-Hikmah as evidenced by the sig (2-tailed) value of $0.000 < 0,05$ so that H_0 is rejected with the n-Gain value in the experimental class of 0.71 which is in the high category.

Keywords: Representation abilities, PhET simulations, Chemical reactions.

1. INTRODUCTION

Chemistry is an abstract subject when viewed from the various concepts contained in the chemical material itself. The many changes in material at the atomic and molecular level and the use of symbols and formulas make this subject difficult for students to understand. According to Chittleborough and Treagust (2007), chemistry includes macroscopic, submicroscopic, and symbolic levels that are interconnected with each other. Representation at the macroscopic level is a level of chemical representation obtained through observation of phenomena that can be seen and felt by students' senses or phenomena that occur in real everyday life. Chemical phenomena can be observed at the macroscopic level, but their explanations often lie at the sub-microscopic level (Petillion & McNeil, 2020; Rahmawati et al., 2022). In addition, many phenomena at the sub-microscopic level are represented symbolically such as the use of atomic symbols, compounds, and the use of chemical equation symbols.

Lessons in chemistry subjects can be understood thoroughly if the learning involves concepts at the macroscopic, submicroscopic, and symbolic levels (Correia et al., 2019). One of the chemistry lessons that must be built on understanding and describing concepts at three levels of representation is chemical reactions (Hinton & Nakhleh, 1999). At the macroscopic representation level, students are required to be able to observe phenomena that occur, either through experiments carried out or phenomena that occur in everyday life. Observed phenomena can include the appearance of odors, color changes, the formation of gases, and the formation of precipitates in a chemical reaction. Sub-microscopic representation provides an explanation at the particle level where matter is described as a composition of atoms, molecules, and ions while symbolic representation is used to represent macroscopic phenomena using chemical reaction equations.

According to Chandrasegaran et al. (2009), when studying the concepts contained in chemistry lessons, many students have difficulty understanding these concepts, this is caused by the students' inability to connect macroscopic and submicroscopic phenomena. Therefore, students cannot directly feel and see the submicroscopic level making it difficult to visualize a chemical reaction (Abdoolatiff & Narod, 2009; Salame & Makki, 2021).

The concept of chemical reactions is a basic concept that must be understood before understanding other chemistry lessons such as chemical calculations, acids and bases, equilibrium, reaction rates, and many more.



Even though it is one of the most important chemical concepts in chemistry, many students have difficulty understanding the concept of chemical reactions (Seliwati, 2023). Because molecules are invisible and concepts are abstract, it is difficult for beginners to represent and make connections involving sub-microscopic levels with macroscopic observables (Hinton & Nakhleh, 1999; Salame & Makki, 2021).

Representation ability is students' ability to describe scientific concepts, theories, and findings through various forms, images, and symbols (Ahmar et al., 2020; Sari & Seprianto, 2018). Russell and Kozma, (2005) explicitly state representation skills as a term used to describe several skills and practices that reflect the use of a diversity of representations. By using representation skills, students will better understand the abstract concepts in chemistry by combining the macroscopic level and sub-microscopic level into a symbolic level through chemical equations (Bucat & Mocerino, 2009; Rahmawati et al., 2022; Sari & Seprianto, 2018). On the other hand, most students have difficulty representing various chemistry concepts. This is under the results of observations at the MA Al-Hikmah school in Bandar Lampung where 97% of students felt confused and had difficulty when studying chemical material, especially material related to atoms, molecules, ions, and chemical reaction equations. Because most students have difficulty representing various chemical phenomena using reaction equation symbols, teachers should use interactive simulations to illustrate how reaction equation symbols describe a chemical phenomenon and its relationships at the sub-microscopic level.

Animation and simulation play an important role in visualizing the sub-microscopic level which plays an important role in the teaching and learning process of chemistry in the classroom (Liu et al., 2021; Moore et al., 2014). Interactive simulations make it easier for students to represent phenomena at the sub-microscopic level, make invisible things visible, play a role in the investigation process, and allow several experiments to be carried out with fast feedback while being interesting and fun for students and teachers (Correia et al., 2019; Nuraida et al., 2021; Pratiwi et al., 2023). In addition, interactive simulations are easily accessible online, allowing users to use them flexibly.

The Physics Education Technology (PhET) was used in this research to find out how much influence it has in improving students' representation abilities after visualizing equation symbols in chemical reactions and compound molecules. This simulation has been widely used in chemistry education because it provides many advantages, including being easily accessible and free. This interactive simulation can provide dynamic access to various levels of representation so that it will help students understand objects that cannot be observed directly by eye (Rahmawati et al., 2022; Salame & Makki, 2021; Watson et al., 2020). This is under the results of Correia et al. (2019) research which states that by using PhET simulations students can represent the behavior of gases at the sub-microscopic level using symbols in the form of images.

Based on the description above, this research aims to analyze students' representation abilities after using PhET Simulations in chemical reaction lessons.

2. METHODS

Population and Sample

This research was at the MA Al-Hikmah Bandar Lampung school with the population in this study being 70 class X students at MA Al-Hikmah Bandar Lampung. Sampling in this study was carried out using a purposive sampling technique considering that the abilities of the two classes were almost the same, so 37 students in class XA1 were obtained as the experimental class and 33 students in class XA2 as the control class.

Research Design

The research method used was quasi-experimental with a pretest-posttest control group design (Fraenkel et al., 2012) This research was carried out by providing a treatment in the form of using PhET simulations in the experimental class and the control class only using conventional worksheets. The worksheets used in the control class are worksheets containing lesson material and practice questions. This research design looks at the



differences in students' pretest and posttest before and after treatment between the experimental class and the control class.

Table 1. Research Design

Class	Pretest	Treatment	Posttest
Experimental	O	X ₁	O
Control	O	C	O

Keterangan:

- O : Experimental class and control class pretest-posttest
X₁ : Experimental class's treatment (using PhET Simulations)
C : Use of conventional worksheets

The research instruments used in this study were pretest and posttest questions as many as 20 multiple-choice questions and 5 description questions using indicators of representation ability (Russell & Kozma, 2005). Indicators of representation ability can be seen in Table 2.

Table 2. Indicators of Representational Ability

Representational abilities (Russell & Kozma, 2005)	Indicator
Using representations to describe chemical phenomena based on molecular entities and processes	Using various symbols in a chemical reaction based on the phenomenon that occurs.
Deriving/selecting a representation and providing an explanation of why the representation is suitable for a particular purpose	Determine representations in the form of images to explain molecular phenomena in a chemical reaction
Using words to identify and analyze patterns of certain representational features (such as the behavior of molecules in an animation)	Explain chemical phenomena based on existing reactions
Describe and explore how different representations express the same or different things	Explain different types of reactions using different representations
Connecting various representations by mapping the features of one type of representation into another type of representation and explaining their relationships	Using other representations to describe the same chemical reaction
Take an epistemological position of the representation that is appropriate or has a difference from the observed phenomenon	Determine the representation used based on existing chemical phenomena
Using representations and their features in social situations to make inferences and predictions about observed chemical phenomena.	Counting the number of compounds contained in a chemical reaction; balance the chemical reaction

Data on students' representation abilities was processed using Microsoft Office Excel 2019 software and analyzed using SPSS version 25.0 for Windows software. The steps for processing student pretest-posttest data are (1) calculating student answer scores; and (2) calculating the pretest and posttest scores using the following formula:

$$\text{Score} = \frac{\Sigma \text{ answer score}}{\text{maximum score}} \times 100$$

calculate the n-Gain value for each student, using the following formula:



$$n - Gain = \frac{\text{posttest scores} - \text{pretest score}}{100 - \text{pretest score}}$$

calculate the average n-Gain value, the representational ability of each student's n-Gain value using the following formula

$$< n - Gain > = \frac{\sum n - Gain \text{ students}}{\text{Number of students}}$$

interpret the criteria for the average n-Gain value, as follows:

Table 3. n-Gain value criteria

<i>n-Gain</i>	Criteria
$> 0,7$	High
$0,3 < n-Gain \leq 0,7$	Medium
$n-Gain \leq 0,3$	Low

(Source: Hake, (2002))

After data processing, analysis of the n-Gain values obtained was carried out using SPSS version 25.0 to obtain normality, homogeneity, and differences in the two averages of student pretest-posttest data from the two samples. Data normality was tested using the Kolmogorov-Smirnov test with a significance level of > 0.05 . Homogeneity of data by looking at the One Way ANOVA value with a significance level of > 0.05 . The difference test between the two averages was carried out using an independent sample t-test from the average n-Gain value of the representation ability of students in the two samples with the results of the n-Gain average test, the representation ability of students who applied learning using PhET simulation had a significant difference compared to The average n-Gain representation ability of students who use conventional worksheets is if the sig (2-tailed) value is < 0.05 .

3. RESULTS & DISCUSSION

Based on the research that has been carried out, research results were obtained in the form of pretest-posttest score data on students' representational abilities. The test instrument in the form of pretest-posttest questions before being given to students has been measured for validity and reliability, and it is stated that the pretest-posttest questions are valid and reliable so that the test instrument is declared suitable for use to measure students' representational abilities. Data on the average pretest-posttest scores for both classes can be seen in Figure 1.

Based on Figure 1, it can be seen that there is a difference between the average pretest and posttest scores in the experimental class and the control class. It can be seen that there was an increase in the average score of students before (pretest) and after (posttest) the implementation of learning in both the experimental and control classes. The calculation results show that the average increase in the pretest-posttest score for the experimental class is higher, namely 66.9, compared to the control class, namely 42.35. This increase in representation ability is shown through the n-Gain value. The average n-Gain value in the experimental class and control class is shown in Table 4.

Table 4. Average n-Gain value in the control and experimental classes

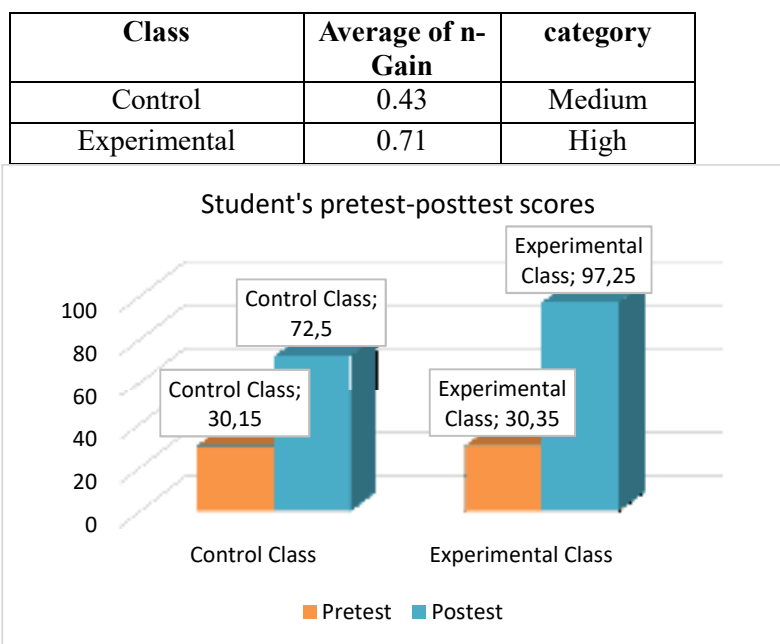


Figure 1. Student's Pretest-Posttest Score

Based on Table 4, it can be seen that there is a difference between the average n-Gain value of representational ability in the control class and the experimental class. This shows that the control class has "medium" n-Gain criteria and the experimental class has "high" n-Gain criteria. This shows that the use of PhET Simulations is effective in improving representation skills on the topic of chemical reactions. PhET Simulations can improve student learning outcomes in chemistry learning (Sa'diyah & Lutfi, 2023; Warsiki, 2023). With PhET simulations, students are helped to understand the number of atoms in a compound so that it is easier for students to balance existing chemical reactions. This has an impact on understanding the next concept, namely the concept of moles and chemical calculations. Students who already understand the concept of chemical reactions will find it easier to carry out chemical calculations.

Hypothesis Test

Hypothesis testing is a test of the difference between two means. This test uses the n-Gain value to find out whether there is a difference in the average n-Gain value in the representational abilities of experimental class and control class students. Before carrying out this test, a normality test and homogeneity test must be carried out. The results of the normality and homogeneity tests can be seen in Table 5.

Table 5. Results of the normality test of the n-Gain value of students' representational abilities

Class	N	<i>Sig. Test of Normality Kolmogrov-Smirnov</i>	Criteria
Control	33	0,200	<i>Sig > 0,05</i>
Experimental	37	0,200	

Based on Table 5, it can be seen that the average normality test results of the n-Gain value of the representational ability of students in the experimental class and control class show a sig value > 0.05 so that based on the test criteria, accept H_0 and reject H_1 , which means the sample comes from a population with a distribution normal. Based on the test results, the homogeneity test was continued. The homogeneity test results can be seen in Table 6.



Table 6. Homogeneity test results of the n-Gain value of representation ability

Class	N	Homogeneity test	
		Sig. value	Criteria
Control	33	0,438	<i>sig. > 0,05</i>
Experimental	37		

Based on Table 6, it can be seen that the results of the homogeneity test for the two variants of the experimental class and the control class have an n-Gain value of 0.438, which means the sig value is > 0.05 , so the test decision is to accept H_0 and reject H_1 , which means both classes are the control class and the experimental class. has a homogeneous population variance. Based on this, the test was continued with the independent sample t-test. The results of the difference test between the two averages can be seen in Table 7.

Table 7. Results of the independent sample t-test of students' representation abilities

Class	N	t-test	
		Sig. (2-tailed)	Criteria
Control	33	0,000	<i>sig. < 0,05</i>
Experimental	37		

Based on Table 7, it can be seen that the results of the difference between two averages using the Independent Sample t-test on the average n-Gain representation ability of students in the experimental class and control class show a sig (2-tailed) value of $0.000 < 0.05$ so that based on the test criteria, it is to accept H_1 and reject H_0 , which means $\mu_{(1x,y)} < \mu_{(2x,y)}$ which means that the average n-Gain learning outcomes of students who use PhET simulation have a significant difference compared to the average n-Gain learning outcomes of students who use conventional student worksheets

This research shows that there is a significant positive influence of the use of PhET Simulations on students' representational abilities in chemical reaction material. The use of visualization using animation and simulation can help students understand difficult concepts related to the dynamics of complex chemical concepts by combining interactive multimedia (animation and simulation) using PhET simulation. Students are helped to understand concepts at the molecular level that students cannot observe directly.

In the experimental class, the macroscopic level is presented through images and then integrated with the submicroscopic level through PhET Simulations visualization. Then it is connected to the symbolic level, namely through chemical equations and formulas. The three levels of representation (macroscopic, sub-microscopic, and symbolic) in an integrated manner can help students understand chemical phenomena so that in the future they can be applied in problem-solving strategies (Farida, 2009).

During the learning process, initially, students found it difficult to create a chemical formula to represent a compound, but this could be overcome with the help of PhET simulation in the "Build a molecule" feature. It is easier for students to imagine water compounds consisting of two hydrogen atoms and one oxygen atom. PhET simulation has a role in helping students visualize their understanding of chemical concepts that exist at the molecular or sub-microscopic level (Correia et al., 2019; Nuraida et al., 2021; Pratiwi et al., 2023; Rahmawati et al., 2022). By understanding the concepts they have regarding compound molecules, students will find it easier to understand chemical reaction lessons.



Figure 2. Build a Molecule feature in PhET Simulations

By using PhET Simulations, students can determine the components of reactants, products, and reaction residues where this concept will be very useful in chemical calculations. Students can also easily calculate the number of atoms in a reaction equation, which will later be used in the concept of balancing chemical reactions. From the interview results, 95% of students felt helped in imagining chemical reactions that occur in everyday life. Students can also easily balance the given reaction equations. PhET simulation only provides features for ammonia production, water decomposition, and methane gas combustion. However, during learning activities, students can create their representation in the form of a round image to represent the number of atoms in the reaction equation, so that students can balance chemical reactions because they understand the number of each atom on the left and right sides of the reaction equation. Apart from that, in PhET Simulation there are game features that can increase motivation and enthusiasm for learning (Sa'diyah & Lutfi, 2023). Following are several images from PhET Simulation which can be seen in Figure 3.

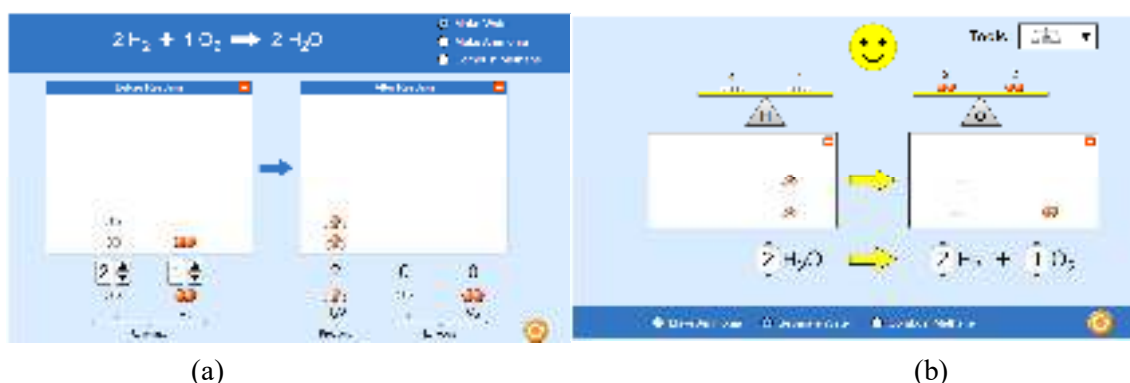


Figure 3. Various features of PhET Simulations: (a) reactant, product, and reaction residue components; (b) balancing chemical reactions

4. CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that the use of PhET Simulations is effective in improving representation abilities in chemical reaction material. This can be seen through the significant difference between the n-Gain values in the control and experimental classes, where the experimental class has a higher average n-Gain value than the experimental class. With PhET simulations, students are helped to understand the number of atoms in a compound so that it is easier for students to write reaction equations based on everyday chemical phenomena. This has an impact on understanding the next concept, namely the concept of



moles and chemical calculations. Students who already understand the concept of chemical reactions will find it easier to carry out chemical calculations.

REFERENCE

- Abdoolatiff, S., & Narod, F. B. (2009). Chemistry education in the ICT Age. *Chemistry Education in the ICT Age*, 85–100. <https://doi.org/10.1007/978-1-4020-9732-4>
- Ahmar, D. S., Azzajjad, M. F., & Syahrir, M. (2020). Students' representation ability in chemistry. *Journal of Applied Science, Engineering, Technology, and Education*, 2(2), 181–187. <https://doi.org/10.35877/454ri.asci22124>
- Bucat, B., & Mocerino, M. (2009). Learning at the sub-micro level: structural representations. In: Gilbert, J.K., Treagust, D. (eds) *Multiple Representations in Chemical Education. Models and Modeling in Science Education*, vol 4. Springer, Dordrecht. https://doi.org/10.1007/978-1-4020-8872-8_2.
- Chandrasegaran, A. L., Treagust, D. F., & Mocerino, M. (2009). Emphasizing multiple levels of representation to enhance students' understandings of the changes occurring during chemical reactions. *Journal of Chemical Education*, 86(12), 1433–1436. <https://doi.org/10.1021/ed086p1433>
- Chittleborough, G., & Treagust, D. F. (2007). The modelling ability of non-major chemistry students and their understanding of the sub-microscopic level. *Chemistry Education Research and Practice*, 8(3), 274–292. <https://doi.org/10.1039/B6RP90035F>
- Correia, A. P., Koehler, N., Thompson, A., & Phye, G. (2019). The application of PhET simulation to teach gas behavior on the submicroscopic level: secondary school students' perceptions. *Research in Science and Technological Education*, 37(2), 193–217. <https://doi.org/10.1080/02635143.2018.1487834>
- Farida, I. (2009). The importance of development of representational competence in chemical problem solving using interactive multimedia. *Science Education*, November 2009. http://s3.amazonaws.com/academia.edu.documents/31933516/makalah_seminar_intr.pdf?AWSAccessKeyId=AKIAJ56TQJRTWSMTNPEA&Expires=1473248224&Signature=hvhFuiq2HQOiNmeo0yBMxrUS2uk%3D&response-content-disposition=inline%3B filename%3DThe_Importance_of_Developmen
- Fraenkel, J. R., Norman, W., & Hyun, H. H. (2012). How to design and evaluate research in education (EIGHTH EDI). McGraw-Hil.
- Hake, R. R. (2002). Relationship of individual student normalized learning gains in mechanics with gender, high-school physics, and pretest scores on Mathematics and Spatial Visualization. *Physics Education Research Conference*, 8(August 2002), 1–14. https://scholar.google.com/citations?view_op=view_citation&hl=en&user=10EI2q8AAAAJ&citation_for_view=10EI2q8AAAAJ:IjCSPb-OGc4C
- Hinton, M. E., & Nakhleh, M. B. (1999). Students microscopic, macroscopic, and symbolic representations of chemical reactions. *The Chemical Educator*, 4(5), 158–167. <https://doi.org/10.1007/s00897990325a>
- Liu, T. C., Lin, Y. C., Hsu, C. Y., Hsu, C. Y., & Paas, F. (2021). Learning from animations and computer simulations: Modality and reverse modality effects. *British Journal of Educational Technology*, 52(1), 304–317. <https://doi.org/10.1111/bjet.12996>
- Moore, E. B., Chamberlain, J. M., Parson, R., & Perkins, K. K. (2014). PhET interactive simulations: Transformative tools for teaching chemistry. *Journal of Chemical Education*, 91(8), 1191–1197. <https://doi.org/10.1021/ed4005084>
- Nuraida, O., Akbar, G. S., Farida, I., & Rahmatullah, S. (2021). Using PhET simulation to learning the concept of



- acid-base. *Journal of Physics: Conference Series*, 1869(1). <https://doi.org/10.1088/1742-6596/1869/1/012020>
- Petillion, R. J. & McNeil, W. S. (2020). Johnstone's triangle as a pedagogical framework for flipped-class instructional videos in introductory chemistry. *Journal of Chemical Education*, 97(6), 1536–1542. <https://doi.org/10.1021/acs.jchemed.9b01105>
- Pratiwi, F., Tiur, H., Silitonga, M., & Karolina, V. (2023). Pengaruh media pembelajaran PhET simulation terhadap hasil belajar kelas x pada materi geometri molekul. *Journal on Education*, 06(01), 9593–9602.
- Rahmawati, Y., Zulhipri, Hartanto, O., Falani, I., & Iriyadi, D. (2022). Students' conceptual understanding in chemistry learning using Phet interactive simulations. *Journal of Technology and Science Education*, 12(2), 303–326. <https://doi.org/10.3926/jotse.1597>
- Russell, J. & Kozma, R. (2005). Assessing learning from the use of multimedia chemical visualization software. *Visualization in Science Education*, 299–332. https://doi.org/10.1007/1-4020-3613-2_15
- Sa'diyah, A. & Lutfi, A. (2023). Atomic structure teaching module with PhET simulation to increase student motivation and learning outcomes. *Hydrogen: Jurnal Kependidikan Kimia*, 11(August). <https://e-journal.undikma.ac.id/index.php/hydrogen/article/view/8436>
- Salame, I. I. & Makki, J. (2021). Examining the use of PhET simulations on students' attitudes and learning in general chemistry II. *Interdisciplinary Journal of Environmental and Science Education*, 17(4), e2247. <https://doi.org/10.21601/ijese/10966>
- Sari, R. P. & Seprianto, S. (2018). Analisis kemampuan multipel representasi mahasiswa FKIP Kimia Universitas Samudra Semester II pada materi asam basa dan titrasi asam basa. *Jurnal Pendidikan Sains Indonesia*, 6(1), 55–62. <https://doi.org/10.24815/jpsi.v6i1.10745>
- Seliwati, S. (2023). Kemampuan memahami persamaan reaksi kimia di era pembelajaran digital pada siswa kelas X MIPA SMAN 5 Palangka Raya. *Jurnal Ilmiah Kanderang Tingang*, 14(1), 212–219. <https://doi.org/10.37304/jikt.v14i1.216>
- Warsiki, A. A. P. (2023). PhET interactive simulations berbasis inquiry terbimbing untuk meningkatkan aktifitas dan hasil belajar kimia pada materi asam basa. *Indonesian Journal of Instruction*, 4(2), 133–140. <https://doi.org/10.23887/iji.v4i2.60456>
- Watson, S. W., Dubrovskiy, A. V., & Peters, M. L. (2020). Increasing chemistry students' knowledge, confidence, and conceptual understanding of pH using a collaborative computer pH simulation. *Chemistry Education Research and Practice*, 21(2), 528–535. <https://doi.org/10.1039/c9rp00235a>



ANALYSIS OF THE ROLE OF GAMIFICATION IN EDUCATION: ITS IMPACT ON STUDENT MOTIVATION

Loly Suwandani¹, Sunyono^{2*}
^{1,2} Lampung University, Indonesia
*lolysuwanda@gmail.com

ABSTRACT

This research examined the role of gamification-based learning in the world of education which has an impact on student learning motivation. The research method used was the survey method, this method was used to collect data and analyze the impact of gamification on student motivation. The subjects of this research were 237 students from East Lampung. The research results showed that the use of gamification can have an impact on students' motivation to learn. Gamification is complemented by game elements such as scores, challenges, and rewards, which can create a more interactive and engaging learning environment and stimulate competitiveness, cooperation, and exploration of complex concepts in a fun way. Rewards associated with gamification provide added value for students to be actively involved in the learning process. This research made an important contribution to understanding the role of gamification in educational contexts and provides a basis for implementing more effective gamification strategies to increase student motivation. The implications of the results of this research can be used as a guide for educators and policymakers to design more interesting and motivating learning experiences in the field of education.

Keywords: Gamification, Motivation, Education

1. INTRODUCTION

Current technological advances allow more things to be done, such as learning based on digital learning environments (Majuri et al., 2018). The use of educational technology including situational, discussion-based, and experimental-empirical methods is increasingly common in higher education (Izvorska & Kartunov, 2022). These technologies include computing, extended reality, gaming, and educational tools seen as critical to addressing educational innovation challenges (Espinosa & Cartagena, 2021). Technology makes the learning process easier for educators and students, opens up new opportunities, and changes the educational paradigm as a whole. In this modern era, mastering technology is a necessity to face the rapid development of globalization (Kahar et al., 2021).

The use of technology in education has enabled more interesting and interactive teaching, increased educational accessibility, expanded learning opportunities, and optimized the process of evaluating and monitoring students. Multimedia video-based learning in education in various forms and styles (presentations, tutorials, demonstrations, scenarios, and simulations) is considered one of the most widely adopted and effective learning methods (Christopoulos et al., 2023). Some of the possibilities developed in this digital environment are related to video games to create meaningful and interesting learning experiences, based on this the development of educational games in learning is increasing (Majuri et al., 2018). Games in learning are a mental context that is run using a computer/laptop according to certain rules, using media to further government or corporate training, education, health, public policy, and strategic communication purposes (Alvarez & Damien, 2011).

Games-based learning is a system applied in the educational process, where users can adopt a game for their needs of interest, knowledge, and learning motivation (Vusić & Geček, 2018). Games that are integrated into education are a complex system where learning objectives, rules, and game mechanisms are combined in learning gameplay (Christopoulos et al., 2023). One of the main goals of Serious Games is to provide reliable and cost-effective services in teaching, as well as students gain knowledge in a clearer, more interactive, and realistic way (Ravysse et al., 2017). The effects caused by gamification in education have changed conventional methods, especially in the field of education (Ružić & Dumancic, 2023). Gamification is the application of game elements



in a non-game context, the integration of gamification has shown potential in increasing student motivation and engagement in educational environments (Baah et al., 2023; Dichev & Dicheva, 2017). However, the impact of gamification on learner motivation depends on context and varies between learners. The use of game mechanisms and dynamics can create stronger motivation for students, compared to just extrinsic motivators (Dichev & Dicheva, 2017). Empirical evidence regarding the influence of gamification on learner motivation is limited, and more research is needed to develop a systematic understanding of how to use gamification in educational contexts.

The fact is that in schools, some students come to class to take part in learning without any preparation. Conventional learning methods that are often used do not motivate students and the level of conceptual mastery is low (Hancock, 1994). This usually occurs when educators fail to set clear learning objectives and use traditional teaching methods (Cialdella et al., 2002). Lack of motivation can also be influenced by students' disinterest in the subject matter (Dişlen, 2013). However, highly structured teaching methods have been proven to maximize student motivation (Hancock, 2002). Therefore, educators need to consider the specific learning needs of each learner and use innovative teaching styles to increase motivation. Based on research that has been conducted, it is stated that the use of gamification in learning can increase student motivation, resulting in increased student learning outcomes. However, other research also states that the use of e-learning gamification does not provide a significant increase in students' learning motivation, so further exploration is needed regarding the role of teachers in the learning context (Buckley & Doyle, 2016; Papp, 2017). Based on this, this research will explain the role related to gamification in the field of education concerning students' learning motivation.

2. METHODS

This research was a quantitative descriptive research. The research method used in this research was a survey method. The subjects selected for this research were 237 students at the junior high school (SMP) level in East Lampung who had used gamification in previous learning. The instrument used was a questionnaire with the duration of filling out the questionnaire starting from 10 February 2024 to 25 February 2024. The number of question items available consisted of 20 questionnaires. The procedure in this research included creating a questionnaire related to a predetermined theme, namely the role of gamification in students' learning motivation. The second stage was giving questionnaires to students who have had experience using gamification in learning via Google Forms. The third stage was data processing in the form of making a percentage for each aspect of the questions that have been filled in by students. The fourth stage was interpreting each aspect of the question descriptively. The learning motivation indicators used as a reference to measure the impact of gamification on learning motivation according to Aluja-Banet et al. (2019), shown in Table 1.

Table 1. Indicators of learning motivation

No.	Indicator	Sub Indicator
1.	Speed indicators	Agility Rate
		Time spent
		Transition time
2.	Persistence indicators	Number of logs executed in a given task per day
		Resilience level
		Number of attempts used to submit a given task.
		Persistence level
3.	Intensity indicators	Delivery rate
		Engagement level
		Competitive level



3. RESULTS & DISCUSSION

The research began by creating questionnaire questions related to the theme, namely the role of gamification on students' learning motivation using indicators (Aluja-Banet et al., 2019). The number of question items in each question sub-indicator is two question items. After completing the survey instrument creation, the next step is to distribute the questionnaire to students. Based on the data collection that has been carried out, the results obtained from the questionnaire are shown in Table 2.

Table 2. Percentage of student learning motivation questionnaires

No.	Indicator	Sub indicator	Question number	Answer	Percentage (%)
1.	Speed indicators	Agility Rate	[1]	Yes	82,7%
				No	17,3%
			[2]	Yes	79,4%
				No	20,6%
		Time spent	[3]	Yes	80%
				No	20%
			[4]	Yes	87%
				No	23%
		Transition time	[5]	Yes	78%
				No	22%
2.	Persistence indicators	Number of logs executed in a given task per day	[7]	Yes	80,1%
				No	19,9%
			[8]	Yes	83%
				No	17%
		Resilience level	[9]	Yes	75%
				No	25%
			[10]	Yes	75%
				No	25%
		Number of attempts used to submit a given task	[11]	Yes	17,3%
				No	86,7%
			[12]	Yes	9,3%
				No	90,7%
		Persistence level	[13]	Yes	81,5%
				No	18,5%
3.	Intensity indicators	Delivery rate	[15]	Yes	96%
				No	4%
			[16]	Yes	100%
				No	0%
		Engagement level	[17]	Yes	86,7%
				No	13,3%
			[18]	Yes	90,7%
				No	9,3%
		Competitive level	[19]	Yes	86,9%
				No	13,1%



No.	Indicator	Sub indicator	Question number	Answer	Percentage (%)
			[20]	Yes	82%
				No	18%

After obtaining the results as listed in Table 2, then interpret each aspect of the student's answers. The nature of motivation consists of two, namely intrinsic motivation, which can grow from within oneself and is usually known as internal motivation, and extrinsic motivation, which arises from outside a person (Uno, 2023). The speed indicators aspect with the strength rate sub-indicator in question 1 obtained a percentage of 82,7%, while in the second question 79.4% of students answered yes, this states that strength is measured as a sigmoid function of the difference between the dates on which a task was performed. of a subject, for example, science becomes available and the time when students first access the task given. The greater percentage of the aligity rate aspect is considered a positive indicator in the learning process because it indicates that students' interest in learning the material is also higher. In the context of gamification, where game elements are used to increase engagement, engagement levels can include aspects such as how often learners participate in challenges, achieve milestones, or complete assigned tasks. Gamification can help increase the aligity rate by making learning more interesting and providing incentives for students to actively participate in the learning process (Sureephong & Puritat, 2016). In the time spent sub-indicator, the third question received a percentage of 80%, while for the fourth question, 87% of students answered yes. This states that students use the available time to answer questions and complete the challenges given in gamification-based applications well and optimally. Tasks or challenges given with a certain time limit can stimulate students to be more focused and work efficiently to complete the task. can stimulate a spirit of healthy competition and increase motivation to achieve quickly. Therefore, having a specified time spent can stimulate a healthy competitive spirit and increase greater motivation (Barata et al., 2013; Dicheva et al., 2015). In the transition time sub-indicator, the percentage result was 78%, while in the sixth question, 82.7% of students stated that to complete/work on the two different tasks, students needed time to rest from the first task to work on the second task. Students can use the available time gap to prepare themselves before starting to work on the next assignment. The application of gamification must take into account the transition time aspect because students have different learning styles. This diversity ensures that intervention time and other elements can be adapted to suit individual needs, to provide a motivational and effective learning experience (Sholahudin & Yenti, 2022).

The persistence indicator measures the extent to which an individual continues to persist in pursuing a goal, despite difficulties (Aluja-Banet et al., 2019). In the sub-indicator number of logs executed in a given task per day, it was found that the percentage of students who answered yes was 80.1% for the seventh question and 83% for the eighth question. This means that while using gamification in learning, students have several notes related to the learning material during the lesson. Recording material in the form of notes involves information processing and content filtering (Willett et al., 2015). Understanding this kind of material can help students become more actively involved in learning, which can contribute to increased motivation (Papageorgiou, 2021; Tan, 2018). The Resilience level sub-indicator obtained a percentage of 75% for questions nine and ten for students who answered yes. This is because it states that around 75% of students are persistent in completing the tasks given by the teacher in the form of gamification. Previous research stated that the use of gamification increases students' motivation, enjoyment, and encouragement to be serious and collaborate (Tan & Saucerman, 2017). The percentage of the sub-indicator number of attempts used to submit a given task in the eleventh question was 17,3% and 9,3% for the twelfth question. This states that students only collect/submit assignments for each question 1-5 times. Persistence level is the average time spent between consecutive attempts on a given task. Based on the questionnaire, the results were 81,5% and 87,5% for questions thirteen and fourteen. This states that students have high perseverance in completing each task given by the teacher in the form of gamification. The more attempts to collect/collect assignments indicate the level of accuracy and perseverance of students. This is an indicator of motivation, students who are diligent and thorough are committed and try hard to



achieve learning goals (Sahiu & Wijaya, 2017).

Next is the intensity indicators, the delivery rate sub-indicator states that 96% and 100% of students collect and complete the assigned tasks without delay. The high level of participation in collecting and working on assignments shows that the majority of students are willing and able to be actively involved in their assignments. This can be encouraged because the assignments given have been packaged in the form of gamification and if they are late it will automatically be seen by the teacher so that this sub-indicator reflects an increase in intrinsic and extrinsic motivation. Gamification can significantly optimize learning motivation (Sholahudin & Yenti, 2022; Srimuliyani, 2023). The engagement level sub-indicator shows that 86,7% and 90,7% of students feel actively involved in the learning process. This is because gamification, which has many features such as rankings or leaderboards, can encourage students to compete with themselves or friends. This healthy competition can increase the spirit of competition and motivation to achieve better results, so by integrating gamification into learning, students feel more active (Cialdella et al., 2002; Majuri et al., 2018; Ružic & Dumancic, 2023). Research states that gamification elements can increase the motivation and engagement of elementary school and college students (Papp, 2017). Competitive level is a ratio of the total activities carried out by a student in a particular subject, this relates to the most active students on the same day (Aluja-Banet et al., 2019). The research results showed that 86,9% and 82% of students admitted to being more active when learning was carried out using gamification. This is because using gamification presents several elements that were not found in previous learning. Gamification is equipped with reward elements that provide direct recognition or prizes to students for achievements or active participation. The excitement and challenges in gamification learning can create a more positive atmosphere and make students more involved. The findings obtained are relevant to research which shows that gamification can increase the level of student engagement and optimize learning (Smiderle et al., 2020). In addition, several studies show that gamification can increase student motivation and engagement, resulting in better learning outcomes. However, the impact of gamification on motivation and engagement may vary based on specific user characteristics (Azzouz & Gutierrez-Colon, 2020; Baah et al., 2023).

4. CONCLUSION

The research was conducted on junior high school (SMP) students who had gained experience using gamification in learning to identify the impact of gamification on students. The research results show that the use of gamification can have an impact on students' motivation to learn. This is because in learning through gamification students begin to be introduced to the material that will be read with different things at each meeting, thereby reducing boredom in learning. Gamification features game elements such as scores, challenges, and rewards, which can create a more interactive and engaging learning environment and stimulate competitiveness, cooperation, and the exploration of complex concepts in a fun way. Applications that incorporate gamification in learning not only provide a platform for understanding scientific concepts but also encourage students' active participation and stimulate intrinsic motivation, leading to more memorable learning. By integrating game elements into the learning experience, teachers can create an immersive environment that encourages active participation and increases student motivation.

REFERENCES

- Aluja-Banet, T., Sancho, M. R., & Vukic, I. (2019). Measuring motivation from the virtual learning environment in secondary education. *Journal of Computational Science*, 36. <https://doi.org/10.1016/j.jocs.2017.03.007>
- Alvarez, J., & Damien, D. (2011). Serious games & simulation for risks management. In *Proceedings of the Serious Games & Simulation Workshop* (Vol. 2).
- Azzouz, N., & Gutierrez-Colon P. M. (2020). Effect of gamification on students' motivation and learning achievement in second language acquisition within higher education: a literature review 2011-2019. *The*



EUROCALL Review, 28(1), 40.

- Baah, C., Govender, I., & Rontala S. P. (2023). Exploring the role of gamification in motivating students to learn. *Cogent Education*, 10(1). <https://doi.org/10.1080/2331186X.2023.2210045>
- Barata, G., Gama, S., Jorge, J., & Gonçalves, D. (2013). Improving participation and learning with gamification. *ACM International Conference Proceeding Series*, 10–17. <https://doi.org/10.1145/2583008.2583010>
- Buckley, P., & Doyle, E. (2016). Gamification and student motivation. *Interactive Learning Environments*, 24(6), 1162–1175. <https://doi.org/10.1080/10494820.2014.964263>
- Christopoulos, A., Mystakidis, S., Cachafeiro, E., & Laakso, M. J. (2023). Escaping the cell: Virtual reality escape rooms in biology education. *Behaviour and Information Technology*, 42(9), 1434–1451. <https://doi.org/10.1080/0144929X.2022.2079560>
- Cialdella, K., Herlin, C., & Hoefler, A. (2002). Motivating student learning to enhance academic progress. *Academic Progress*, 1–73.
- Dichev, C. & Dicheva, D. (2017). Gamifying education: what is known, what is believed and what remains uncertain: a critical review. *International Journal of Educational Technology in Higher Education*, Vol. 14, Issue 1. <https://doi.org/10.1186/s41239-017-0042-5>
- Dicheva, D., Irwin, K., Dichev, C., & Talasila, S. (2015). A course gamification platform supporting student motivation and engagement. *2014 International Conference on Web and Open Access to Learning, ICWOAL 2014, January 2016*. <https://doi.org/10.1109/ICWOAL.2014.7009214>
- Dişlen, G. (2013). *STUDENTS' AND TEACHERS' VOICES*. 35–45.
- Espinosa, M. P. P. & Cartagena, F. C. (2021). Advanced technologies to face the challenge of educational innovation (Tecnologías avanzadas para afrontar el reto de la innovación educativa). *RIED-Revista Iberoamericana de Educacion a Distancia*, 24(1), 35–53.
- Hancock, D. R. (1994). Motivating adults to learn academic course content. *Journal of Educational Research*, 88(2), 102–108. <https://doi.org/10.1080/00220671.1994.9944824>
- Hancock, D. R. (2002). Influencing postsecondary students' motivation to learn in the classroom. *College Teaching*, 50(2), 63–66. <https://doi.org/10.1080/87567550209595877>
- Izvorska, D. & Kartunov, S. (2022). Modern educational technologies in professional training of student in technical institutes of higher education. *September*, 63–68. <https://doi.org/10.46793/tie22.063i>
- Kahar, M. I., Cika, H., Nur Afni, & Nur Eka Wahyuningsih. (2021). Pendidikan era revolusi industri 4.0 menuju era society 5.0 di masa pandemi covid 19. *Moderasi: Jurnal Studi Ilmu Pengetahuan Sosial*, 2(1), 58–78. <https://doi.org/10.24239/moderasi.vol2.iss1.40>
- Majuri, J., Koivisto, J., & Hamari, J. (2018). Gamification of education and learning: A review of empirical literature. *CEUR Workshop Proceedings*, 2186(GamiFIN), 11–19.
- Papageorgiou, E. (2021). Students' perceptions of learning, using interactive notes. *South African Journal of Higher Education*, 35(2), 207–229. <https://doi.org/10.20853/35-2-3975>
- Papp, T. A. (2017). Gamification effects on motivation and learning: Application to primary and college students. *International Journal for Cross-Disciplinary Subjects in Education*, 8(3), 3193–3201. <https://doi.org/10.20533/ijcdse.2042.6364.2017.0428>
- Ravyse, W. S., Seugnet Blignaut, A., Leendertz, V., & Woolner, A. (2017). Success factors for serious games to enhance learning: a systematic review. *Virtual Reality*, 21(1), 31–58. <https://doi.org/10.1007/s10055-016->



0298-4

- Ružic, I. M., & Dumancic, M. (2023). Gamification in education. *Informatologia*, 48(3–4), 198–204. <https://doi.org/10.3390/encyclopedia3040089>
- Sahiu, S., & Wijaya, H. (2017). Hubungan motivasi belajar ekstrinsik terhadap hasil belajar psikomotorik pada mata pelajaran agama Kristen Kelas V di SD Zion Makassar. *Jurnal Jaffray*, 15(2), 231. <https://doi.org/10.25278/jj71.v15i2.262>
- Sholahudin, U., & Yenti, Y. (2022). Possible gamification learning for optimizing student learning motivation. *EduLine: Journal of Education and Learning Innovation*, 2(3), 261–266. <https://doi.org/10.35877/454ri.eduline975>
- Smiderle, R., Rigo, S. J., Marques, L. B., Peçanha de Miranda Coelho, J. A., & Jaques, P. A. (2020). The impact of gamification on students' learning, engagement and behavior based on their personality traits. *Smart Learning Environments*, 7(1). <https://doi.org/10.1186/s40561-019-0098-x>
- Srimuliyani, S. (2023). Menggunakan teknik gamifikasi untuk meningkatkan pembelajaran dan keterlibatan siswa di kelas. *EDUCARE: Jurnal Pendidikan Dan Kesehatan*, 1(1), 29–35.
- Sureephong, P. & Puritat, K. (2016). Enhancing user performance and engagement through gamification: case study of aqua republica. *International Conference on Software, Knowledge, Information Management & Applications (SKIMA) Enhancing*, 220–224.
- Tan, P. M. & Saucerman, J. J. (2017). Enhancing learning and engagement through gamification of student response systems. *ASEE Annual Conference and Exposition, Conference Proceedings, 2017-June*. <https://doi.org/10.18260/1-2--28276>
- Tan, Y. L. L. (2018). Meaningful gamification and students' motivation: A strategy for scaffolding reading material. *Online Learning Journal*, 22(2), 141–156. <https://doi.org/10.24059/olj.v22i2.1167>
- Uno, H. (2023). Teori Motivasi dan Pengukurannya: Analisis di Bidang Pendidikan. Bumi Aksara.
- Vusić, D., & Geček, R. (2018). Instructional design in game based learning and applications used in educational systems. *Tehnički Glasnik*, 12(1), 11–17. <https://doi.org/10.31803/tg-20180312141348>
- Willett, W., Goffin, P., & Isenberg, P. (2015). Understanding digital note-taking practice for visualization. *IEEE Computer Graphics and Applications*, 35(4), 38–51. <https://doi.org/10.1109/MCG.2015.52>



SYSTEMATIC LITERATURE REVIEW: CULTURAL INTEGRATION IN LEARNING CONCEPTS WITH AN ETHNOMATHEMATICS APPROACH

Rahmi Hayati¹*, Edi Syahputra², Edy Surya³

¹Universitas Almuslim, Indonesia

^{2,3}Universitas Negeri Medan, Indonesia

*hayatirahmi@yahoo.com

ABSTRACT

In an educational context, the integration of culture in the learning concept is essential to ensure that each student feels recognized and their values are appreciated. The ethnomathematics approach is one way to integrate culture into mathematics learning. By including mathematical examples and problems that are relevant to students' culture, learning will become more meaningful and students will be more motivated to learn. In addition, by understanding mathematical concepts from various cultures, students can develop a deeper understanding of these concepts. It can also help in creating an inclusive learning environment and stimulate students' interest in mathematics. It is important to continue to develop this approach in our educational context to ensure that every student gets a fair and stimulating opportunity to learn mathematics.

Keywords: *Cultural Integration, Learning concept, ethnomathematics*

1. INTRODUCTION

Mathematics education is an important part of every individual's development. However, mathematics learning in schools often tends to ignore cultural aspects, making it difficult for students to relate mathematical concepts to their daily lives (Hendriyanto et al., 2023). One approach that can be used to overcome this problem is the ethnomathematics approach. This approach integrates culture in mathematics learning so that students can see the relevance between mathematical concepts and their culture (Serepinah & Nurhasanah, 2023).

By applying an ethnomathematics approach, mathematics learning can become more interesting and relevant for students. They can see how mathematical concepts do not only come from textbooks but can also be found in everyday life and various aspects of their culture. This can motivate students to study mathematics with more enthusiasm because they can see the immediate use and relevance of what they are learning.

In addition, by integrating culture into mathematics learning, students can also understand that mathematical concepts are not isolated from their cultural context (Ramadhani et al., 2023). They will better understand how mathematics is not only a calculation tool, but also has roots in human culture and history. Thus, mathematics educators need to consider an ethnomathematics approach to teaching to create inclusive, relevant, and motivating learning for all students. By integrating culture into mathematics learning concepts, we can help students develop a deeper understanding and appreciation of how mathematical concepts are used in everyday life and how culture contributes to influencing mathematical understanding.

In addition, cultural integration in mathematics education can also help in maintaining and promoting cultural heritage and stimulate students' interest in learning mathematics (Andriono, 2021). By including examples and applications of mathematics in cultural contexts, students can understand mathematical concepts in a more real and relevant way. In addition, cultural integration in mathematics education can also help students develop a sense of pride in their cultural heritage. This can increase students' motivation to learn mathematics because they feel that learning mathematics is also part of inheriting and maintaining their cultural identity.

Thus, the ethnomathematics approach opens up opportunities for students to realize that mathematics is not only separate from their daily lives and culture but is also an integral part of both aspects. So, as mathematics



educators, it is important to look for ways to integrate cultural aspects in mathematics learning to create more meaningful and relevant learning experiences for students (Verner et al., 2019),

2. METHODS

The method used in this research was a literature review. The literature review was the first and most important step in preparing a research plan. A literature review is a search and research of the literature by reading various books, journals, and other publications related to the research topic, to produce an article regarding a particular topic or issue (Marzali, 2017). The context that was the object of this research was closely elaborated data regarding educational leadership. Next, the process of data collection and analysis was carried out, then the research presented conclusions as a conclusion to the results of this research.

3. RESULTS & DISCUSSION

Ethnomathematics Concepts in Learning

The concept of ethnomathematics in learning includes the use of culture and everyday life as a context for learning mathematics. This approach not only focuses on the application of mathematical concepts in real life but also considers the various mathematical practices that have existed in society since time immemorial. For example, in Javanese culture, there is a practice of mathematical calculations used in traditional carving arts such as batik or wood carving. By studying these mathematical practices, students not only learn mathematical concepts but can also appreciate the richness of traditional culture and art. This not only provides a deeper understanding of mathematics but also opens students' minds to the cultural diversity that exists around them.

Apart from that, the concept of ethnomathematics also allows students to see mathematical concepts in various aspects of everyday life. For example, when learning about patterns and sequences in mathematics, students can identify patterns found in traditional art, music, or dance in their culture. This not only makes learning mathematics more interesting but also helps students to relate mathematical concepts to their own experiences and life contexts. By adopting the concept of ethnomathematics in learning, mathematics learning can be more inclusive and can accommodate students' diverse cultural backgrounds. This creates a more grounded and relevant learning environment for students and helps break down the gap between everyday life and abstract mathematical concepts.

Apart from that, the concept of ethnomathematics can also stimulate students' interest in mathematics, because they can see the relevance and usefulness of mathematics in the context of their lives. When students can identify mathematical concepts in their daily lives, they will be more motivated to learn and understand mathematics in more depth. By presenting mathematics as an integral part of everyday life and culture, an ethnomathematics approach can also help students to develop analytical, problem solving, and critical thinking skills. They can see how mathematical understanding can be used to understand and solve various situations in everyday life, both in cultural contexts and in universal contexts.

Therefore, it is important for mathematics educators to integrate ethnomathematics concepts in learning (Tampubolon et al., 2023). By utilizing mathematical practices in various cultures and everyday life as a learning context, students can gain a more comprehensive understanding of mathematics and how mathematical concepts can be applied in a variety of situations. Apart from that, in applying the concept of ethnomathematics, educators can also broaden students' perspectives on mathematics and culture. Through this approach, students not only learn about mathematical concepts but also develop a sense of pride in their cultural heritage. In this way, learning mathematics is no longer something separate from everyday life, but instead becomes an important part of understanding and preserving cultural riches.

Application of the Ethnomathematics Approach in the Curriculum

It is important to include an ethnomathematics approach in the mathematics curriculum, from elementary to advanced levels. This ensures that students of all levels can experience an inclusive and meaningful learning



experience. In addition, by including cultural aspects in the curriculum, students can develop a broader understanding of mathematical concepts and relate them to everyday life and their cultural heritage (Adam, 2004). Apart from that, implementing an ethnomathematics approach in the curriculum also requires the development of learning materials that support cultural integration. This includes compiling examples and applications of mathematics that are relevant to various cultures, as well as developing learning resources that highlight the contribution of culture to the development of mathematics. In this way, students can see the connection between mathematics and their culture, and develop a sense of pride in their cultural heritage (Lidinillah et al., 2022).

Apart from that, in implementing the ethnomathematics approach, educators also need to make adjustments in teaching and assessment methods. Teaching methods that support an ethnomathematics approach must allow students to use their cultural context to understand mathematical concepts (Rosa & Orey, 2011). Meanwhile, assessments must also consider the application of mathematical concepts in cultural contexts, so that students can demonstrate their understanding comprehensively. Finally, implementing an ethnomathematics approach in the curriculum can also involve collaboration with local communities or certain ethnic groups in developing learning materials (Yandani & Agustika, 2022).

Cultural Influences on Mathematics Teaching

Mathematics teaching that integrates culture can have a significant positive impact on students. First, cultural integration in mathematics teaching can create self-confidence and positive identity in students, especially those from diverse cultural backgrounds. They can see the contribution of their culture in understanding mathematics as valuable and relevant. Apart from that, teaching mathematics that pays attention to culture can also increase student participation in learning. By involving real examples and situations related to students' culture, they can feel more motivated to be actively involved in mathematics learning. It also allows teachers to create more contextual and meaningful learning experiences for students (Mania & Alam, 2021).

The influence of culture in teaching mathematics can also create a stronger relationship between students and the subject matter. When students see that mathematical concepts can be applied in their cultural context, they will be more involved in the learning process and understand the relevance and usefulness of mathematics in everyday life. By implementing mathematics teaching that pays attention to culture, students can also develop an attitude of tolerance and respect for cultural diversity (Christian Ginting et al., 2023). They will better understand that there are various views and approaches to mathematics in various cultures, and appreciate the uniqueness and contribution of each culture in developing mathematical concepts (Wulandari et al., 2024). Thus, teaching mathematics that pays attention to culture not only creates more meaningful learning but also helps students develop a broader understanding of cultural diversity and how mathematics can be a platform that connects various cultural heritages.

The Importance of Supporting Mathematics Teaching that Pays Attention to Culture

Support for culturally attentive mathematics teaching is not only important for individual students but also for building an inclusive and cultural society. Through culturally attentive mathematics teaching, we can help bridge cultural gaps and increase appreciation for diversity in society (Zaenuri et al., 2019). In addition, this approach can also be a strong foundation for introducing mathematical concepts to students from different cultural backgrounds. By engaging mathematical concepts in their cultural context, students can more easily understand and feel connected to the subject matter, thereby increasing their learning success.

Support for mathematics teaching that takes into account culture is also important in efforts to preserve and promote cultural heritage. By integrating culture into mathematics teaching, we help strengthen students' sense of pride in their cultural heritage. This can have a positive impact on the maintenance and development of cultural heritage because students will care more about and understand their cultural values through inclusive mathematics learning (Meaney et al., 2022). In addition, support for mathematics teaching that pays attention to culture also plays a role in preparing students for life in a multicultural society. By understanding the contribution of culture to



mathematics, students will be better prepared to interact and work in a culturally diverse environment. This will help create a society that is more inclusive and tolerant of differences, thus supporting the creation of a harmonious and cultural environment (Fouze & Amit, 2023). Therefore, educators and educational policymakers need to continue to support culturally attentive mathematics teaching. Through the integration of culture in mathematics learning, we not only enhance students' learning experiences but also help prepare them to appreciate and maintain cultural richness in the future.

Culture-Based Mathematics Learning Methods

Several mathematics learning methods can be applied specifically to pay attention to culture in the teaching process. One of them is a contextual approach that allows students to understand mathematical concepts through real situations related to their culture. By providing students with culturally relevant examples and problems, they can see the connection between mathematics and their everyday lives. In addition, this approach can also involve the use of teaching materials that tell the history of mathematics from various cultures. By introducing cultural heritage from a mathematical perspective, students can feel more connected to the subject matter and understand the contribution of culture to the development of mathematical concepts. Furthermore, collaborative learning is also a method that can support mathematics teaching that pays attention to culture (Trisnani & Utami, 2021). Through collaboration between students with different cultural backgrounds, they can share knowledge and experiences in understanding mathematical concepts. This not only increases students' understanding of cultural diversity but also strengthens relationships between students in the learning environment (Muhtadi et al., 2017).

The application of technology in mathematics learning can also be a means of paying attention to culture. By using digital learning resources that integrate cultural context, students can more easily access information and teaching materials that are relevant to their cultural background. Apart from that, technology also allows the development of mathematics applications that can be adapted to various cultures, so that students can learn mathematics more fun and meaningfully (Turmuzi et al., 2024). By paying attention to various culture-based mathematics learning methods, educators can create an inclusive learning environment and support holistic student development. Through teaching mathematics that pays attention to culture, students can gain a deeper understanding of mathematics while developing a sense of pride and appreciation for their cultural heritage.

Strategies for Integrating Culture in Mathematics

Integrating culture in mathematics learning requires appropriate strategies to ensure student engagement and a deep understanding of mathematical concepts in a cultural context. One strategy that can be used is an emphasis on community involvement in mathematics teaching. By involving communities in mathematics learning, students can understand the contribution of their culture in the development of mathematical concepts. For example, inviting local community leaders or cultural figures to share experiences about the application of mathematics in the daily lives of their community. This not only provides students with a more concrete understanding but also strengthens the relationship between school and community and builds students' pride in their cultural heritage. In addition, using teaching materials that incorporate stories or legends from certain cultures can also be an effective strategy (Mania & Alam, 2021). By including cultural narrative elements in mathematics teaching, students can develop a sense of curiosity and interest in their own culture, while understanding mathematical concepts in a context that is more interesting and relevant to them.

An interdisciplinary approach is also a strategy that can improve mathematics teaching that takes into account culture. By integrating cultural elements in mathematics learning, for example, through art, music, or language, students can more easily relate mathematical concepts to their everyday cultural experiences and expressions. Finally, learning that is responsive to cultural diversity is also a key strategy for integrating culture into mathematics. This approach allows educators to respond to the individual needs of students with diverse cultural backgrounds so that each student can feel valued and engaged in mathematics learning. By implementing these



strategies, culturally attentive mathematics teaching not only creates more meaningful learning but also helps create an inclusive learning environment and prepares students to appreciate the cultural diversity around them.

The Role of Ethnomathematics in Multicultural Education

Ethnomathematics plays an important role in preparing students for life in a multicultural society (Wahyudin, 2018). By studying cultural contributions to the realm of mathematics, students can develop a deeper understanding of how mathematics relates to the daily lives of various cultures. This understanding will help them to better understand and appreciate the varying perspectives of mathematics among various cultural groups. Along with that, an ethnomathematics approach can also help improve the academic achievement of students from diverse cultural backgrounds. By applying cultural context in learning mathematics, students can feel more involved and motivated in learning mathematics. Apart from that, ethnomathematics can also bridge learning gaps between students, especially in the context of cultural diversity (Khatri, 2020).

In the context of multicultural education, educators need to understand and apply ethnomathematics concepts in teaching mathematics. This will help create an inclusive learning environment, enrich students' learning experiences, and encourage mutual respect and tolerance for cultural differences (Anderson-Pence, 2015). By integrating ethnomathematics in multicultural education, we not only create more meaningful mathematics learning for students but also help form individuals who can appreciate and understand cultural diversity in a multicultural society.

Building Mathematical Understanding Through Local Culture

One effective way to build mathematical understanding through local culture is to utilize concrete examples and applications of mathematics in everyday life that are relevant to local culture. For example, in teaching geometry, educators can use examples of traditional buildings or decorative patterns commonly found in local culture to strengthen students' understanding of geometric concepts. In addition, considering approaches that are responsive to cultural diversity is also important in building mathematical understanding through local culture (Cahya Sari Putra & Nur Mahmudah, 2021). Educators need to understand the diverse backgrounds of students and ensure that mathematics teaching materials are not only relevant to local culture but also accessible and understandable to all students without exception. By utilizing folklore, traditional games, or daily practices in teaching mathematics, students can see the relevance of mathematical concepts in their daily lives, while fostering a sense of pride in local culture (Efendi & Surya, 2023). This not only improves mathematical understanding, but also strengthens students' identity and love of their culture (Andhany et al., 2023). By utilizing local culture as a context for mathematics learning, students can develop their mathematical skills while experiencing the depth and richness of their culture (Siregar et al., 2023). This approach also allows students to see the value and relevance of mathematics in their daily lives, thereby strengthening learning motivation and understanding of mathematical concepts in the local cultural context (Ramadhani et al., 2023). Thus, building mathematical understanding through local culture is not only about helping students understand mathematical concepts but also about enriching their learning experience by appreciating and celebrating local culture which is an important part of their identity (Cimen, 2014).

Mathematics Learning Innovation with Ethnomathematics

Developing mathematics learning innovations using an ethnomathematics approach can be an important step in creating a more diverse and inclusive learning experience. One innovation that can be implemented is the use of digital technology to explore and embrace diverse mathematical practices in various cultures. By utilizing digital platforms, students can learn traditional mathematical practices from various cultures, such as problem-solving, measurement, or number order, which can enrich their understanding of mathematical concepts (Suherman & Vidákovich, 2022); (Ramadhani et al., 2021). In addition, technology can also be used to facilitate



collaboration between students from different cultural backgrounds in solving mathematical problems related to their cultural heritage (Yolanda Br Tarigan & Syahputra, 2023).

Another innovative approach is to involve local communities in mathematics learning. By inviting local cultural figures or practitioners who use mathematics in everyday life to share their experiences and knowledge, students can see how mathematical concepts are used in real contexts and are relevant to their culture. Apart from that, the development of mathematical games based on folklore or traditional practices is also an interesting innovation. By using folklore or traditional games as a basis, students can learn and understand math concepts in a fun and meaningful way, while remaining connected to their cultural heritage.

Through these innovations, educators can create mathematics learning experiences that are more interesting and relevant to the lives of students from various cultural backgrounds. This not only increases students' learning motivation but also helps create an inclusive learning environment and enriches students' understanding of the contribution of culture to the domain of mathematics. By continuing to enrich the mathematics learning approach with ethnomathematics, we can ensure that every student feels valued and involved in learning mathematics while preparing them to become individuals who appreciate and understand the cultural diversity around them.

Evaluation and Effectiveness of Ethnomathematics in Learning

To evaluate the effectiveness of using ethnomathematics in learning, educators can involve various evaluation methods that are responsive to cultural diversity. One approach that can be used is to involve students in the evaluation process to get a direct view of how ethnomathematics influences their understanding and motivation to learn mathematics (Sulistiyowati et al., 2023). Additionally, the use of case studies and qualitative analysis can also provide in-depth insight into how ethnomathematics influences the academic achievement and engagement of students from various cultural backgrounds. By interviewing students, parents, and educators, we can gain a comprehensive understanding of the impact of ethnomathematics on mathematics learning.

Not only that, the use of quantitative data to monitor the progress of students from various cultural groups is also needed. By comparing test or assessment results between students from different cultural backgrounds, we can evaluate the effectiveness of ethnomathematics in reducing learning gaps and improving mathematics learning for all students. In addition to academic evaluation, it is also important to pay attention to the social and psychological effects of applying ethnomathematics. Monitoring student interactions, attitudes toward mathematics, and self-confidence in learning mathematics from a cultural perspective can provide a more holistic understanding of the effectiveness of ethnomathematics in creating inclusive learning environments.

By integrating various evaluation methods that are responsive to cultural diversity, we can gain a comprehensive understanding of the effectiveness of ethnomathematics in mathematics learning. This will enable educators to continue to develop and adapt ethnomathematics approaches to suit the needs of students from various cultural backgrounds, thereby creating more inclusive and meaningful mathematics learning (Imswatama & Lukman, 2018).

4. CONCLUSION

After explaining the concepts of ethnomathematics and cultural integration in mathematics learning, it can be concluded that this approach provides many significant benefits in learning. Cultural integration in mathematics learning can help students to better understand mathematical concepts in a way that is relevant to their daily lives. This also helps in broadening students' perspectives on mathematics, as well as respecting cultural diversity in the classroom. However, it should be remembered that the implementation of ethnomathematics and cultural integration in mathematics learning requires a careful and structured approach. Teachers need to understand their students' culture well and ensure that mathematics learning remains the main focus. The teacher's ability to create relevant and satisfying learning experiences for all students is also key to the success of this approach. For this reason, it is recommended that ethnomathematics approaches and cultural



integration become an integral part of the mathematics education curriculum. Sufficient support from schools and mathematics curriculum providers is also necessary to ensure that the training and resource approaches can be implemented effectively for teachers.

REFERENCES

- Adam, S. (2004). Ethnomathematical ideas in the curriculum. *Mathematics Education Research Journal*, 16(2), 49–68. <https://doi.org/10.1007/BF03217395>
- Anderson-Pence, K. (2015). Ethnomathematics : the role of culture in the teaching and learning of mathematics. *Utah Mathematics Teacher Fall/Winter*, 3(2), 52–60.
- Andhany, E., Syahputra, E., & Simamora, E. (2023). Ethnomatematics studies: Poda lessons to Markobar in Mandailing culture. *Proceedings of the 8th Annual International Seminar on Transformative Education and Educational Leadership, AISTEEL*, 9–10. <https://doi.org/10.4108/eai.19-9-2023.2340511>
- Andriono, R. (2021). Analisis peran etnomatematika dalam pembelajaran matematika. *ANARGYA: Jurnal Ilmiah Pendidikan Matematika*, 4(2). <https://doi.org/10.24176/anargya.v4i2.6370>
- Cahya, E. & Nur, F. (2021). The implementation of ethnomathematics based-learning for students. *SJME (Supremum Journal of Mathematics Education)*, 5(2), 1–9. <https://doi.org/10.35706/sjme.v5i2.4827>
- Chrsitianti G. A., Siagian, P., & Surya, E. (2023). Development of learning materials through ctl with karo culture context to improve students' problem solving ability and self-efficacy. *Proceedings of the 4th International Conference on Science and Technology Applications, ICoSTA*, 14(2), 265–274. <https://doi.org/10.4108/eai.1-11-2022.2326212>
- Cimen, O. A. (2014). Discussing Ethnomathematics: Is mathematics culturally dependent? *Procedia - Social and Behavioral Sciences*, 152, 523–528. <https://doi.org/10.1016/j.sbspro.2014.09.215>
- Dwidayati, N., & Suyitno, A. (2019). Ethnomathematics role as an encouragement of the growth of student's nationalism. *KnE Social Sciences*, 2019, 759–774. <https://doi.org/10.18502/kss.v3i18.4766>
- Efendi, I., & Surya, E. (2023). Pengaruh penerapan etnomatematika pada permainan tradisional engklek sebagai media pembelajaran matematika terhadap hasil belajar siswa Kelas V SDN 097361 Serbelawan. *Science and Education Journal*, 2(3), 486–494. <https://sicedu.org/index.php/sicedu/article/view/144>
- Fouze, A. Q., & Amit, M. (2023). The importance of ethnomathematics education. *Creative Education*, 14(04), 729–740. <https://doi.org/10.4236/ce.2023.144048>
- Hendriyanto, A., Priatna, N., Juandi, D., Dahlan, J. A., Hidayat, R., Sahara, S., & Muhaimin, L. H. (2023). Learning mathematics using an ethnomathematics approach: A systematic literature review. *Journal of Higher Education Theory and Practice*, 23(7), 59–74. <https://doi.org/10.33423/jhetp.v23i7.6012>
- Imswatama, A., & Lukman, H. S. (2018). The effectiveness of mathematics teaching material based on ethnomathematics. *International Journal of Trends in Mathematics Education Research*, 1(1), 35–38. <https://doi.org/10.33122/ijtmr.v1i1.11>
- Lidinillah, D. A. M., Rahman, Wahyudin, & Aryanto, S. (2022). Integrating Sundanese ethnomathematics into mathematics curriculum and teaching: a systematic review from 2013 To 2020. *Infinity Journal*, 11(1), 33–54. <https://doi.org/10.22460/infinity.v11i1.p33-54>
- Mania, S., & Alam, S. (2021). Teachers' perception toward the use of ethnomathematics approach in teaching math. *International Journal of Education in Mathematics, Science and Technology*, 9(2), 282–298.



<https://doi.org/10.46328/IJEMST.1551>

- Marzali, A. (2017). Menulis kajian literatur. *ETNOSIA: Jurnal Etnografi Indonesia*, 1(2), 27. <https://doi.org/10.31947/etnosia.v1i2.1613>
- Meaney, T., Trinick, T., & Allen, P. (2022). Ethnomathematics in education: The need for cultural symmetry. *Handbook of Cognitive Mathematics*, 1–2, 191–219. https://doi.org/10.1007/978-3-031-03945-4_4
- Muhtadi, D., Sukirwan, S., Warsito, W., Charitas, R., & Prahmana, I. (2017). Measuring and making patterns. 3–4.
- Ramadhani, R., Syahputra, E., & Simamora, E. (2021). Ethno-flipped classroom model : Sebuah rekomendasi model pembelajaran matematika. *Axioma*, 1–6.
- Ramadhani, R., Syahputra, E., & Simamora, E. (2023). Ethnomathematics approach integrated flipped classroom model: Culturally contextualized meaningful learning and flexibility. *Jurnal Elemen*, 9(2), 371–387. <https://doi.org/10.29408/jel.v9i2.7871>
- Rosa, M., & Orey, D. C. (2011). Ethnomathematics: the cultural aspects of mathematics (Ethnomathematics: os aspectos culturais da matematica). *Revista Latinoamericana de Etnomatemática*, 4(2), 32–54. <http://www.redalyc.org/articulo.oa?id=274019437002>
- Serepinah, M., & Nurhasanah, N. (2023). Kajian etnomatematika berbasis budaya lokal tradisional ditinjau dari perspektif pendidikan multikultural. *Scholaria: Jurnal Pendidikan dan Kebudayaan*, 2, 148–157. <https://doi.org/10.24246/j.js.2023.v13i2.p148-157>
- Siregar, B., Siregar, H., Panjaitan, A., Mulyono, M., Kairuddin, K., Syahputra, E., Sari, D., & Hia, Y. (2023). *Hots-based test instrument design on geometry transformation with culture context*. 9–10. <https://doi.org/10.4108/eai.19-9-2023.2340428>
- Suherman, S., & Vidákovich, T. (2022). Assessment of mathematical creative thinking: A systematic review. *Thinking Skills and Creativity*, 44(June), 1–34. <https://doi.org/10.1016/j.tsc.2022.101019>
- Sulistyowati, E. (2023). Meta-analysis study of the effectiveness of the ethnomathematical approach on students' achievement. *Pegem Journal of Education and Instruction*, 14(1), 197–204. <https://doi.org/10.47750/pegegog.14.01.22>
- Tampubolon, T., Sibarani, S., Zuhri, Efendi, Zakiah, N., & Zaini, H. (2023). Ethnomathematics learning to improve students' understanding for numeracy concepts. *JPI (Jurnal Pendidikan Indonesia)*, 12(2), 358–366. <https://doi.org/10.23887/jpiundiksha.v12i2.60716>
- Trisnani, N., & Utami, W. T. P. (2021). Ethnomathematics-based learning tools. *International Journal of Elementary Education*, 5(4), 593. <https://doi.org/10.23887/ijee.v5i4.40574>
- Turmuzy, M., Suharta, I. G. P., Astawa, I. W. P., & Suparta, I. N. (2024). Meta-analysis of the effectiveness of ethnomathematics-based learning on student mathematical communication in Indonesia. *International Journal of Evaluation and Research in Education*, 13(2), 903–913. <https://doi.org/10.11591/ijere.v13i2.25475>
- Verner, I., Massarwe, K., & Bshouty, D. (2019). Development of competencies for teaching geometry through an ethnomathematical approach. *Journal of Mathematical Behavior*, 56(December), 1–7. <https://doi.org/10.1016/j.jmathb.2019.05.002>
- Wahyudin (2018). Etnomatematika dan pendidikan matematika multikultural. *Prosiding Seminar Nasional Pendidikan Matematika Etnomatnesia*, 1991, 1–19. <https://jurnal.ustjogja.ac.id/index.php/etnomatnesia/article/view/2290>



- Wulandari, D. U., Mariana, N., Wiryanto, W., & Amien, M. S. (2024). Integration of ethnomathematics teaching materials in mathematics learning in elementary school. *IJORER: International Journal of Recent Educational Research*, 5(1), 204–218. <https://doi.org/10.46245/ijorer.v5i1.542>
- Yandani, P. E., & Agustika, G. N. S. (2022). Implementation of ethnomathematics in mathematics learning videos for first grade of elementary school. *MIMBAR PGSD Undiksha*, 10(2), 326–336. <https://doi.org/10.23887/jjpgsd.v10i2.47683>
- Yanti, I. (2024). Role of ethnomathematics in mathematics learning. *IJER (Special Edition) The 3rd International Conference on Education (Icon 2023)*, Vol. 8 No.3 (16-23).
- Yolanda Br Tarigan, N., & Syahputra, E. (2023). Pengembangan modul matematika berbasis etnomatematika untuk meningkatkan pemahaman konsep matematis siswa di Kelas VII SMP Swasta Santa Maria Kabanjahe. *Science and Education Journal*, 2(3), 506–512.



APPLYING DUOLINGO IN IMPROVING STUDENTS' SPEAKING SKILL

Rahmi Fhonna^{1*}, Fitriah², Muharral³, Suryani⁴

^{1, 2, 3}English Department of UIN Ar-Raniry Banda Aceh, Indonesia

⁴English Education Program, Faculty of Education and Teacher Training, Universitas Abulyatama Aceh, Indonesia

*rahmifhonna@ar-raniry.ac.id

ABSTRACT

This study aims to find out the use of the Duolingo application in improving the speaking skills of students at SMP 8 Banda Aceh. This study used a pre-experimental research design to obtain accurate research results. The sample was selected using a purposive sampling technique which is part of non-random sampling, and there were 34 students involved in this study as participants. Research instruments are the form of pre-test and post-tests to distinguish the results before and after treatment.

Based on data analysis, it was identified that there is an improvement in students' speaking skills and the result of the hypothesis is that the value of the t score is higher than the t table ($0.967 > 0.678$). This means that the hypothesis is accepted. It can be concluded that the use of the Duolingo application can improve the students' speaking skills. Therefore, the use of the Duolingo application in the learning process in improving students' speaking skills is highly recommended to be applied at all levels of study.

Keywords: Duolingo Application, students' Improvement, Speaking skill

1. INTRODUCTION

Speaking is one of the skills that must be mastered by English learners because language is used to communicate with others in everyday life. It is not only about delivering ideas with the right intonation but also related to how to deliver the contents of the conversation. Furthermore, speaking skill requires the speaker to recognize how to interact as about speaking turn (Jondeya, 2011). It is an undeniable fact that students should practice their English frequently. Therefore, the obligation of teachers is to foster the students' self-confidence so that they are brave to use English (Niah, 2019). In teaching-learning process, as a consequence, the use of media is an effort to create the quality and support its process, in which the students can enjoy participating in learning activities. It is very helpful in conveying information and simplifying the teaching process, as well as enabling teachers to practice the principles of illustration teaching and learning objects (Matra, 2020). Indrasari, Novita, & Megawati (2018) reported that media is one thing that can convey information between the source and the recipient.

It is believed, consequently, that several applications can help students to improve their English skills, especially speaking. One of them is the use of Duolingo which provides 66 different language courses available in 23 languages, 22 more courses are still being developed (Teske, 2017). About 120 million users from all over the world have registered on this application. Duolingo is one of the most popular English learning applications for beginners today because it has been downloaded by more than 200 million users and has around 30 translator languages. Uniquely, users will not feel bored learning foreign languages through this application, because Duolingo is designed to resemble a game display that can be adapted to some activities and learning styles. Duolingo, in addition, offers "gamification" learning for users, in which the games in this application provide benefits for users to learn the target language (Nushi & Egbali, 2017). Another advantage of Duolingo is that it provides daily reports on learning progress and materials that can be saved offline.

Duolingo has a very motivating learning system using strategy game mechanics to encourage students in learning. It is built very much like a computer game where the participants have to pass certain levels. Students must complete the tasks provided by the Duolingo application. For example, in speaking, students must be able to pronounce the sentences that have been provided correctly to proceed to the next more complicated sentence



stage. Users can complete various types of exercises including multiple choices, writing and also speaking through the microphone. Duolingo mainly uses practice and repetitive practice in lessons. This research, as a result, was conducted to investigate whether the Duolingo application can be a new alternative for students to improve their speaking skills.

2. METHODS

A quantitative approach was used to examine the problems that arise. The purpose of using quantitative methods was to calculate how effective the Duolingo application was when used on students to improve their speaking ability. Quantitative methods have three structures, namely experimental, correlation, and survey (Creswell, 2012). Here the researcher used experimental research to get the results of the research. According to Sugiyono (2012), experimental design is divided into three, namely, pre-experimental design, true experimental, and quasi-experimental. Here the researcher used a pre-experimental design with the type of one-group pre-test and post-test design. So in this design, there is a pre and post-test to see more accurately the data obtained between the two, after the pre-test, treatment and after that, a posttest was given. In this study, the researcher used a non-random sampling/non- probability sample, which is purposive sampling. In this case, the participants who were selected to be the members were based on the researcher's considerations. The samples used were one class of students from junior high school level (SMP 8 Banda Aceh), consisting of 34 people.

The researcher gave a pre-test during the first meeting with students, the pre-test contained how to pronounce in self-introduction and several questions related to speaking. At the second meeting the researcher introduced the Duolingo application to the students, how to use the application, and introduced the features provided, the researcher also taught about what elements should be in it. After introducing the Duolingo application and how it works, the researcher divided the students into several groups with their friends and started teaching self-introduction to the students. At the third meeting, the researcher repeated the discussion about the important elements that students must pronounce correctly. Then direct them by discussing with their group members; directing and pronouncing the sentences that have been provided in the Duolingo application. At the last or fourth meeting, the researcher gave a post-test to the students to see if there was a significant change after they were taught by using the Duolingo application to increase their ability in speaking.

3. RESULTS AND DISCUSSION

Research findings described the results of data analysis. To obtain the data, the researcher provided the pre-test and post-test.

Pre-Test

Before giving treatment, a pre-test was given to know the students' speaking skill. The frequency and percentage of the pre-test can be seen in the Table 1 below:

Table 1. The Frequency and Percentage of Pre-test Score

Frequency	Percentage
14 Students	41,17%
20 Students	58,83%
Total: 34 Students	100%

Table 1 shows the summary of the pre-test results. There were 14 students classified as successful at 41,17% and 20 students classified as unsuccessful at 58,83%. The percentage above is determined based on the results of the assessment of vocabulary and pronunciation with a predetermined score.



Post-Test

After treatment, a post-test was given to know the students' speaking after using the Duolingo application. The frequency and percentage of the post-test score can be seen in Table 2.

Table 2. The Frequency and Post-Test Score

No	Criteria	Frequency	Percentage
1	Successful	32 students	94,11%
2	Unsuccessful	2 students	5,89%
	Total	34 students	100%

Table 2 showed that there were 32 students classified as successful with 94,11% and 2 students categorized in an unsuccessful group with 5,89% in post-test. It could be concluded that there was an improvement in students' speaking skills, from 41,17% in pre-test to 94,11% in post-test. The comparative of students' scores at pre and post-test speaking can be seen in Table 3.

Table 3. The Comparative of Students' Speaking

	Mean	N	Std. Deviation	Std. Error Mean
Pre-Test	64,70	34	11,00	1,88
Post-Test	79,70	34	9,53	1,63

Table 3 shows the mean score of students' speaking, which they obtained around 64.70 on the pre-test with a standard deviation was 11.00 and a standard error of 1.88, and the post-test was 79.70 with a standard deviation was 9,53 and a standard error mean was 1.63. It was provided by the pre-test and post-test average scores where the post-test score was higher and had an improvement than the pre-test mean score after being given treatment. From the table, it also can be seen that the mean value was getting better from 64,70 in the pre-test up to 79.70 in the post-test. It proved that using the Duolingo application improved students' speaking with an improvement of 15.00%. After that, the writer also classified the frequency and percentage of the score of students' speaking using the Duolingo application which can be seen in Table 4.

Table 4. The Frequency and Percentage of the Score of Students' Speaking Skill Using Duolingo Application

No	Score	Category	Pre-test		Post-test	
			F	P	F	P
1.	96-100	Excellent	0	0%	0	0%
2.	86-95	Very good	1	2,94	9	26,47
3.	76-85	Good	4	11,76	10	29,41
4.	66-75	Fairly good	7	20,58	12	35,29
5.	56-65	Fairly	11	32,35	3	8,82
6.	36-55	Poor	11	32,35	0	0%
7.	0-35	Very poor	0	0%	0	0%
Total			34	100%	34	100%

Table 4 shows the frequency and percentage of pre-test and post-test scores of students' speaking using the Duolingo application. In the pre-test, there were no students classified in the excellent and only 1 student classified in the very good category, 4 students or 11,76% classified in the good category, 7 students or 20,58% categorized in the fairly good option, 11 students or 32,35% classified in the fair category and 11 students or 32,35% classified the poor category and fortunately, no student was in the very poor category. In the post-test, in



addition, no students were in the excellent category as well. 9 students or 26,47% classified in the very good category, 10 students or 29,41% classified as the good category, 12 students or 35,29% classified as the fairly good category, 3 students or 8,82% students classified fairly, and also no student classified in poor and very poor category. It meant that the students' speaking score in the post-test were better than in the pre-test.

Test of Hypothesis

The formula from the T-Score was utilized by the researcher to analyze the hypothesis. A t-test is required, to locate the outcomes of the research hypotheses Sudjana (2008). The T-score played a significant role in this study's analysis. To compare the data, scores, and effectiveness findings from the study, the T-score sought to identify a significant difference between the Pre-test, which served as the first test, and the Post-Test, which served as the second test. The researcher compared the calculated t-test findings with the t-table value after determining the results of the calculation. In this case, the researcher could see if the value and outcomes of the t-test were higher than those of the t- table (alpha: 5%), from which it could be stated that there are extremely noticeable and significant changes and differences in the outcomes attained by students while studying. The calculation of the overall deviation scores of the students' pre-test and post-test can be seen in the following:

$$\begin{array}{llll} \sum = 2110 & \sum = 143.110 & \sum = 2705 & \sum = 218.995 \\ \sum^2 = 4.452.100 & & & \sum^2 = 7.317.025 \end{array}$$

a) Calculating The Standard Deviation of Pre-Test

$$\begin{aligned} \sum SD1 &= \sum x^2 - \frac{(\sum X)^2}{N} \\ &= 143.110 - \frac{4.452.100}{34} \\ &= 143.110 - 130.944 = 12.156 \end{aligned}$$

b) Calculating The Standard Deviation of Pos-Test

$$\begin{aligned} \sum SD2 &= \sum Y^2 - \frac{(\sum Y)^2}{N} \\ &= 218.995 - \frac{7.317.025}{34} \\ &= 218.995 - 215.206 = 3.789 \\ S_{x-y} &= \sqrt{\frac{\sum SD1 + \sum SD2}{N + N - 2} - \left[\frac{1}{N} + \frac{1}{N}\right]} \\ &= \sqrt{\frac{12.156 + 3.789}{66} - \left[\frac{1}{34} + \frac{1}{34}\right]} \\ &= 15.15 \end{aligned}$$

c) Calculating the T-Score



$$t - score = \frac{\bar{X}^1 - \bar{X}^2}{\sqrt{\frac{\sum SD1 + \sum SD2}{N + N - 2} - \left[\frac{1}{34} + \frac{1}{34}\right]}}$$

$$= \frac{79,70 - 64,70}{15,15} = 0,967$$

d) Calculating T-Table used level 5% with df:

$$df = N + N - 2$$

$$= 34 + 34 - 2 = 66 \longrightarrow 0,678$$

This indicates that based on the evidence of the comparison of t score and t table, hypothesis (Ha) stated there is a difference in students' speaking skills after they learn speaking by using the Duolingo application, was accepted.

Overall, the results of this research indicated the improvement of students' speaking skill at the junior high school level at SMP 8 Negeri Banda Aceh in the academic year 2021/2022. This research used the Duolingo Application to improve students' speaking because the Application is interesting and all the students are excited to use it while learning to speak. They become enthusiastic about their studies which make them serious to learn about speaking. They are actively involved while learning speaking and asking some questions about speaking material that are provided by the Duolingo Application. It, in addition, can be used everywhere and is easy to apply in teaching. Fauzi (2018) stated that Duolingo's application was effective to improve English vocabulary in the sixth grade students of Madrasah Ibtidaiyah Darul Ilmi Banjarbaru School Year 2017/2018. There were two classes, they were VIB consisted of 25 students who got treatment using the Duolingo application and VIA consisted of 26 students who got treatment using conventional teaching. The instrument of the research was a vocabulary test consisting of multiple choices. In addition, according to Munday (2016), Duolingo is an easy-to-use app that is useful for students.

4. CONCLUSION

After the researcher conducted the research, it could be concluded that using the Duolingo Application can improve students' speaking skill. This is proven by the results of t-score which is higher than the t-table value ($0.967 > 0.678$). The improvements were visible after the treatment using this technique was carried out; this proves that using the Duolingo application can increase students' ability in speaking. The application of Duolingo apps also improves their understanding of using the application in learning speaking. This is also evidenced by the average pre-test score of 64,70 and the increase of the post-test score up to 79.70. Therefore, it can be stated that the students experienced an improvement in their speaking skill after using the Duolingo application as a medium for their studies.

REFERENCES

- Creswell, J. W. (2012). Educational research: Planning, conducting, and evaluating quantitative and qualitative research. Boston: Pearson Education. inc.
- Fauzi, A. R. (2018). The effectiveness of duolingo in improving vocabulary ability at the Sixth Grade of Madrasah Ibtidaiyah Darul Ilmi Banjarbaru School year 2017/2018. Thesis. English Education Department, Faculty Of Tarbiyah And Teacher Training, Antasari State Islamic University. Banjarmasin. <http://idr.uin-antasari.ac.id/id/eprint/9261>.



- Indrasari, A., Novita, D., & Megawati, F. (2018). Big book: Attractive media for teaching vocabulary to lower class of young learners. *JEES (Journal of English Educators Society)*, 3(2), 141-154.
- Jondeya, R. S. (2011). The effectiveness of using information gap on developing speaking skills for the eighth graders in Gaza governorate schools. Thesis. Deanery of Postgraduate Studies, Faculty of Education, Department of Curricula and Teaching Methods, Al-Azhar University. Gaza.
- Matra, S. D. (2020). Duolingo applications as vocabulary learning tools. *JELLE: Journal of English Literature, Linguistics, And Education*, 1(1).
- Munday, P. (2016). The case for using Duolingo as part of the language classroom experience. *Sacred Heart University*, 19(1), 83-101.
- Niah, S. (2019). The utilization of duolingo to improve the speaking and listening skills of junior high school students in Pekanbaru. In *an International Conference of CELSciTech 2019-Social Sciences And Humanities Track (ICCELST-SS 2019)* (pp. 102-107). Atlantis Press.
- Nushi, M. & Eqbali, M. H. (2017). Duolingo: A mobile application to assist second language learning. *Teaching English with Technology*, 17(1), 89-98.
- Sugiyono, S. (2012). Metode penelitian kuantitatif kualitatif dan R&B. Bandung: Alfabeta.
- Teske, K. (2017). Duolingo. *CALICO Journal*, 34(3), 393–401. Retrieved from <https://www.jstor.org/stable/90014704>.



STEM IN INDONESIAN MATHEMATICS EDUCATION

Tika Dwi Nopriyanti¹, Zulkardi^{2*}, Ratu Ilma Indra Putri³, Nyimas Aisyah⁴

^{1,2,3,4}Universitas Sriwijaya, Indonesia

*zulkardi@unsri.ac.id

ABSTRACT

STEM (Science, Technology, Engineering, Mathematics) is one approach that can be used in learning mathematics. Articles resulting from research using a STEM approach have been published in journals in Indonesia, with mathematics being one of the sciences that is the main component of STEM. However, there are still a few who categorize STEM articles as sources of information for future researchers. Therefore, this research aims to conduct STEM research using the Systematic Literature Review (SLR) method. The SLR method begins by identifying, analyzing, evaluating, and categorizing STEM articles obtained from 2020-2024 with topics related to the STEM approach. Research data was taken from 22 articles that had been published in 12 journals, consisting of two journals indexed by Sinta 1, seven journals indexed by Sinta 2, and three journals indexed by Sinta 3. The results of this research showed that of the 22 articles identified in this research consisting of STEM articles, development of STEM teaching materials, STEM learning design with thinking abilities measured, namely critical, creative, problem solving, and pedagogical thinking abilities

Keywords: *STEM, systematic literature review, mathematics*

1. INTRODUCTION

The rapid development of the times requires humans to balance the quality of their abilities and skills to adapt to the innovations that occur. The development of the 21st century can be seen in the use of technology in all aspects of human life. Information will spread quickly in a short time, so human abilities are needed to filter all existing information and be able to solve problems in the future. The world of education is one part that must keep up with the times, so innovation in learning is needed. To support 21st-century learning, 21st-century skills need to be included in the curriculum, one of which is providing a comfortable, interesting, and contextual learning atmosphere (Larson & Miller, 2011). One approach that uses context in the learning process and a pleasant learning atmosphere is the STEM (Science, Technology, Engineering, Mathematics) approach.

STEM is an innovation for the STEM field of science that aims to foster a deeper understanding of each lesson that connects scientific or interdisciplinary disciplines (Hanover Research, 2011; Bybee, 2013; Roberts, 2012). Through this STEM approach, students are also taught to use technology in learning to prepare them for careers in the fields of science and technology. Apart from this, the STEM approach can help students understand the material and, at the same time, develop creative, critical, collaborative, and problem-solving thinking skills that will be useful for students in solving problems by analyzing existing information and making the right decisions with the right reasons and evidence. so that no errors occur. The STEM approach requires students to solve problems and deal with new problems that exist in students lives, think logically to produce creative and appropriate solutions, and be able to use technology that is in line with the skills required for work in the 21st century (Widya et al., 2019; Munahefi et al., 2022; Kusyanto et al, 2022). The STEM approach to learning mathematics makes something abstract in mathematics into something concrete or real simultaneously through teaching modules that have been provided by educators so that learning becomes more meaningful (Ramadhani & Nurita, 2023)

2. METHODS

This research used the Systematic Literature Review (SLR) method. The SLR method is a method that functions to identify, evaluate, and interpret research sources in the form of relevant articles to answer research questions in detail (Calderón & Ruiz, 2015; Hidayat et al., 2019). This research took samples from ten journals



that were accredited by the Ministry of Research, Technology, and Higher Education of the Republic of Indonesia (Kemenristekdikti). Search results via the Sinta website obtained 37 journals in accreditation categories 1, 2, and 3, which are mathematics education journals, and fourteen journals published research articles on STEM (Science, Technology, Engineering, and Mathematics) topics. The journal in Category 1 is Journal Mathematics Education (JME). The journal category with Sinta 2, which is included in the category and displays articles about STEM, is composed of six journals, namely Mosharafa (Mathematics Education Journal), Prima Edukasi Journal, Elements Journal, Mathematics Education Research Journal (JRPM), Al-Jabar: Journal of Mathematics Education, Kreano: Journal of Creative-Innovative Mathematics, Axiom Journal of Mathematics Education, Elementary Journal, Journal of Innovation in Educational and Cultural Research, and Indonesian Education Journal. The Sinta 3 category, which provides research articles on STEM topics, is Teorema: Mathematics Theory and Research, Elementary: Scientific Journal of Basic Education, and Journal of Science Education Research.

Articles that have been obtained from journals that fall into this category are then analyzed using a comprehensive approach by identifying research that meets the STEM research criteria. The analysis begins by looking for STEM, STEM in Mathematics Learning, Learning Media, Thinking Abilities, and Context in each journal of the twelve selected journals. A total of 23 articles were collected at this stage and then classified based on title, year, journal name, problem focus, method, research subject, content, context, and mathematical abilities.

This research focuses on the results of research conducted in the last five years, from 2019 to 2024. The articles that have been obtained are analyzed comprehensively, compared, categorized, and divided into several main topic sections. Development and design research that focuses on the content used or mathematical problems to be solved with STEM, the context used in STEM, and the thinking abilities that will be measured in the research

3. RESULTS AND DISCUSSION

The STEM approach to learning mathematics is currently trending as a learning solution. This is because learning that uses a STEM approach makes the student's learning process more meaningful by being student-centered to prepare students for graduation with 21st-century abilities and skills. Therefore, updated articles on the latest research results with the STEM theme in 2020–2024 can be accessed. analysis based on the year of publication, research methods, research subjects, media developed, and mathematical abilities measured

Analysis of Articles Based on Year of Publication

STEM publications in Indonesia ranged from 14 journals with a period of 2020 to 2024; the publication trend experienced an increase in 2021. However, there was a 50% decrease in publications for the following year. When compared with other journals, Kreano Journal, AL-Jabar Journal, and JRPM are journals that consistently publish articles with STEM themes. Article publications in the 2020–2024 period can be seen in Figure 1.

In the period 2020–2024, the most articles published with STEM themes were published by the journals Kreano Sinta 2, Algebra Sinta 2, and JRPM Sinta 2, with 3 articles each. For the Sinta 1 journal, JME only published 1 article in the last five times in 2022. Based on the 2020–2024 period, the first article published in the Mosharafa journal was an article written by Utomo (2020) explaining the logical reasoning abilities of prospective mathematics teachers to solve problems by integrating the STEM approach and using the Geogebra application to provide solutions, proof, and resolution of the problems given. Meanwhile, of the four articles published in 2023, the latest article published with a STEM theme written by Sukendra (2023) explained that using STEM-based e-modules for HOTS-oriented high school students can be a solution for teaching materials used by teachers in the learning process.

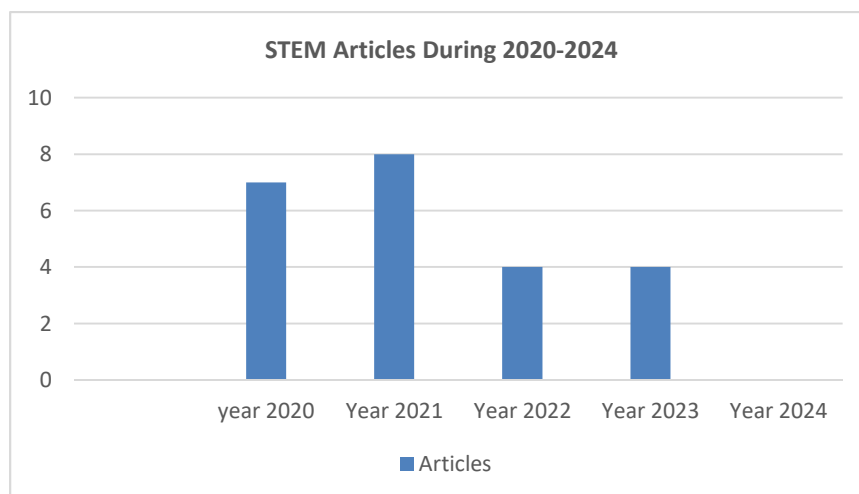


Figure 1. STEM Articles During 2020-2024

STEM Research Based on Research Methods

The STEM theme research in 23 articles used various research methods, ranging from development research, design research, application research, experimental research, and literature review research. A summary of the 23 articles can be seen in Figure 2.

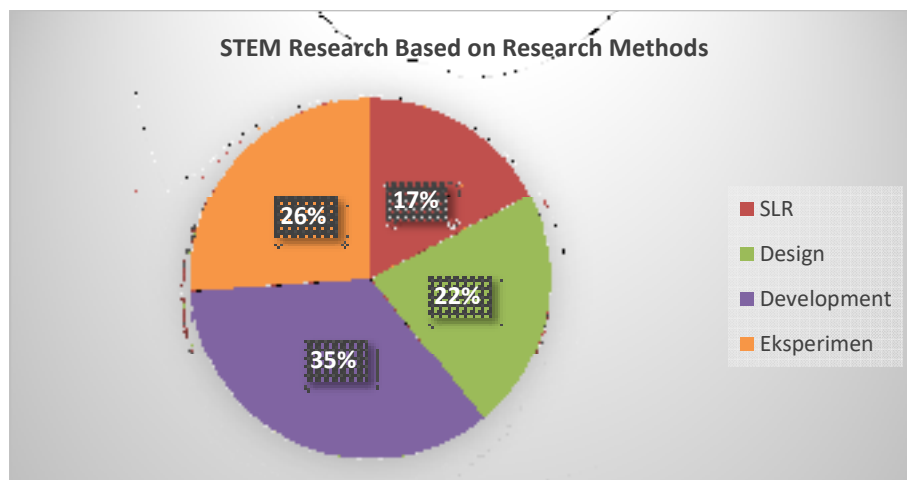


Figure 2. Articles Based on Research Methods

35% of all articles are development research, consisting of the development of activity sheets, learning media, and e-modules. The method used in development research uses the ADDIE and Plump methods. The journals that published more development research out of the 14 journals were the JRPM Journal and the Kreano Journal, which each published two articles. The results of this research are to produce products developed in the form of STEM-based Activity Sheets, Learning Media, Questions, and STEM-based e-modules that are valid, practical, and have a positive influence on learning, learning outcomes, and students' thinking abilities, which means that learning using a STEM approach and using modules or integrated STEM learning tools can improve the quality of learning, learning outcomes, and students' thinking abilities. The other 65% of articles are design research, experiments, and literature review (SLR) studies.



Based on Research Subjects

STEM is an abbreviation of Science, Technology, Engineering, and Mathematics, which is an approach formed based on the combination of various sciences such as Science, Technology, Engineering, and Mathematics (Nesa et al, 2017). The learning process that uses a STEM approach can connect several theoretical mathematical concepts based on technology and information with contextual problems that exist in everyday life (Widana & Septiari, 2021)). So the STEM approach can be used at all levels of education.

Based on the analysis, the 23 articles selected had varying research subjects. There are six research subjects, namely teachers, prospective teacher students, elementary school, middle school, high school, and articles. The STEM research subjects are dominated by junior high school students, at 39%, consisting of grades 7 and 8. The subjects are 17.4% of high school students in grades X and Systematic Literature Review, which examines articles discussing STEM published in the journals JSER, Teorema, Elementary, and Algebra Journal. STEM research subjects in Indonesia are shown in Figure 3.

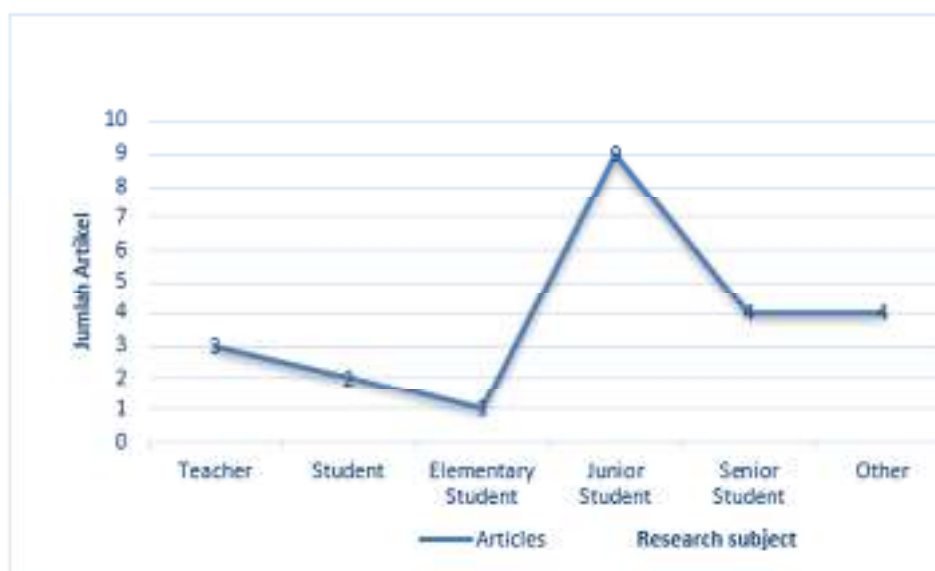


Figure3. STEM Research Subjects in Indonesia

Based on The Media Developed

The results of the analysis of 23 articles about STEM, 9 articles that developed student activity sheets based on measured abilities, The correct use of Activity Sheets in the learning process can improve learning outcomes, students' thinking abilities such as creativity, critical thinking, reasoning, understanding concepts, and student communication (Saputra et al, 2020; Argianti, et al., 2021; Arivina, 2020; Novaliyosi, et al., 2021; Sukendra, et al., 2020; Komarudin, et al., 2021; Sulistiawati, et al., 2021; Amalina & Vidakovich, 2022; Rohimah et al, 2022). A resume of STEM articles published in 2020-2024 based on the media developed can be seen in Figure 4.

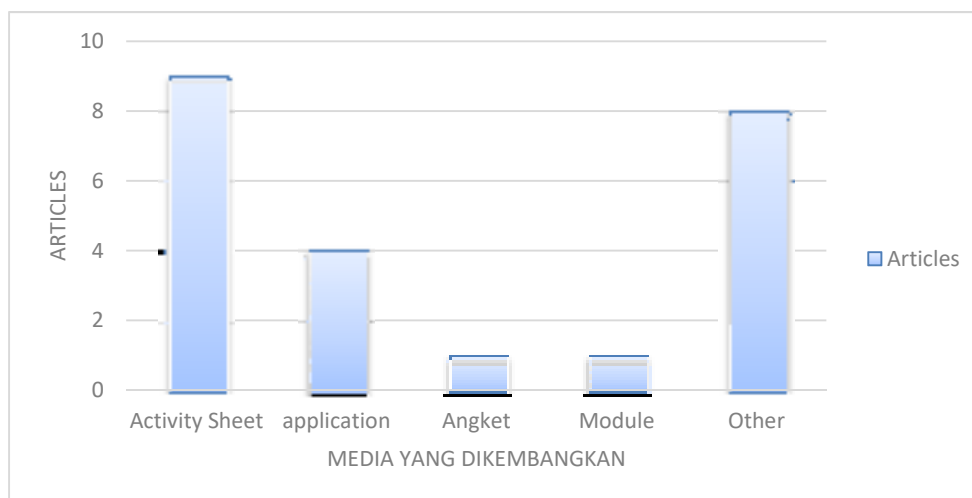


Figure 4. STEM Articles Based on Developed Media

STEM Articles Based on Measured Abilities

The following are the results of the analysis of 23 STEM articles in 14 journals accredited by the Ministry of Research, Technology, and Higher Education. Learning that uses a STEM approach can improve students' mathematical thinking abilities. The STEM approach in the mathematics learning process and learning using teaching aids, learning media, and activity sheets can train and develop students' mathematical thinking abilities, which are included in the abilities that students must have in the 21st century (Amalina & Vidákovich, 2022; Widana & Septiari, 2021; Arivina & Jailani, 2020; Rahmawati et al, 2023; Pratiwi et al, 2023). The results of the analysis of 23 articles about STEM can be seen in Figure 5.

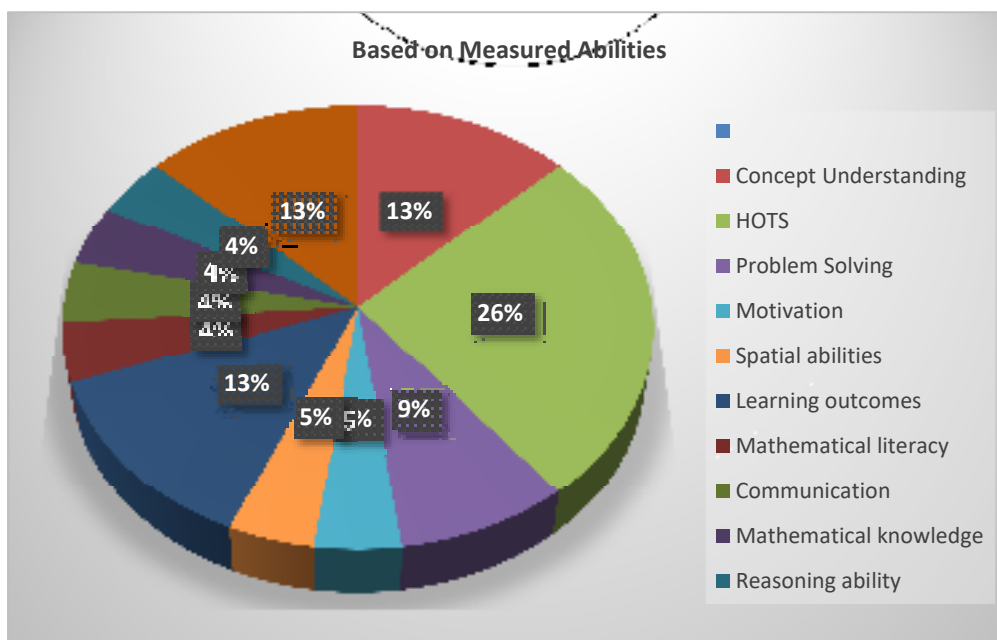


Figure 5. STEM Articles Based on Measured Abilities



23 STEM research articles published in 2020-2024 from 14 journals accredited by the Ministry of Research, Technology, and Higher Education answered that the STEM approach is an innovation in education, especially mathematics learning. In the last 5 years of STEM research, 35% of all STEM research was development research, consisting of the development of Activity Sheets, e-Modules, and Media. The products produced by development research are teaching materials that are valid, practical, and have good potential effects (Amalina & Vidakovich, 2022; Saputra et al., 2020; Arifin et al., 2020; Arivina & Jailani, 2020; Novaliyosi et al., 2021; Aprilia et al., 2021; Krisdiana et al., 2020; Sukendra & Widana, 2023).

Table 1 is the result of an analysis of 23 articles to classify them based on the focus of STEM research in Indonesia. So it is hoped that the following table can serve as a guide or reference in assessing the distribution of STEM research focus in 2020–2024.

Table 1. Resume of STEM Research Articles in Indonesia

No	Research Focus	Content	Context	References
1	Teachers' understanding of STEM	Others	Geogebra, mathematical technology knowledge About STEM, SPLDV	Sari et al. (2022); Widana et al. (2021); Ma'rufi et al. (2023);
2	Analysis of Student Abilities	Others	STEM test, SPLDV	Amalina et al. (2022); Komarudin et al. (2021)
3	Development of teaching materials	Building space, trigonometry, Linear Programming, functions, SPLDV	Box Shapes, AR, Proglin application, other, SPLDV Calc	Saputra et al. (2020); Arifin et al. (2020); Arivina et al. (2020); Novaliyosi et al. (2021); Heni et al. (2021); Krisdiana et al. (2020); Sukendra et al. (2023); Sulistiawati et al. (2021)
4	STEM collaboration with other models (PBL and PjBL)	Others	other	Widana et al. (2021); Imaduddin et al. (2021)
5	STEM-based learning design for thinking skills	One Variable Linear Equations, SPLTV, Number Patterns	Cubes, Dynamo Cars; Flower petals, games	Rohimah et al. (2022); Pratiwi et al. (2023); Susanti & Haris (2020); Oktapiani et al. (2020)
6	STEM Article Analysis	Others	Others	Rahmawati & Juandi (2023); Ardwiyantri et al. (2021)

4. CONCLUSION

Based on the results and discussion explained above, it can be concluded that to achieve the goals of learning mathematics, you can use a STEM approach by integrating STEM with learning models and tools. The STEM (Science, Technology, Engineering, and Mathematics) approach can create a comfortable, active, student-centered learning atmosphere by using context to make learning more meaningful. Using a STEM approach to learning will help prepare students for 21st-century abilities and skills. In the learning process using the STEM approach, thinking abilities develop, such as creative thinking abilities, critical thinking abilities, reasoning, communication, spatial abilities, and learning outcomes.



It is hoped that the study in this article can become literature for other researchers as a first step in conducting further research related to the STEM approach to mathematics learning.

REFERENCES

- Amalina, I. K., & Vidakovich, T. (2022). An integrated STEM-based mathematical problem-solving test: Developing and reporting psychometric evidence. *Journal Mathematics Education*, 587-604.
- Amalina, I., & Vidákovich, T. (2022). Assessment in STEM problem-solving: A systematic review. *The International Journal of Assessment and Evaluation*, 29(2), 63.
- Aprilia, E., Pujiastuti, H., & Rafianti, I. (2021). Development of mathematics learning media using STEM approach to linear program materials. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 12(1), 164-177. Retrieved from <https://journal.unnes.ac.id/nju/index.php/kreano/article/view/26268>
- Aprilia, E., Pujiastuti, H., & Rafianti, I. (2021). Development of mathematics learning media using STEM Approach to Linear Program Materials. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 164-177.
- Ardwiyanti, D., Prasetyo, Z., & Wilujeng, I. (2021). STEM research trends in Indonesia: A systematic literature review. *Journal of Science Education Research*, 38-45. Retrieved from https://d1wqtxts1xzle7.cloudfront.net/110257748/41752-116687-1-PB-libre.pdf?1704851771=&response-content-disposition=inline%3B+filename%3DSTEM_research_trends_in_indonesia_A_syst.pdf&Expires=1709273885&Signature=IXYZ7eFUslERZ2igu5gtA5cnl05bgTXrGXHCU~aw44M
- Argianti, A., & Andayani, S. (2021). Keefektifan pendekatan STEM berbantuan wolfram alpha pada pembelajaran matematika ditinjau dari motivasi dan kemandirian belajar. *Jurnal Riset Pendidikan Matematika*, 8(2), 217-230. Retrieved from <https://journal.uny.ac.id/index.php/jrpm/article/view/35263/17275>
- Arifin, A. M., Pujiastuti, H., & Sudiana, R. (2020). Pengembangan media pembelajaran STEM dengan augmented reality untuk meningkatkan kemampuan spasial matematis siswa. *Jurnal Riset Pendidikan Matematika (JRPM)*, 7(1), 59-73. Retrieved from <https://journal.uny.ac.id/index.php/jrpm/article/view/32135/14528>
- Arivina, A. N. & Jailani. (2020). Development of trigonometry learning kit with a STEM approach to improve problem solving skills and learning achievement. *Jurnal Riset Pendidikan Matematika (JRPM)*, 7(2), 178-194. Retrieved from <https://journal.uny.ac.id/index.php/jrpm/article/view/35063/15003>
- Bybee, R. W. (2013). <https://docplayer.net/476748-K-12-stem-education-overview.html>. Arlington: National Science Teachers Association, NSTA Press.
- Calderón, A. & Ruiz, M. (2015). A systematic literature review on serious games evaluation. *Computers & Education*, 87, 396-422. doi:<https://doi.org/10.1016/j.compedu.2015.07.011>
- Imaduddin, M., Sholikhathi, S., & In'ami, M. (2021). STEM education research in Indonesian Elementary Schools: A systematic review of project-based learning. *Elementary: Islamic Teacher Journal*, 9(2), 201-228. Retrieved from <https://journal.iainkudus.ac.id/index.php/elementary/article/view/11552>



- Irman A, W. S. (2020). Developing a STEM-based students' worksheet building material in elementary school Bandar Lampung City. *Jurnal Prima Edukasia*, 8(2), 145-155. Retrieved from <https://journal.uny.ac.id/index.php/jpe/article/view/33478/pdf>
- Komarudin, K., Suherman, S., & Anggraini, A. (2021). Analysis of mathematical concept understanding capabilities: The impact of maker space STEM learning approach models and student learning activities. *Journal of Innovation in Educational and Cultural Research*, 2(1), 35-43. Retrieved from <http://www.jiecr.org/index.php/jiecr/article/view/21>
- Krisdiana, I., Setyansah, R., & Pratiwi, I. (2020). Student worksheets with the SPLDV calc application to improve creative thinking abilities. *JPI (Jurnal Pendidikan Indonesia)*, 9(4), 686-692. doi:<https://doi.org/10.23887/jpi-undiksha.v9i4.19366>
- Kusyanto, Irwan, E., & Yazid, I. (2022). Implementasi pendekatan STEM untuk meningkatkan kemampuan berpikir kritis, berpikir kreatif dan self-efficacy. *Pasundan Journal of Mathematics Education: Jurnal Pendidikan Matematika*, 12(2). Retrieved from <https://www.journal.unpas.ac.id/index.php/pjme/article/view/5438/2525>
- Larson, L. C., & Miller, T. N. (2011). 21st century skills: Prepare students for the future. *Kappa Delta Pi Record*, 121-123. doi:<https://doi.org/10.1080/00228958.2011.10516575>
- Ma'rufi, M. I. (2023). Exploring mathematical technological knowledge of teachers with GeoGebra application. *Al-Jabar: Jurnal Pendidikan Matematika*, 14(1), 1-12. Retrieved from <http://ejournal.radenintan.ac.id/index.php/al-jabar/article/view/13654/6218>
- Munahefi, D. N., Kartono, Waluya, B., & Dwijanto, D. (2022). Analysis of self-regulated learning at each level of mathematical creative thinking skill. *Bolema*, 36(72), 580-601. DOI:10.1590/1980-4415v36n72a26
- Nesa, W., Hartono, Y., & Hiltrimartin, C. (2017). Pengembangan buku siswa materi jarak pada ruang dimensi tiga berbasis Science, Technology, Engineering, and Mathematics (STEM) problem-based learning di kelas X. *Jurnal Elemen*, 3(1), 1-14.
- Novaliyosi, Khaerunnisa, E., & Khasanah, M. (2021). Development of LKS with a STEM approach that supports the mathematical communication skills of SMP Students. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 12(2), 200-211. Retrieved from <https://journal.unnes.ac.id/nju/index.php/kreano/article/view/29552>
- Oktapiani, N., & Hamdu, G. (2020). Desain pembelajaran STEM berdasarkan kemampuan 4C di sekolah dasar. *Elementary: Jurnal Ilmiah Pendidikan Dasar*, 7(2), 99-108. <http://dx.doi.org/10.30659/pendas.7.2.99-108>
- Pratiwi, A. N., Aisyah, N., Somakim, S., & Kamran, M. (2023). STEM-based approach: A learning design to improve critical thinking skills. *Al-Jabar: Jurnal Pendidikan Matematika*, 14(1), 225-237. Retrieved from <http://www.ejournal.radenintan.ac.id/index.php/al-jabar/article/view/18054>
- Rahmawati, L., Juandi, D., & Nurlaelah, E. (2023). A meta-analysis on the effectiveness of the stem approach on students' mathematical creative thinking ability. *Al-Jabar: Jurnal Pendidikan Matematika*, 14(1), 109-120. Retrieved from <http://ejournal.radenintan.ac.id/index.php/al-jabar/article/view/16637>
- Ramadhani, F. A., & Nurita, T. (2023). Implementation of STEM-integrated problem based learning to improve students' problem solving skills in liquid pressure. *Jurnal Pendidikan MIPA*, 349-358. doi:<http://dx.doi.org/10.23960/jpmipa/v24i1.pp349-358>



- Hanover Research. (2011, 10 -). *K-12 STEM education overview*. Retrieved 03 01, 2024, from Hanover Research: <https://docplayer.net/476748-K-12-stem-education-overview.html>
- Roberts, A. (2012). Applying STEM instructional strategies to design and technology curriculum. *Technology Education in the 21st Century, Proceeding of the PATT 26 Conference* (pp. 111-118). Stockholm: Linkoping University.
- Rohimah, S., Darhim, D., & Juandi, D. (2022). A local instructional theory (LIT) for teaching linear equation through STEM instruction. *Jurnal Elemen*, 8(2), 340-351.
- Saputra, R. A., Herpratiwi, H., & Caswita, C. (2020). Developing a STEM-based students' worksheet building material in. *Jurnal Prima Edukasia*, 8(2), 145-155. doi:doi:<https://doi.org/10.21831/jpe.v8i2.33478>
- Sari, A. F. & Juandi, D. (2022). Analysis of senior high school mathematics teachers' perception of the application of stem-based learning. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 13(2), 296-307. Retrieved from <https://journal.unnes.ac.id/nju/kreano/article/view/36522>
- Sukendra, I., & Widana, I. (2023). Senior high school mathematics e-module based on STEM orienting to higher order thinking skills questions. *JPI (Jurnal Pendidikan Indonesia)*, 647-657. doi:<https://doi.org/10.23887/jpiundiksha.v12i4.61042>
- Sulistiawati, S., Juandi, D., & Yuliardi, R. (2021). Pembelajaran terintegrasi stem untuk meningkatkan literasi matematis mahasiswa calon guru matematika pada perkuliahan pra-kalkulus 1. *Teorema: Teori Dan Riset Matematika*, 6(1), 82-97. doi:<http://dx.doi.org/10.25157/teorema.v6i1.4727>
- Susanti, E., & Kurniawan, H. (2020). Design pembelajaran matematika dengan pendekatan STEAM (Science, Technology, Engineering, Mathematics). *AKSIOMA: Jurnal Matematika dan Pendidikan Matematika*, 11(1), 37-52. Retrieved from <https://journal.upgris.ac.id/index.php/aksioma/article/view/5292>
- Utomo, E. S., Rahman, F., & Fikrati, A. N. (2020). Eksplorasi penalaran logis calon guru matematika melalui pengintegrasian pendekatan stem dalam menyelesaikan soal. *Mosharafa*, 13-22.
- Widana, I., & Septiari, K. (2021). Kemampuan berpikir kreatif dan hasil belajar matematika siswa menggunakan model pembelajaran Project-Based Learning berbasis pendekatan STEM. *Jurnal Elemen*, 7(1), 209-220.
- Widya, Rifandi, R., & Rahmi, Y. L. (2019). STEM education to fulfil the 21st century demand: A literature review. *Journal of Physics: Conference Series*, 1317(1), 12208.



DIGITAL LITERACY COMPETENCE OF PRE-SERVICE TEACHERS: EXAMINING THEIR READINESS TO USE TECHNOLOGY

Cut Intan Meutia^{1, 2}, Kartina Ramadani

¹UNIMED/IAIN Langsa

²Universitas Negeri Medan

*cutintanmeutia@iainlangsa.ac.id

ABSTRACT

This paper examines pre-service language teachers' digital proficiency and readiness in light of the changing needs of the twenty-first-century educational environment. In light of the evolving roles of educators and the critical role, that technology plays in empowering students. This study explores pre-service teachers' perceptions of and integration of digital literacy into their instructional strategies. The study used a phenomenological case study methodology, collecting data from 23 pre-service English instructors at IAIN Langsa through semi-structured interviews and questionnaires. The study shows participants' varied degrees of digital proficiency, which focuses on core ICT abilities. The results show a disconnect between theoretical understanding and real-world implementation in educational settings, even if many people have good attitudes toward digital literacy. To address the digital age problems, the essay highlights the value of teacher education programs in closing this gap and the necessity for pre-service teachers to gain pedagogical and technological experiences. The study's conclusions point to the need for more investigation to determine how digital literacy is used in classroom settings and to improve the digital readiness of aspiring teachers.

Keywords: Readiness, Digital Literacy, Digital Competence, Technology

1. INTRODUCTION

The difficulties of the twenty-first century and the digital competency of aspiring teachers have drawn much attention. To empower students in the twenty-first century, educators must adapt their teaching methods and the competencies they must acquire. Educators must create the conditions and chances necessary for in-depth learning. Instructors are expected to be more than facilitators of effective learning; they must be creative in selecting various tactics that can be combined and modified depending on the student and the situation. Pre-service teachers can apply the teaching skills they have learned in their higher education to their teaching practice by participating in an internship in a school. Pre-service teachers' technology-related experiences and beliefs impact their intention and preparedness to use technology in real-world settings (Park & Son, 2020). The pre-service language instructors discussed different technological platforms and tools for using technology at different teaching stages in the classroom. The primary focus of previous discussions has been the impact of technology integration on pre-service teachers' teaching perspectives and their ability to foster more profound subject knowledge, learning, and comprehension (Lei & Zhao, 2007).

According to several studies (Kirschner & Davis, 2003; Valcke et al., 2007), for student teachers to become digitally competent, their teacher education programs must provide them with the necessary technological instruction. Nonetheless, studies on teacher education continue to show that teacher educators and student teachers generally lack the skills necessary to use technology in a didactic and pedagogical way (Haugerud, 2011). Possessing specialized teaching-profession abilities and general skills appropriate for all circumstances—personal and professional—is necessary to integrate and use technology for educational objectives effectively. Professional digital competence for teachers is what this is known as (Lund et al., 2014). In this sense, teacher educators have two roles to play: not only should they be able to employ technology in their instruction, but they should also aid in enhancing the professional digital competency of aspiring teachers. How technology is integrated into these settings becomes especially crucial in a complicated educational program like teacher education, where teacher preparation occurs both on campus and in field practice schools. Thus, the following



query is crucial to our study: How well-versed are pre-service teachers in digital literacy? Are they prepared to use a computer throughout their practicum as teachers? To answer this question, the researchers will examine data from semi-structured interviews and open questionnaires given to pre-service teachers during their teaching practicum in schools.

The review acknowledges the existence of multiple terminologies and definitions of digital competence (Ala-Mutka, 2011; Ferrari, 2012), along with knowledge, skills, and competencies related to the use of technology, such as computer literacy (Nawaz & Kundi, 2010) and digital literacy. These terms have distinct interpretations in various intellectual, cultural, historical, social, and pedagogical contexts. Furthermore, this article highlights that teachers' professional use of digital technologies and digital competence differs from other professions based on the large body of research on teachers' use of ICT in the classroom (Almås & Krumsvik, 2007). Krumsvik (2011b) defines digital competence as "the teacher's...proficiency in using technology in a professional context with good pedagogic-didactic judgment" (Krumsvik, 2011b, pp. 44–45). This definition emphasizes the importance of teachers in the definition of digital competence. "The ability of people to know how to operate these [digital] technologies, and to use them safely, wisely, and productively" and "an awareness of the social practices that surround the appropriate use of new technologies" are the definitions of digital literacy given by Pegrum, Hockly, & Dudeney, (2022).

Krumsvik (2008, 2014) introduced a framework for the professional digital competence teachers need to use technology meaningfully in their classrooms and recognize its role in students' lives and society, realizing the importance of examining digital literacy among pre-service teachers. The four components of a teacher's professional digital competence are (a) basic ICT skills, (b) didactic ICT competence, (c) learning methods, and (d) digital competence, according to Krumsvik (2008, 2011; 2014), who introduced the Digital Competence Model, which was developed in a Scandinavian environment. Teachers' practical use of technology, including adoption, adaptation, appropriation, and invention, is basic ICT skills. "didactic ICT competence" describes how teachers employ technology in their pedagogy or achieve epistemic goals connected to students' knowledge development. To implement learning methodologies, educators must look at how they learn technology and how that knowledge may be transferred to their pupils. Lastly, digital competence is a meta-awareness that links instructors' technological proficiency to a comprehension of society's overall digitalization. With this larger framework in mind, we concentrate on the first element Krumsvik (2008) highlights in our study, which is the fundamental ICT abilities of pre-service teachers. Furthermore, we concentrate mainly on what pre-service teachers understand these ICT competencies (digital literacy or digital competence) to be because of their essential character.

In addition to helping students learn their subjects, this digital competency can give them the attitudes and abilities they need to thrive in the knowledge-based society of the twenty-first century. As a result, the digital revolution and the growing digitization of school life over the past decades have created a need for digitally competent teachers who can adequately implement technology (Krumsvik, 2011b; Mishra & Koehler, 2006). This is because today's workforce requires individuals to employ a variety of cognitive skills to solve problems in digital environments (Alviram & Eshet-Alkalai, 2006). Accordingly, it has been suggested that to stay up with the rapidly evolving digital society, educators and students must have a certain level of computer literacy (Nawaz & Kundi, 2010).

Education reforms, regulations, and frameworks also reflect the growing emphasis on abilities, skills, and attitudes, including digital competence. Along with reading, writing, math, and conversational abilities, digital competency is now the fifth fundamental skill. Nonetheless, the research indicates that there "seems to be a gap between technical knowledge and knowledge on how to employ technology in a learning context" among student teachers, teacher educators, and pre-service teachers (Haugerud, 2011, p. 227). This focuses on incorporating digital competency into teacher education curriculum texts (Instefjord & Munthe, 2015).



Teachers' preparedness for integrating technology

According to the Merriam-Webster Dictionary, readiness is "the state of being prepared for something or willing to do something." Since teachers' technical knowledge and abilities do not guarantee their preparedness for technology integration in the classroom, teacher preparation to use technology for learning and teaching is multifaceted and complex (Cuhadar, 2018). A core knowledge base for pre-service teachers' preparedness for incorporating technology in the classroom (Mishra & Koehler, 2006). It emphasizes that the use of technology by educators includes not only technical expertise but also technological understanding from the standpoint of the intended curriculum and related pedagogy. To meet the needs of students in the digital age, universities must ensure that their instructors can incorporate technology into their courses.

The connections between the attitudes of pre-and in-service teachers and their actual usage of digital technologies have been the subject of extensive research (Khanum, Siddique, & Haleem, 2021). However, conditions that do not encourage the use of ICTs in teaching may also be an obstacle. Researchers have covered several of the obstacles that teachers face in general education. First-order and second-order barriers are the two categories into which Ertmer (1999) divided these barriers. First-order hurdles are those that instructors face from the outside, such as time constraints, lack of access to software and technology, lack of support, and inadequate teacher preparation. Teachers' willingness, beliefs, expertise, and established classroom practices are examples of second-order hurdles. The capacity to "seek change and improve the current situation and build what is desired" (p. 3) is referred to as the "third-order barrier" of "design thinking," as proposed more recently by Tsai and Chai (2012). Instructors with technology-based design thinking competency may overcome first- and second-order barriers. Therefore, it is essential to assess pre-service teachers' preparedness for effective technology integration in teaching to support them better with this process through teacher education programs.

2. METHODS

A qualitative technique was utilized in this study to explore, understand, and explain the social phenomenon that an individual or group of individuals is facing or experiencing (Creswell, 2014). Using interviews to gather data, this research used a phenomenological case study methodology to explain the participants' experiences of a phenomenon (Giorgi, 2009). Furthermore, the phenomenon that Bevan (2014) describes will depict the participants' experiences according to their encounters. This study's data came from direct research objects or primary sources gathered through interviews and questionnaires. The purpose of the questionnaire is to collect personal information, experience, knowledge of attitudes, and opinions from participants using a list of statements (Cheng, & Dörnyei, 2007). In the meantime, regular talk during the interview was meant to directly analyze the respondent's phenomenon (Cheng, & Dörnyei, 2007). A Google Form was used to deliver the open-ended survey online. All participants underwent semi-structured face-to-face interviews utilizing the semi-structured questions from the study. The study's subjects were IAIN Langsa pre-service English instructors who had completed an internship before beginning their teaching careers. Twenty-three pre-service English teachers served as research subjects for the questionnaire data collection. In addition, nine others were interviewed. Purposive sampling was the basis used to choose the interview subjects. Only subject representatives who matched the predetermined requirements were used for this (Cheng, & Dörnyei, 2007). The total score of the respondents' responses to every question on the questionnaire served as the selection criterion. This study was carried out at IAIN Langsa. This study was carried out during the even semester of 2023. Following the acquisition of the questionnaire data, a descriptive analysis was conducted. Descriptive data analysis was performed to determine the average answer and the frequency distribution of the responses. Following the results of the data analysis on the questionnaire, data gathering via interviews was carried out. Transcripts of the recorded data were created once the interview data was acquired—the data analysis aimed to identify themes about their competence and preparedness.



3. RESULTS & DISCUSSION

Participants were asked to provide detailed explanations for their written comments, which they also submitted through Google Forms. To maintain secrecy, the names given to the participants in the extracts are pseudonyms. After the Google Forms responses were analyzed, smaller participant groups were called to participate in semi-structured in-person interviews. These semi-structured interviews were used to gather additional information and for triangulation. Face-to-face interviews were extended invitations to all survey respondents to obtain a more thorough understanding of the problem.

Only 23 people, nevertheless, gave a favorable response. Semi-structured questions from the survey were used in face-to-face interviews with eight participants who were the first to answer. They were asked in in-person interviews to elaborate on the points brought up during the first round of data collecting. The interviews allowed the researchers to go deeper into the survey and conduct a more thorough investigation of the results. The semi-structured follow-up interview analysis further supported these conclusions. Interviewees praised digital literacy initiatives and indicated a desire to improve their proficiency in digital literacy before starting their teaching careers. Digital literacy among the participants entailed using digital technologies for various reasons, including teaching and communication. Many attendees discussed how technology benefits teaching and learning and why it is crucial. Several responses from the participants are listed below.

to increase the enjoyment of teaching and learning activities

Pupils are more excited to engage in the educational process.

makes teaching and learning more accessible as it is applicable

To provide digital learning, technology that can access and execute digital learning activities must be integrated. This is because I teach a digital science class with a learning management system.

since it facilitates learning and information access

since it may facilitate teaching

In general, they both agree on the advantages. There is no denying that using technology in the classroom interferes with instruction.

To increase the enjoyment of teaching and learning activities.

for pupils to participate in learning with tremendous enthusiasm

makes it easier to access and exchange information about educational resources

because it facilitates my teaching approach

Since utilizing educational technology is more enjoyable and keeps kids from getting bored, it helps them concentrate and want to engage in teaching and learning activities until they are completed.

These answers show that the participants understood the notion of digital literacy. They held that accepting new knowledge and having an open mind are traits of those who are digitally literate since people who use digital technology well must be receptive to different viewpoints. Every participant mentioned how crucial digital activities are to maintaining relationships. Factors influencing the use of technology before the teacher education program before starting their teacher education program, it was discovered that each participant had a different level of expertise with computers and the Internet (such as email and web searches). However, based on their abilities and sincere interest in technology, their experiences and degree of technological expertise varied. These results are consistent with what was disclosed. As a result, the participants showed interest in using technology in the classroom. The participants also discussed a number of the tools they use in the classroom, such as a wireless speaker, laptop, focus, speaker, notebook, gadget, portable speaker, and overhead projector. As reported in several other studies, the questionnaires needed to address the extensive use of YouTube (Yang, Wang, & Bautista, 2024).



"I am conversant with new technologies and their features, the researchers said when they asked this question. They replied, "I understand." However, the researchers saw that their understanding remained moderate because they were using conventional technologies—devices in this instance. Assignments are sent or downloaded by students using their devices. The question "I know how to use ICT as a medium for sharing ideas and thinking together" did not delve deeper into improving laptop usage. The only purpose for which computers and notebooks are used is to access PowerPoint presentations shown in the classroom. They also need clarification about what technology is suitable for them to employ when delivering material in the classroom when this topic is posed.

Additionally, these pre-service teachers use less advanced tools than pupils could use to aid their education. They need to learn how to mentor students with more advanced technology. Researchers also inquired about using specific programs that supplement classroom instruction when individuals utilize technology. It is interesting to note that they also do not employ any specialized applications to hone their teaching abilities during teaching practice. Specifically, they must learn to use ICT for idea sharing and group thought. Pre-service teachers believe they can use devices like laptops, wireless speakers, notebooks, In-focus, Projector, and gadgets for teaching.

Their primary focus was using mobile devices, social media, and the Internet to search for information or access online content. Nobody was involved in the creation of media. Their primary emphasis was using social networking sites, mobile phones, and the Internet for online purchasing and information searches. They said that they understood when this question was posed. However, because they essentially use tools and technologies that people generally use, it is challenging to define comprehension in this context. This demonstrates that they must still include any particular technology in teaching and learning.

Regarding the instructor component, a vital link was found between the educational approaches used by the classroom teacher and the students' perceptions of the influence of technology use. These pupils engaged in learning and experiences differently and with enthusiasm. It was found through data analysis of the EFL pre-service teachers' interviews that these teachers are not prepared for many of the technological challenges that arise while implementing technology in the classroom. This was in contrast to earlier studies (Lorenz et al., 2015), which showed that pre-service teachers use technology significantly to support their teaching. There is no way to generalize this assertion. Lankshear and Knobel (2006) linked new literacies to digital competence. In this instance, pre-service teachers claim to comprehend, but they are still far from being prepared to carry out their pre-teaching obligations. The results showed that the participants knew few digital tools. Their understanding of digital literacy was limited to knowledge acquisition rather than critical, creative, and collaborative application.

3. CONCLUSION

The outcome shows that the pupils must prepare to use digital technology for learning and teaching. Additionally, they stated that while digital technologies were standard, they were not yet at the manufacturing stage. To assess and improve their competencies, they must put their theoretical knowledge into practice while receiving feedback. To better equip them to educate students who are digital natives, in-service teachers and course instructors also provide feedback. It is necessary to conduct additional research to determine how well-prepared pre-service teachers are to apply their digital literacy knowledge in actual teaching environments. Subsequent studies may also make use of observations of real-world usage or activities where participants are given a challenge to address with digital tools. This might offer a more thorough understanding of the individuals involved.



REFERENCES

- Ala-Mutka, Kirsti. (2011). Mapping digital competence: Towards a conceptual understanding. *Sevilla: Institute for Prospective Technological Studies*. 7-60.
- Aviram, A., & Eshet-Alkalai, Y. (2006). Towards a theory of digital literacy: Three scenarios for the next steps. *European Journal of Open, Distance and E-Learning*, 9(1).
- Cheng, H. F., & Dörnyei, Z. (2007). The use of motivational strategies in language instruction: The case of EFL teaching in Taiwan. *International journal of innovation in language learning and teaching*, 1(1), 153-174.
- Cuhadar, C. (2018). Investigation of pre-service teachers' levels of readiness to technology integration in education. *Contemporary Educational Technology*, 9(1), 61-75.
- Ertmer, P. A. (1999). Addressing first-and second-order barriers to change: Strategies for technology integration. *Educational technology research and development*, 47(4), 47-61.
- Ferrari, A. (2012). Digital competence in practice: An analysis of frameworks (Vol. 10, p. 82116). Luxembourg: Publications Office of the European Union.
- Giorgi, A. (2009). The descriptive phenomenological method in psychology: *A modified Husserlian approach*. Duquesne university press.
- Haugerud, T. (2011). Student teachers learning to teach: The mastery and appropriation of digital technology. *Nordic journal of digital literacy*, 6(4), 226-238.
- Instefjord, E., & Munthe, E. (2015). Preparing pre-service teachers to integrate technology: an analysis of the emphasis on digital competence in teacher education curricula. *European Journal of Teacher Education*, 39(1), 77–93. doi:10.1080/02619768.2015.1100602
- Khanum, B., Siddique, A., & Haleem, B. (2021). Exploring teachers' motivation and awareness towards the use of ict's at secondary school level. *Psychology and education*, 58(5), 7271-7278.
- Kirschner, P., & Davis, N. (2003). Pedagogic benchmarks for information and communications technology in teacher education. *Technology, Pedagogy and Education*, 12(1), 125-147.
- Krumsvik, R. J. (2008). Situated learning and teachers' digital competence. *Education and Information Technologies*, 13(4), 279–290. <https://doi.org/10.1007/s10639-008-9069-5>.
- Krumsvik, R. J. (2011). Digital competence in the Norwegian teacher education and schools. *Hogre € Utbildning*, 1(1), 39–51.
- Krumsvik, R. J. (2014). Teacher educators' digital competence. *Scandinavian Journal of Educational Research*, 58(3), 269–280
- Lankshear, C., & Knobel, M. (2006). *New literacies: Everyday practices and classroom learning*. Open University Press.
- Lei, J., & Zhao, Y. (2007). Technology uses and student achievement: A longitudinal study. *Computers & Education*, 49(2), 284-296.
- Lorenz, R., Eickelmann, B., & Gerick, J. (2015, March). What affects students' computer and information literacy around the world?—An analysis of school and teacher factors in high performing countries. In *Society for Information Technology & Teacher Education International Conference* (pp. 1212-1219). Association for the Advancement of Computing in Education (AACE).



- Lund, A., Furberg, A., Bakken, J., & Engelién, K. L. (2014). What does professional digital competence mean in teacher education?. *Nordic journal of digital literacy*, 9(4), 280-298.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers college record*, 108(6), 1017-1054.
- Nawaz, A., & Kundi, G. M. (2010). Digital literacy: An analysis of the contemporary paradigms. *Journal of Science and Technology Education Research*, 1(2), 19-29.
- Park, M., & Son, J. B. (2022). Pre-service EFL teachers' readiness in computer-assisted language learning and teaching. *Asia Pacific Journal of Education*, 42(2), 320-334.
- Swatman, P. M., Krueger, C., & Van Der Beek, K. (2006). The changing digital content landscape: An evaluation of e-business model development in European online news and music. *Internet research*, 16(1), 53-80.
- Tsai, C. C., & Chai, C. S. (2012). The "third"-order barrier for technology-integration instruction: Implications for teacher education. *Australasian Journal of Educational Technology*, 28(6).
- Valcke, M., Rots, I., Verbeke, M., & Van Braak, J. (2007). ICT teacher training: Evaluation of the curriculum and training approach in Flanders. *Teaching and Teacher Education*, 23(6), 795-808.
- Yang, W., Wang, C., & Bautista, A. (2024). A YouTube video club for teacher learning: Empowering early childhood educators to teach STEM. *British Journal of Educational Technology*.



THE ROLE OF INDONESIAN LANGUAGE TEACHERS IN CREATIVE INDUSTRY-LED LEARNING

¹Keken Wulansari¹, Isah Cahyani^{2*}, Andoyo Sastromiharjo³

^{1,2,3}Universitas Pendidikan Indonesia, Indonesia

*Isahcahyani@upi.edu

ABSTRACT

The industrial revolution encourages the emergence of creative industries due to the rapid development of information technology. Creativity, skills and talents are the main elements in the creative industry that can be integrated into learning to realize higher-quality education. Teachers can act as facilitators to stimulate students' creativity, skills, and talents through language learning so that they can be helpful in real life. The purpose of this study is to describe the role of Indonesian language teachers in learning that can maximize language competence as a supporter of the creative industry. The qualitative method is used in this research to collect data by conducting a literature study by analyzing various relevant sources, such as books and journals. Data were also collected by interviewing Indonesian language teachers in public and private high schools.

Data analysis was done by reducing the data, analyzing it, and drawing conclusions. The result of this study is that the Indonesian language has the opportunity to support the creative industry so that it can encourage awareness of language preservation. Teachers also have obstacles when learning to improve students' language competence. Teachers also mentioned the support of the Indonesian language in the creative industry.

Keywords: teacher, creative industry, language learning.

1. INTRODUCTION

Education is experiencing various changes due to globalization. These changes have positive and negative impacts that encourage a paradigmatic shift in education in the 21st century. The paradigm shift is not only passively transferring knowledge but also facilitating learners to express, explore, and focus creativity on learners. Crisvin et al. (2023) explained that to increase student creativity in learning; teachers have a significant role in several key factors, including innovating teaching methods, not limiting learners' accessibility using technology, collaboration and communication with learning communities and between teachers, sharing good practices between senior teachers and young teachers, and the importance of the role of 'guru penggerak'.

In addition to creativity, the learning paradigm in the 21st century is also more oriented towards *meaningful learning*, meaning that teachers can help students build skills that can be seen in value and benefits so that they can be useful in real life. Learning is also oriented towards student-centred learning, so students are encouraged to learn according to their learning style. The teacher becomes a facilitator to help students build their skills, and students can find their information with guidance from the teacher (Lase, 2019, pp.38-39). Learner-centred learning requires students to be more independent and creative.

Creativity is one of the 4Cs, which are skills needed in 21st-century learning. The creative process that produces new ideas is highly dependent on a person's creativity so that it can produce new inventions referred to as innovations. (Annisa et al., 2023, p.391). The element of creativity also encourages education to intersect with the concept of the creative industry. DCMS (1998) explains that the creative industry comes from individuals' creativity, skills, and talents to create profits. The creative industry in education can create creativity and innovation that encourages independence (Marbun & Prastawa, 2023). Goods produced in the creative industries are not only products that solve problems or meet market needs but also products that have artistic richness (Loots & Bennekom, 2023).

The Ministry of Tourism and Creative Economy mentions 17 subsectors in the creative industry including (1) game developers, (2) crafts, (3) interior design, (4) music, (5) fine arts, (6) design, (7) fashion, (8) culinary, (9) film, animation and video, (10) photography, (11) visual communication design, (12) television and radio, (13) architecture, (14) advertising, (15) performing arts, (16) publishing, and (17) applications. The creative industry in education does not mean making education an economic commodity but trying to combine it with ethics and science so that alternative ways to advance education emerge (Kurniawan, 2015). Especially in the context of



language learning, it is hoped that Indonesian, through the four language skills taught, can be the foundation for developing creative industries in Indonesia. Teachers as educators can direct and adjust the four language skills taught to students with *hard skills* and *soft skills* to be achieved.

Integrating the creative industry and learning can also hone the independence of students and can have an entrepreneurial spirit as one of the drivers of the creative industry. Education through teachers prepares learners to become active and successful members of society. In addition, it also helps learners compete in the global community and take their role. Entrepreneurship and creative industries support each other. Entrepreneurs with their abilities see the various opportunities that exist in the creative industry.

The current entrepreneurial spirit allows for the development of creative industries coupled with the demographic bonus being experienced by Indonesia. The demographic bonus has the opportunity to help develop the creative industry because, in 2030, the population with productive age will reach 30%. The productive age population can become a *creative class* that can develop digital lifestyles and creative industries. Hartati and Rozi (2023), in their research entitled "Creative Industries based on Indonesian Language and Literature", states that the creative field based on language and literature is entrepreneurial and can potentially increase public awareness and love for the Indonesian language.

2. METHODS

This research is a qualitative study with data collection in words, sentences, pictures, and numbers, followed by careful interpretation of the data (Sugiyono, 2014). Data collection was conducted using literature study and interview methods. The interview respondents were four Indonesian language teachers in public and private high schools in Surakarta City with different genders, age ranges, and education levels. The data obtained through the interview method was strengthened by a literature study from various relevant literature sources. Literature study is one of the data collection methods in qualitative research. It involves collecting data from intensely examined documents so that information is obtained that supports, proves, and adds confidence to a study. (Satori & Komariah, 2010). The data was then analyzed by data reduction, presentation, and conclusion drawing.

3. RESULTS & DISCUSSION

Creative Industries in the Language Field

Language skills are needed by everyone, not limited to Indonesian language learners or Indonesian language teachers. Indonesian language teachers argue that language contains the value of *life skills*, so it must be mastered by everyone. *Life skills* are abilities/skills to be able to adapt and behave productively so that they can become independent in life (Linggasari & Rochaendi, 2022, p.50). The teacher explained that there are four language skills, each of which contains *life skills* and can be loaded with entrepreneurial values related to the creative industry. Entrepreneurship can help identify economically valuable opportunities from the creative and innovative processes of the creative industries. For example, if maximized, writing skills can become a writer of novels, poems, and essays. The next skill is speaking skills. If you have a creative attitude, it can be maximized and increase opportunities to become a broadcaster.

Teachers' language and literature skills can support the creative industry. The creative industry is growing in the current era. It has many consumers who are at productive age, such as Generation X, Y, and Z. Teachers think that language-based creative industries are very big opportunities. The great opportunity for language-based creative industries makes language skills the basis. For example, a word-based business that can be read but not heard is a product in the form of crafts such as t-shirts and wall hangings. Word processing packaged in crafts such as t-shirts is one creative industry that makes language the basis of creativity to socialize, raise, and strengthen. It can also criticize or remind in the form of written expression (Hartati & Rozi, 2023, p.586).

The development of written expression to be more interesting can be combined with audiovisuals to produce creative content. Narrated videos are in high demand and are often found on social media. For example, the content of inspirational words on Reels (Instagram), TikTok, etc. Writing that is in great demand on social



media must contain trends that are in great demand by young people to exist. Words can be one of the capitals in creative content with interesting and different packaging, so they are in great demand and can generate profits. Indonesian language teachers have realized the opportunity for words in digital commodities as one of the opportunities in the creative industry. Teachers also argue that the words used must be useful, not offensive. Words are part of language, a medium in the creative industry that can be used for thought, taste, and imagination when giving names or information (Sugono, 2014, p.5).

Role of the Indonesian Language Teacher

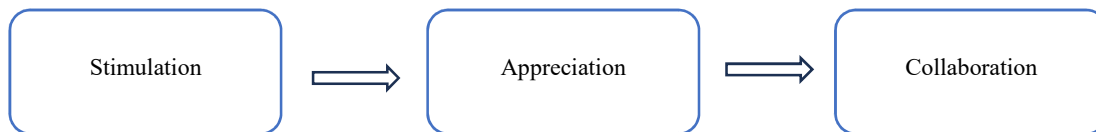


Figure 1. Flow of Teacher's Role in Creative Industry-Based Learning

Teachers encourage learners to develop their skills and competencies beyond the demands of the curriculum. The three main steps that can be taken by teachers in Indonesian language learning to develop learners' competencies to be able to take part in the creative industry based on the results of interviews are to provide stimulation, appreciation, and collaboration. Stimulation is given to attract learners' interest by giving examples. The second step taken by the teacher is to give appreciation to students for trying to maximize their skills, and the third is to collaborate with other subjects to develop the results of creativity that has been made by students.

The first step is to provide stimulation. Musfiroh (2009) explains that stimulation is a process of awakening abilities in a person that does not impose certain ability targets. Stimulation can be provided through good examples given by the teacher. Teachers argue that educators must be role models in everyday life. For example, teachers can model the use of good and correct language to students when using the Indonesian language. This is in line with Tantri (2018), who explains that *soft skills* become effective if there is a transmission using *role models* that can be done by teachers as educators so that they provide good *role models*. Providing an example or example is a stimulation the teacher gives for students to want to develop their competence.

The next role that the teacher can play after being stimulated is to give appreciation to students who succeed in doing work. This can be one of the encouragements for learners to continue doing work if the results of their hard work are appreciated. Through appreciation, learners feel recognized for their hard work and achievements, so self-confidence and optimism arise (Ulfah & Arifudin, 2022, p.14). Creative industries that require skills and creativity in their work require support from teachers so that learners continue to be confident in carrying out their creative processes.

The next role that language teachers can play in implementing creative industries in the language field is collaborating with other subject areas (*blended learning*), such as entrepreneurship subjects. *Blended learning* is a way and means to provide authentic learning experiences for students with different backgrounds and educational needs. (Yang et al., 2021). Entrepreneurship subjects are considered to support creative industry-based language learning so that students can get authentic learning experiences from these two subjects. The main capital in the form of creative work can be generated from Indonesian language subjects, and then follow-up to target opportunities from the work produced can be from entrepreneurship subjects.

Obstacles

The creative industry is not far from the elements of entrepreneurship. If it is included in Indonesian language learning in schools, developing it requires creativity and capital. Teachers argue that if the language is to be followed up into creative industry products, then for students, the difficulty is in the capital part. The existence



of capital can meet operational needs in producing so that it impacts the sustainability of a business (Setiaji & Fatuniah, 2018, p.6).

Another difficulty in integrating language learning with the creative industry is that not all students are born with the same talent, for example, writing talent. Teachers must make learning more interesting so students are interested in learning based on the creative industry. The way teachers make learning more interesting is to introduce learners to the concepts and benefits of each text studied so that learners can apply them in their daily lives.

The Indonesian language teacher also explained that some learners do not realize their talents. Lack of awareness of students' talents and the benefits of learning Indonesian can be a problem because students become less motivated to follow language and literature learning at school. Therefore, the teacher's role is to direct students so they can have *life skills* from their talents and be used to make a profit. Another obstacle encountered is the assumption that following up on written products has never been done because to make the product worth selling is the demand of entrepreneurship subjects and not Indonesian.

4. CONCLUSION

The Indonesian language contains *life skills* and entrepreneurial values so that it can be maximized to support the creative industry. The four language skills taught to students through language and literature learning in schools can be developed; for example, writing skills added to creativity will become various literary works with economic potential. Various works of students, if developed and not just limited to curriculum demands and packaged with technology, can be an opportunity to develop the creative industry in Indonesia. For example, there is a lot of word content that is added to songs and uploaded by digital creators. The role of teachers in maximizing the potential of students through Indonesian language learning is to do three main things, namely by stimulating or providing good examples or examples. The second role that teachers can play is to appreciate students if they can maximize their potential in the creative industry. The third is to collaborate with other subjects to develop the work produced by students. Integrating language learning in schools with the creative industry also has obstacles felt by teachers, such as the capital needed and not all students having an interest in the realm of language and literature.

REFERENCES

- Annisa, P. S. M., Gultom, F. E. & Debora, M. (2023). Penerapan Optimalisasi Keterampilan 4C(Creative Thinking, Critical Thinking And Problem Solving, Communication, Collaboration) dalam Pembelajaran Contextual Oral Language Skills. *Jurnal Ilmiah Korpus*, 7(3), 391–399.
- Crisvin, Asbari, M. & Chiam, J. V. (2023). Innovate to Liberate: Akselerasi Kreativitas Siswa dalam Pendidikan. *Journal of Information System and Management*, 02(05), 8–12.
- DCMS 1998. *Creative Industries – Mapping Document*. London: Department for Culture, Media and Sport.
- Hartati, L. & Rozi. (2023). Industri Kreatif Berbahasa Bahasa dan Sastra Indonesia. *Diglosia: Jurnal Pendidikan, Kebahasaan, dan Kesusastraan Indonesia*, 7(2), 582–590.
- Kurniawan, H. (2015). Pengembangan Industri Kreatif Anak-Anak dalam Pendidikan Komunitas berbasis Kecerdasan Bahasa. *Sastra, Pendidikan Karakter dan Industri Kreatif*. Surakarta.
- Lase, D. (2019). Pendidikan di Era Revolusi Industri 4.0. *Jurnal Suderman*, 1(1), 28–43.
- Linggasari, E. & Rochaendi, E. (2022). Pembelajaran Bahasa Indonesia di Sekolah Dasar melalui Model Pendidikan Kecakapan Hidup. *LITERASI: Jurnal Ilmu Pendidikan*, 13(1), 40–64.
- Loots, E. & Bennekom, S. V. (2023). Entrepreneurial Firm Growth in Creative Industries: Fitting in and Standing out! *Creative Industries Journal*, 16(3), 383–405.



- Marbun, M. E. & Prastawa, S. (2023). Implementasi Industri Kreatif pada Pembelajaran Produk Kreatif dan Kewirausahaan pada Sekolah Menengah Kejuruan di Surakarta. *Educatioanl Journal: General and Specific Research*, 3(2), 542–551.
- Musfiroh, T. (2009). *Menumbuhkembangkan Baca-Tulis Anak Usia Dini*. Jakarta: Grasindo.
- Satori, D. & Komariah, A. (2010). *Metode Penelitian Kualitatif*. Bandung: Alfabeta.
- Setiaji, K. & Fatuniah, A. L. (2018). Pengaruh Modal, Lama Usaha, dan Lokasi terhadap Pendapatan Pedagang Pasar Pasca Relokasi. *Jurnal Pendidikan Ekonomi dan Bisnis*, 6(1), 1–14.
- Sugiyono. (2014). *Metode Penelitian Kuantitatif, Kualitatif, dan Tindakan*. Bandung: Alfabeta.
- Sugono, D. (2014). *Peran dan Kekuatan Bahasa Indonesia dalam Industri Kreatif Kebahasaan*. Jakarta: Badan Pengembangan dan Pembinaan Bahasa Kementerian Pendidikan dan Kebudayaan.
- Tantri, N. N. (2018). Pentingnya Keterampilan Berbahasa Untuk Meningkatkan Soft Skill Umat Hindu. *Satya Widya: Jurnal Studi Agama*, 1(1), 26-36.
- Ulfah & Arifudin, O. (2022). Peran Guru dalam Upaya Pengembangan Bakat dan Minat Peserta Didik. *Jurnal Al-Amar*, 3(1), 9–16.
- Yang, S., Carter Jr, R.A., Zhang, L. & Hunt, T. (2021). Emanant Themes of Blended Learning in K-12 Educational Environments: Lessons from the Every Student Succeeds Act. *Computers & Education*, 163, 1–12.



THE ABILITY TO UTILISE TECHNOLOGY ON CERTIFIED TEACHERS IN THE LESSON IMPLEMENTATION PROCESS IN SDN SAMAHANI ACEH BESAR

Atika¹, Putry Julia², Hafidh Maksum³

^{1,2,3} PGSD Study Program FKIP Universitas Serambi Mekkah, Aceh, Indonesia
*atikaramadan12345@gmail.com

ABSTRACT

This research is based on the problem of the ability of technology utilisation of certified teachers in the process of implementing learning at Samahani Elementary School in Aceh Besar. In addition, some teachers still lack the confidence to use learning technology due to the lack of teacher knowledge in the application of technology. This study aims to determine the ability of technology utilisation in certified teachers in the process of implementing learning at Samahani Elementary School in Aceh Besar, this research uses a qualitative approach. The research subjects consisted of 2 homeroom teachers, namely class II teachers and class VI-a teachers. Data collection techniques using observation sheets and interviews. There are three data processing techniques, namely the Data Reduction Stage, the Data Display Stage, and the Conclusion Drawing and Verification Stage. From the results of observations and interviews, the two teachers, namely the Class II Homeroom Teacher and the VI-a SDN Samahani Homeroom Teacher, mastered the use of technology as a certified teacher, where teachers must understand the characteristics of students, curriculum/syllabus development, learning design, implementation of educational and dialogical learning, utilization of learning technology, evaluation of learning processes and outcomes, and development of students to actualize their various potentials. With the use of media that is following learning objectives, suitability with learning materials, suitability with student characteristics, paying attention to effectiveness and efficiency, and teachers must be able to operate learning technology, learning objectives will be achieved.

Keywords: Learning Technology, Teacher Certification

1. INTRODUCTION

Education is a conscious effort that is deliberately planned to achieve predetermined goals. Education aims to improve the quality of Human Resources (HR). Each country has educational goals, Indonesia's educational goals have been included in Law No.02 of 1989 concerning the national education system. Education plays an important role in preparing quality human resources. Therefore, education should be managed, both in quality and quantity. Learning is the beginning of preparing qualified future generations. One of the efforts that can be made to achieve national education goals is through teaching and learning activities. One of the characteristics of learning is the occurrence of changes or individual development which includes three directions known as cognitive, effective, and psychomotor development. Learning and teaching activities often experience obstacles and obstacles so that the expected goals are not achieved, namely changes in students. One of the reasons for the absence of change as a student is that the students are tired of participating in busy teaching and learning activities so the learning outcomes achieved are not satisfactory and the learning load is too much. Coupled with teachers who do not use media during the teaching and learning process, making children feel bored and saturated.



Based on the results of preliminary observations in class II and class VI-a SD Negeri Samahani Aceh Besar, elementary school students who are still at the stage of development of concrete thinking require learning media as a tool in understanding the material. If the media used is still conventional, namely only utilising the surrounding environment sometimes makes students feel confused and eventually experience errors in understanding the material, it is necessary to develop a learning media that is easy for students to understand. Learning will be more optimal if learning uses an intermediary tool/media because based on the paradigm of constructivism states that the media occupies a strategic position in realising optimal learning conditions.

Based on the results obtained by the researchers, in the learning process the teacher only utilises the surrounding environment as the learning media, it can be said that the learning media used is still conventional. The application of technology in learning can help convey the meaning of learning itself so that it can be well received by students. In class II and class VI focus has been provided but the application of technology in learning is only limited to displaying images and slides, the media has not been developed into multimedia. Therefore, there is a need for innovation in developing a learning media so that it can increase student learning motivation. According to Hamalik (2020: 24), "the use of teaching media in the teaching and learning process can arouse new desires and interests, as well as generate motivation for students in the teaching and learning process".

Based on the learning problems mentioned above, improvements need to be made as a strategy to improve student achievement in teaching and learning. As a facilitator, the teacher does not dominate students through stories, lectures, or explanations, but he views students as responsible individuals who can process learning resources so that they carry out learning activities based on appropriate instructions. Naibaho (2018:34) states that "teachers as facilitators must be able to make time for personal or small group consultations with learners both indoors and outdoors. That way the teacher helps students in overcoming learning difficulties and planning effective learning activities".

Given the importance of the use of technology to facilitate the learning process, researchers are interested in researching to find out more about the implementation of the teaching and learning process at Samahani Elementary School using learning technology. So, the researcher took the title, "Ability to use technology on certified teachers in the lesson implementation process at SDN Samahani Aceh Besar".

2. METHODS

The approach taken in this research is a qualitative descriptive approach. The main purpose of conducting qualitative research is to describe systematically the facts and characteristics of the object or subject under study precisely. This research was conducted from the 24th to the 28th of July at SD Negeri Samahani, even semester 2022/2023. The subjects in this study were 2 homeroom teachers, the homeroom teachers were chosen with the consideration that the homeroom teachers were certified teachers. Data collection techniques in this study were observation using questionnaires and teacher interviews. As for data analysis techniques, researchers used the Miles and Huberman model, namely the data reduction stage, data display, and conclusion drawing.

3. RESULTS & DISCUSSION

In collecting data, researchers not only conducted interviews but also observed certified teachers to find out the ability to utilise technology on certified teachers in the process of implementing learning at Samahani Elementary School in Aceh Besar. This observation was only carried out on 2 certified



teachers, namely class II teachers and class VI-a teachers. The following observations were made by researchers:

Discussion 1, Understanding of Learners. Understanding students is one of the pedagogic competencies that must be possessed by a teacher. There are at least four things that teachers must understand from their students, namely the level of intelligence, creativity, physical disabilities, and cognitive development. Second, teachers are able to identify the characteristics of students by paying attention to students during learning.

2nd discussion, Curriculum development. This is the process of planning and preparing the curriculum by curriculum *developers and the* activities carried out so that the resulting curriculum can become teaching materials and references used to achieve national goals. The two teachers at Samahani Primary School studied by the researcher, adjust learning to curriculum development, but there are differences in the curriculum used, the grade II teacher uses the SD independent curriculum, while the grade VI-a teacher uses the SD 2013 curriculum.

The 3rd discussion, Learning Design. It is a systematic procedure consisting of several components in a unity that is interrelated and influences to achieve certain learning objectives consistently and tested. Teachers also make learning designs that are in accordance with the material being taught.

Discussion 4, Implementation of Educative and Dialogical Learning. Educative learning is defined as learning that produces not only the basics of mastery of science and technology but also at the same time the cultivation of strong character and mastery of life skills so that they appear as human beings who are loving towards others. Where teachers can direct students to carry out spiritual attitudes such as prayer, gratitude, and respect for others.

Discussion 5, Utilisation of learning technology. Teachers utilise learning media when learning takes place. The use of technology in education and learning is intended to facilitate or streamline learning activities. In this case, teachers are required to have the ability to use and prepare learning materials in a computer network system that can be accessed properly.

The sixth discussion, Evaluation of the Learning Process and Results, is conducted to determine changes and formation of learner competencies. Class assessment is carried out with daily tests, general tests, and final exams. Class assessments are carried out by teachers to determine the progress and learning outcomes of students, diagnose learning difficulties, provide feedback, improve the learning process and the formation of student competencies, and determine grade promotion.

The 7th discussion, Development of Learners to Actualise Their Various Potentials. Teachers provide broad insights when learning takes place, be it by providing motivation, building a positive mindset, counseling services, and so on.

The 8th discussion, Conformity with Learning Objectives. The media displayed by the teacher must be in accordance with the learning objectives in order to achieve the target of the learning objectives. If the material taught by the teacher is different from the learning objectives then the teaching and learning process is said to be not achieved.

The 9th discussion, Suitability with Learning Materials. The media displayed by the teacher is by the learning material to achieve a teaching and learning process in the classroom, and also by paying attention to learning objectives, the learning process using technology will run smoothly.



10th discussion, suitability with the teacher's ability to operate it. When learning takes place teachers can use learning technology. The use of technology as a learning medium will clearly make the teaching and learning process effective and efficient because it can make it easier for a teacher to get or convey learning information and better help improve student understanding. Based on the results of the description and discussion, it can be concluded that the role of certification teachers in the use of learning technology has been seen. Where SDN Samahani teachers have used learning technology in the teaching and learning process. Also, the role of certified teachers in understanding the characteristics of students, curriculum development, learning design, implementing educational and dialogical learning, utilising learning technology, evaluating learning processes and outcomes, and developing students to actualise their various potentials has been mastered and implemented by teachers at Samahani State Elementary School.

4. CONCLUSION

Based on the results of research on the ability to use the technology of certified teachers in the learning implementation process at Samahani Elementary School, it can be concluded that Samahani Elementary School teachers master the use of learning technology as certified teachers, where teachers must understand the characteristics of students, curriculum/syllabus development, learning design, implementation of educational and dialogical learning, use of learning technology, evaluation of learning processes and outcomes, and development of students to actualise their various potentials. With the use of media that follows learning objectives, suitability with learning materials, suitability with student characteristics, paying attention to effectiveness and efficiency, and teachers must be able to operate learning technology, learning objectives will be achieved. SDN Samahani Certification Teachers use learning technology as a tool in the learning process, namely, students become motivated in learning, this can be seen from the enthusiasm of students in receiving learning, students are more active and participate creatively in learning.

5. ACKNOWLEDGMENTS

On this occasion the researcher would like to express his gratitude to:

- Ibu Putry Julia, S.Pd., M.Pd, as the first supervisor, who has taken the time, energy, and thought in guiding the author from the beginning to the end of writing this thesis.
- Mr Dr Hafidh Maksum, S.Pd., M.Pd, as supervisor II, who has sincerely guided and provided direction to the author from the beginning until the completion of this thesis.
- Mrs. Dian Aswita, S.Pd., M.Pd, as the Head of the Elementary School Teacher Education (PGSD) Study Program who has allowed and guided the author in completing the lectures in this elementary school teacher education department.
- Mr Jalaluddin, S.Pd., M.Pd as Dean of FKIP Universitas Serambi Mekkah and his staff who have helped smooth the writing of this thesis.
- Lecturers within the scope of USM, especially the elementary school teacher education study programme who have equipped the author with various knowledge so that it is very helpful in writing this thesis.
- The Head of the Aceh Besar District Education and Culture Office for granting permission to conduct research at Samahani Elementary School in Aceh Besar.
- Mr Azhari, S.Pd.I, Head of SDN Samahani, Aceh Besar district, who permitted to conduct research at the school.
- My mother and father who raised me, guided me, and always gave their blessings, love, hope,



enthusiasm, motivation, and support for my success.

- Thanks also to colleagues, and all students majoring in Primary School Teacher Education (PGSD) who have provided very helpful suggestions and moral assistance.

REFERENCES

- Ajizah, I., & Munawir, M. (2021). The urgency of educational technology: an analysis of the advantages and disadvantages of educational technology in the era of the industrial revolution 4.0. *ISTIGHNA: Journal of Education and Islamic Thought*.
- Dewi, S. Z., & Hilman, I. (2019). Using ICT as an innovative learning resource and media in primary schools. *Indonesian Journal of Primary Education*.
- Euis Mukaromah (2020) Utilisation of Information and Communication Technology in Improving Student Learning Passion. *Indonesian Journal of Education Management and Administration Review* 2020 June.
- Heryani, A., Pebriyanti, N., Rustini, T., & Wahyuningsih, Y. (2022). The role of technology-based learning media in improving digital literacy in high school social studies learning. *Journal of Education*.
- Munawir, M., Aisyah, A. N., & Rofi'ah, I. (2022). Improving teacher skills through certification. *Scientific Journal of Education Profession*.



DIGITALIZATION OF ENGLISH LANGUAGE LEARNING: GLOBALIZING INDONESIAN MADRASSAS

Lutfiana Hikmawati¹

¹Madrasah Aliyah Swasta Sunan Pandanaran, Yogyakarta, Indonesia 55581

*lutfianahikmawa52@gmail.com

ABSTRACT

Madrassas are educational institutions that have deep roots in Indonesia and emphasize the teachings of Islam. However, as a part of the integral education system, madrassas also incorporate other subjects mentioned in the national curriculum, including the global language, English. This study aims to provide a view of the digitalization of English language learning in madrassas in Indonesia as the advancement of technology can provide more learning experiences to prepare for the dynamic global world. This study employs systematic literature review methods using scientific journal articles and books. The results show that while it is not limited to a certain subject, digitalization is inevitable and therefore transforming madrassas to be ready for the digital era. The undergoing changes have both positive and negative impacts on the teaching and learning process in madrassas. Concerning English language learning, it is implied that digitalization has positive impacts in improving students' skills. Based on the research results, it can be concluded that integrating technology and digitalizing the teaching and learning process while also considering the core values of madrassas provide ways to improve English language learning, leading madrassas to participate more in the global world.

Keywords: Digitalization, Madrassas, English, Global

1. INTRODUCTION

Following the advancement of technology nowadays, being able to use the English language has become an indispensable skill because as a global language, it is used by people with different occupations in almost all fields (Rao, 2019). Therefore, whether it is to gain more knowledge from books and other sources or as a means of communication, mastering this language is undeniably important. There are many ways to achieve this goal, such as including English in the national education system. It is shown by many nations' policy to employ English as one of the compulsory subjects in their curriculum. This approach is also done in Indonesia, where it has become a subject that must be taught to the students since 1967 and survived the changing era (Isadaud et al., 2022).

As a mandatory subject, English is also taught in madrassas acknowledged by the Ministry of Religious Affairs. Madrasa is an educational establishment centered on the teaching of Islam and it usually combines the Islamic boarding school with public school using the national curriculum (Syar'i et al., 2020). Some of the madrassas also focus on guiding the students to memorize and understand Al-Quran. Furthermore, it has several levels from *madrasah ibtidaiyah* which is equal to elementary schools, *madrasah tsanawiyah* which is equal to junior high schools, and *madrasah aliyah* which is equal to senior high schools. As a country where the majority of the people is Islam, madrasa has a long history in Indonesia as it made a major contribution to educating the people back when the Dutch colonized this country (Syarif, 2020). Since that, the continuous efforts to make madrassas as recognized institutions did not cease until 1950, when a law was published stating that students in madrassas or religious schools were considered fulfilling their studies (Muhajir, 2019; Syarif, 2020).

Therefore, as one of the educational institutions in Indonesia, madrassas need to keep up with the teaching and learning environment constructed in the curriculum while also considering the development of technology to be implemented in their curricula. Digitalization or digital, as the name suggests, is an advanced way to make and get the worth of things utilizing digital technology and digitized data (Gobble, 2018). Digitalization in education is swift because it provides more chances to learn and connect with a teacher online up to the preparation and actual tests (Obidina et al., 2020).

Sheppard and Young (2006) in Sutrisno (2023) also stated that agility in things including using technology can assist madrasa to adjust to the ever-changing world and solve problems faced in education. Furthermore,



technology also allows students to get materials in other sources aside from the classroom, communicate with friends and teachers, and get various opportunities to assess their knowledge and skills (Chapelle & Sauro, 2017). While there are many studies about digitalization and the impact of technology in madrassa, there is little for digitalization in English language learning in madrassa. Taken from the aforementioned reason, this paper aims to provide a view on employing digital technology in English language learning conducted in madrassas to provide more learning experiences for the students so they can participate more in the global world while not forgetting the values unique to madrassas.

2. METHODS

This article employs the systematic literature review (SLR) proposed by Snyder (2019, p. 336) that follows four steps, including: preparing; carrying out; examining; and reporting the review. For further analysis, this article uses a method proposed by Miles and Huberman (1994) by collecting, displaying, reducing, and drawing conclusions from the data. The data used was taken from references including scientific journal articles and books related to madrassas and digitalization in education.

3. RESULTS & DISCUSSION

English Language Learning in Indonesian Madrassas

English as the *lingua franca* or the language of the world means that if one wants to participate in international communication and transaction, they have to be able to understand and use the language. Richards (2015) states that for countries that do not use English as their first language, they use it as their second or foreign language. There are four macro-skills in English; reading, listening, writing, and speaking. These skills are needed to be learned to communicate using English. As this language is used widely in many fields, non-English-speaking countries have to facilitate the people to learn it. To reach this goal, one of the ways is through education.

Indonesia, a country where English is a foreign language, has a long history of English education. It started in the sixteenth century when the Dutch colonized this country and thus its language and several other European languages were compulsory subjects. However, after Indonesian independence, they were erased, leaving only English as it was deemed as having the potential to be an international language (Zein et al., 2020). Then, in the New Order period, English was made a compulsory subject for schools under the Ministry of Education and Cultures and Ministry of Religions Affairs (Isadaud et al., 2022; Zein et al., 2020).

Madrassas emerged as a result of the education system at that time of colonization where schools could not reach every person in Indonesia so traditional schools that have more accessibility were established, including *pesantren*, the base for madrassas (Syarif, 2020). Initially, madrassas were educational institutions that focused on teaching Al-Quran, Islamic teachings, and other supporting subjects but now, the lessons are adjusted so that general knowledge is also conveyed to prepare the students to face challenges (Wijaya, 2021). Therefore, madrassas as a part of the Ministry of Religious Affairs also must insert English in their curricula that combines general subjects and Islamic teachings. This obligation is based on the Decree of the Minister of Religion which stated that madrassas must have the right and autonomy to manage their education and adapt to technology and science development (2022). It can also mean that madrassas can keep their unique values of Islam and its teachings while still being able to project the national curriculum. These values need to be kept to preserve the identity of the madrassa.

Several studies have been done about English language learning and its relation with Indonesian madrassas. Umar (2022) in his article states that English has become an important subject in *pesantren* and madrassa because it can be used as a medium for *da'wah* or spreading Islamic teachings and for the students in madrassa to be able to follow the latest knowledge. The latter is related to how students in madrassas also need to understand and utilize technology for good causes. To achieve those, instilling praiseworthy characteristics in the lessons is one of the best ways. Similarly, Hidayati (2017) argues that there are opportunities for English language teaching in Indonesian madrassas by integrating religious values into it. This way, the students get both knowledge. Sholeh et al. also found that many Islamic moderation values can be fused with English lessons to



teach students about good values that can be implemented in daily life (2022). This way, it is ensured that students are used to applying them in their interaction and communication, locally and globally.

Digitalization of English Language Learning

Taking into account the fact that English language learning is necessary in many countries, the implementation of it should be done effectively, following the development of the technology. Various applications, websites, and other means have been constructed to be used in the teaching and learning process. In this way, digitalization, which means the use of digital technology, is a vital part of learning. It has many advantages that make it easier for the educational process. In terms of foreign language learning, technology can help learners interact with the target language they want to learn without the need to go abroad (Blake, 2008). Various applications also let one meet with people from different countries easily and thus provide authentic experiences. Learning languages can be taxing for the learners and digitalization can act as a tool to ease the process.

A study by Mahrani et al. (2022) found that the use of digital technology can improve independent learning. Being an independent learner has many advantages as there are no limits in studying because of the easy access to materials needed from the Internet. Nowadays, face-to-face meetings are unnecessary because one can use social media to conduct them virtually, without losing anything. Instead, it saves time and money, and it allows people in different parts of the world to meet easily. Moreover, digitalization in English language learning also provides more engagement for the learners to be exposed to the English language, leading to be independent learners (Nugroho & Atmojo, 2020). Similarly, Fansury et al. (2020) also argue that because digital media can be integrated into various applications, including social media, it can make learning easier and improve learners' engagement.

Digitalization of English Language Learning in Indonesian Madrassas

Digitalization has undeniable impacts on education in madrassas. Husna et al. (2023) support this by stating that madrassa's educational system has to be dynamic to transform madrassas to be more digital. Technology is inseparable from Islamic education and the term 'digital madrassa' refers to the integration of technology in madrassas (Santosa & Jazuli, 2022). This becomes a subject worth to be studied because digitalization makes the teaching and learning process more diverse and various, improving students' engagement. Moreover, technology can also improve students' achievements which results in an improvement in its quality (Siskandar, 2020).

Hence, considering the effect of digitalization in education and English language learning in madrassas, it is important to implement it in the practice of teaching and learning process in madrassas. The Islamic values they need to convey to the students can also be presented through digital technology. In this way, madrassas can preserve the unique values related to their identity, while using modern technology in their teaching and learning process. Moreover, it can assist English learning by providing more opportunities to study and interact with other people and giving more authentic materials.

4. CONCLUSION

Madrassas are educational institutions that combine Islamic teachings with general knowledge. They have great values that can be implemented in life. In Indonesia, madrassas are intertwined with its history, being an inseparable part of the struggle to be free from colonization. At first, they are the accessible and affordable choices for people but over time, madrassas are recognized formally under the Ministry of Religious Affairs. Therefore, they must employ the national curriculum and keep up with the development of technology. Using the national curriculum means integrating other subjects, including English. The international language is a must for a country that does not use it as its first language to ensure that it can participate in the global world. However, learning a foreign language is not easy so the need to employ different ways to learn it emerges. One of the ways to assist English language learning is through digitalization. Nowadays, technology cannot be separated from



daily life. Digitalization is the use of technology and it is very impactful to the world of education. Madrassas must not shut the digitalization and embrace it instead, considering that digitalization has many advantages in the teaching and learning process, while it can also be used as a media for *da'wah*, thus spreading the values of Islam.

There are limited numbers of studies about the digitalization of English language learning in madrassas even when it has many aspects to be examined, including the teacher's and students' perspectives, implementation, and others. This paper provides a view of the relationship between technology and madrassas and how the former affects the latter. More research must be done to find out in-depth about this issue.

REFERENCES

- Blake, R. J. (2008). *Brave new digital classroom: Technology and foreign language learning*. Georgetown University Press.
- Chapelle, C. A., & Sauro, S. (2017). Introduction to the *Handbook of Technology and Second Language Teaching and Learning*. In C. A. Chapelle & S. Sauro (Eds.), *The Handbook of Technology and Second Language Teaching and Learning* (1st ed., pp. 1–9). Wiley. <https://doi.org/10.1002/9781118914069.ch1>
- Fansury, A. H., Januarty, R., Rahman, A. W., & Syawal. (2020). Digital Content for Millennial Generations: Teaching the English Foreign Language Learner on COVID-19 Pandemic. *Journal of Southwest Jiaotong University*, 55(3), 40. <https://doi.org/10.35741/issn.0258-2724.55.3.40>
- Gobble, M. M. (2018). Digitalization, Digitization, and Innovation. *Research-Technology Management*, 61(4), 56–59. <https://doi.org/10.1080/08956308.2018.1471280>
- Hidayati, T. (2017). English language teaching in Islamic education in Indonesia; Challenges and Opportunities. *Englisia Journal*, 3(2), 65. <https://doi.org/10.22373/ej.v3i2.751>
- Husna, A., Rusdarti, R., Haryono, H., & Formen, A. (2023). Digital Transformation of Madrasah in the 5.0 Society Era. 106–111.
- Isadaud, D., Fikri, M. D., & Bukhari, M. I. (2022). The Urgency of English in the Curriculum in Indonesia to Prepare Human Resources for Global Competitiveness. *DIAJAR: Jurnal Pendidikan Dan Pembelajaran*, 1(1), 51–58. <https://doi.org/10.54259/diajar.v1i1.177>
- Kemenag RI. (2022). *Keputusan Menteri Agama Republik Indonesia Nomor 347 Tahun 2022 Tentang Pedoman Implementasi Kurikulum Merdeka pada Madrasah*.
- Mahrani, K. H., Falatena, A., & Wahyunengsih, W. (2022). The effectiveness of learning media digitalization on increasing independence for Indonesian millennial learners. *International Journal Pedagogy of Social Studies*, 7(2), 1–8. <https://doi.org/10.17509/ijposs.v7i2.51807>
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*. SAGE Publications.
- Muhajir. (2019). The curriculum of Madrasah Aliyah in the National Education System in Indonesia: The shift analysis. *Proceedings of the 6th International Conference on Community Development (ICCD 2019)*. 6th International Conference on Community Development (ICCD 2019), Bandar Seri Begawan, Indonesia. <https://doi.org/10.2991/iccd-19.2019.91>
- Nugroho, A., & Atmojo, A. E. P. (2020). Digital learning of English beyond classroom: EFL learners' perception and teaching activities.



- Obidina, M. M., Nikolaeva, O. B., & Grotskaya, N. N. (2020). Presentation in English language teaching in the context of higher education digitalization. *Journal of Physics: Conference Series*, 1691(1), 012126. <https://doi.org/10.1088/1742-6596/1691/1/012126>
- Rao, P. S. (2019). The role of English as a global language. *Research Journal of English*, 4(1), 65–79.
- Richards, J. C. (2015). Key issues in language teaching. Cambridge University Press.
- Santosa, S., & Jazuli, M. F. (2022). The digital Madrasah as an idea of IT-Based Islamic education. *Nazhruna: Jurnal Pendidikan Islam*, 5(2), 379–391. <https://doi.org/10.31538/nzh.v5i2.2121>
- Sholeh, M. B., Ahsin, N., Alany, Z., & Fatimah, F. (2022). The Integration of Religious Moderation Values in English Language Teaching in Madrasah: *International Conference on Madrasah Reform 2021* (ICMR 2021), Surabaya, Indonesia. <https://doi.org/10.2991/assehr.k.220104.027>
- Siskandar, S. (2020). The role of religious education and utilization of digital technology in improving the quality of sustainability madrasa. *Jurnal Tarbiyah*, 27(1). <https://doi.org/10.30829/tar.v27i1.675>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Sutrisno, S. (2023). Madrasa agility in the digital age: Increasing flexibility and countering Artificial Intelligence threats. *AL-WIJDAN Journal of Islamic Education Studies*, 8(2), 294–309. <https://doi.org/10.58788/alwijdn.v8i2.2478>
- Syar'i, A., Akrim, A., & Hamdanah. (2020). The development of Madrasa education in Indonesia. *Revista Argentina de Clínica Psicológica*, XXIX (4), 513–523. <https://doi.org/10.24205/03276716.2020.858>
- Syarif, F. (2020). The History of Madrasa Development in Indonesia. *Tsaqofah Dan Tarikh: Jurnal Kebudayaan Dan Sejarah Islam*, 5(1), 23–40.
- Umar, U. (2022). English language teaching in *pesantren* in Indonesia: Development and Challenges. *Journal of English Language and Literature (JELL)*, 7(1), 55–64. <https://doi.org/10.37110/jell.v7i1.143>
- Wijaya, M. M. (2021). Islamic education model in Madrasah in the perspective of Islamic education philosophy. 8(1).
- Zein, S., Sukyadi, D., Hamied, F. A., & Lengkanawati, N. S. (2020). English language education in Indonesia: A review of research (2011–2019). *Language Teaching*, 53(4), 491–523. <https://doi.org/10.1017/S0261444820000208>



CULTURAL HERITAGE IN THE CLASSROOM (Interactive Learning Media Based on the Sragen Cultural Heritage Catalog)

Atik Dwi Kurniasih^{1*}, Sunardi², Sariyatun³

^{1,2,3}Sebelas Maret University, Indonesia

*atikdk@student.uns.ac.id

ABSTRACT

This article contains a study regarding the use of cultural heritage in learning history. This research focuses on developing interactive history learning media based on the cultural heritage catalogue in Sragen district. This learning media is created based on problem analysis and the background of students' learning styles in class XI SMA Negeri 3 Sragen. This research is a type of qualitative research with a case study approach. Data collection techniques used were literature studies, interviews, observations, and questionnaires. The research results showed that 75% of respondents or 111 students needed learning media that was integrated with local history/local heritage in Sragen, and 110 students were interested in learning media in the form of interactive digital catalogs based on cultural heritage.

Keywords: cultural heritage, interactive learning media, history learning

1. INTRODUCTION

Law Number 11 of 2010 states that cultural heritage is the nation's cultural wealth as a form of thought and behaviour in human life, which is essential for understanding and developing history, science, and culture in the lives of society, nation, and state. Cultural heritage can be considered as the cultural roots of a nation that builds national identity and is coloured by local patterns or distinctive local wisdom (Kemdikbud, 2020). As part of the nation's culture, cultural heritage is the nation's cultural heritage, which contains important socio-cultural values. Therefore, cultural heritage must be preserved.

Preserving cultural heritage is a dynamic effort aiming to maintain its existence and value, consisting of three types: protection, development and utilization (Kemdikbud, 2020). In every effort to preserve these activities, the role of the community is significant and needed in efforts to protect cultural heritage, especially the local community. The public's sense of concern and understanding of the importance of preserving cultural heritage has a significant influence on the sustainability of cultural heritage.

One effort to preserve cultural heritage is to use cultural heritage as a learning resource for students in history learning. The history learning outcomes in the Merdeka Curriculum are mentioned at the end of the class (Kemdikbudristek, 2022). In phase F, students in classes XI and XII can develop basic historical concepts to study historical events in local, national and global trajectories. In the independent curriculum, progressive history learning is required to contextualize various events that occurred in the past with the current situation in terms of learning technology content knowledge, so history teachers are required to utilize technology in teaching.

One use of technology in learning history is by creating exciting learning media for students. The existence of innovative learning media in learning can make it easier for students to learn and understand the material and learning objectives. Students can achieve learning outcomes (Porcu, 2020). The most important use of engaging learning media in learning history is to make students interested in learning history by providing reconstructions of events that occurred in the past (Sulistyo & Nafiáh, 2019). One innovative learning media that students can use easily is to create interactive learning media, where the learning sources come from local history by utilizing the existence of historical cultural heritage in the students' surroundings. (Kurniasih et al, 2023). National history



material in the independent curriculum provides an opportunity to touch on regional feelings where teachers are free to develop their learning by highlighting local content integrated into a historical narrative.

One of the innovations in creating learning media is maximizing smartphone use. Smartphones are available in various operating systems, including the most frequently used ones, namely Android, iOS, and Windows Phone (Lee, 2011). One learning model that utilizes information and communication technology is usually called mobile learning. Mobile learning is a learning model that involves a moving device so that users can access learning material without time limits and wherever the user is (Warsita, 2010). A digital catalogue is one of the history learning media that can be categorized as mobile learning. Digital catalogues are learning media that can attract students' interest in learning and are easy to access and practical (Wahyu et al., 2021). Research conducted by Zubaidah and Musadad (2022) states that using digital catalogue media in learning can facilitate the teaching and learning process where students will be encouraged to think critically and creatively.

The material displayed in the digital catalogue is material regarding heritage from the colonial period to the post-independence period in the Sragen district. This selection was based on the fact that in the environment around SMA Negeri 3 Sragen, there are many relics from the colonial and independence periods. These cultural heritage buildings will be made into a digital catalogue based on cultural heritage in the Sragen district. Based on the background above, it is necessary to develop history-learning media based on a digital catalogue of cultural heritage in the Sragen district.

2. METHODS

The research method used is a descriptive qualitative research method with data triangulation techniques. Research data was obtained from SMA Negeri 3 Sragen with 3 stages (Sugiyono, 2014). The first stage was literature study, observation and interviews with the History teacher at SMA Negeri 3 Sragen and 5 class XI students. The second stage was distributing questionnaires via the Google Form link to class 8 class. The results of filling out the questionnaire were 148 respondents. The third stage was an analysis of teacher documents in the form of teaching modules and learning outcomes.

3. RESULTS & DISCUSSION

The initial stage carried out was by interviewing with the class meanwhile, the results of interviews with students also provide the same statement that so far, history teachers in their classes rarely use learning media that attract students to learning and are limited to books and power points and occasionally watching videos. The results of interviews with teachers also obtained data that teachers only sometimes asked students to visit historical places or cultural heritage sites in the Sragen district. Based on the questionnaire distributed via Ling G Form, it is known that they need learning media that is integrated with local history/local heritage in Sragen, as shown in the following diagram:



Apakah kamu membutuhkan media pembelajaran yang terintegrasi dengan sejarah lokal/ peninggalan lokal di Sragen?

148 jawaban

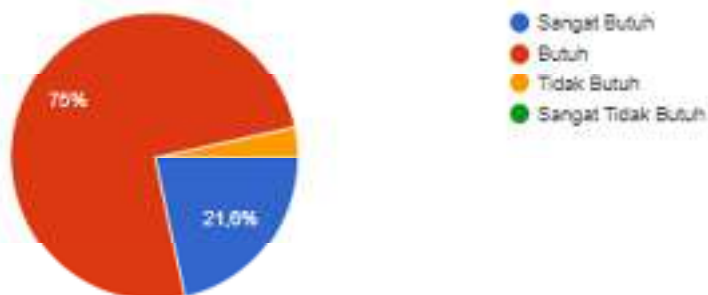


Figure 1. Diagram of the Need for Learning Media that Integrates Local History

Figure 1 shows that 75% of respondents, or 111 students, need learning media integrated with local history/local heritage in Sragen, 21.6% of respondents or 32 students, really need learning media that is combined with local history/local heritage in Sragen, and the remaining 3.4% of respondents or 5 students do not need learning media that is integrated with local history/local heritage in Sragen. The selection of cultural heritage-based learning media in the Sragen district is also supported by the results of the student questionnaire, which is shown in the following table:

Table 1. Frequency Distribution of Students' Interest in Learning Media Based on the Cultural Heritage of the Sragen District

Category	Frequency	Total
Very Interested	33	22,3%
Interested	110	74,3%
Less Interested	0	0
No Interested	5	3,4%
Total	148	100%

From the table above, it is known that 22.3% of students are very interested in cultural heritage-based learning media in the Sragen district, whereas, 74.3% of students are interested in artistic heritage-based learning media in the Sragen district, and 3.4% of students are not interested in cultural heritage-based learning media. Cultural heritage in Sragen district.

The learning media designed is an interactive digital catalogue media based on the cultural heritage of the Sragen district for class (Kemdikbudristek, 2022). An interactive digital catalogue media based on cultural heritage in the Sragen district will focus on colonial heritage in the Sragen district, especially in the Sragen Kota sub-district. Sragen Kota sub-district itself has quite a lot of cultural heritage from the colonial era compared to other sub-districts in Sragen district.

The interactive digital catalogue media specifications based on cultural heritage in the Sragen district were designed using Canva to create the initial design. Canva itself was chosen because it is an online graphic design tool that is easy to use and free. The resulting media format extensions are in the form of apk and html, which can be installed on students' smartphones and can be accessed online or offline. The content of an interactive digital catalogue media based on the cultural heritage of Sragen district was developed containing colonial relics in



Sragen district, especially in Sragen Kota sub-district, including: (1) Rupbasan/House for storing looted goods (Inventory No. 02/Srg/DISPARBUDPOR/2015); (2) Modjo Sugar Factory (Inventory No. 01/Srg/DISPARBUDPOR/2009); (3) Abattoir/Cow Slaughterhouse (Inventory No. 03/Srg/DISPARBUDPOR/2015); (4) District Livestock and Fisheries Service Office. Sragen (Inventory No. 04/Srg/DISPARBUDPOR/2015); (5) SMU 3 Sragen School Building (Inventory No. 05/Srg/DISPARBUDPOR/2015); (6) SMP 1 Sragen School Building (Inventory No. 06/Srg/DISPARBUDPOR/2015) (Sajekti, 2021). Each discussion of cultural heritage buildings is equipped with a menu feature in the form of photos and descriptions of each cultural heritage building. There is a choice of explanation for students whether to read the information themselves or listen to a voice recording containing an explanation of the cultural heritage building. Another part of the interactive digital catalogue based on cultural heritage in the Sragen district is media use instructions, evaluations and references.

4. CONCLUSION

The development of an interactive digital catalogue media based on cultural heritage in the Sragen district was created based on students' needs for learning media sourced from the environment around students so that students learn by students' natural nature. The use of cultural heritage in history learning is intended as an effort to increase historical awareness where in phase F (classes XI and -historical heritage sites. This is in line with the mandate in Law Number 11 of 2010 which states that preserving cultural heritage requires community involvement, in this case involving students as the nation's next generation.

REFERENCES

- Kemdikbud. (2020). *Potret Cagar Budaya Di Indonesia. Tangerang Selatan: Pusat Data dan Teknologi Informasi, Kemdikbud.* Jakarta
- Kemdikbudristek. (2022). *Keputusan Kepala Badan Standar, Kurikulum dan Asesmen Pendidikan Kemdikbudristek Nomor 003/H/KR/2022.* Jakarta: Badan Standar Kurikulum dan Asesmen Pendidikan.
- Kurniasih, A. D., Sunardi, & Sariyatun. (2023). Analisis dan Perancangan Mobile Learning berbasis Cagar Budaya di Kabupaten Sragen sebagai Media Pembelajaran Sejarah. *Historiography*, 126-139.
- Lee, W. (2011). *Awal Pengembangan Aplikasi Android.* Indiana: Wiley.
- Porcu, O. (2020). Exploring Innovative Learning Culture in the Newsroom. *Journalism*, 21(10), 1556–1572.
- Sajekti, A. S. (2021). *Katalog Cagar Budaya Kabupaten Sragen tahun 2021.* Sragen: Disdikbud Kab. Sragen.
- Sugiyono. (2014). *Metode Penelitian Pendidikan Pendekatan Kuantitatif Kualitatif, dan R & D.* Alfabeta.
- Sulistyo, W. D., Nafiáh, U. (2019). *Analisis Kebutuhan dan Tantangan Paradigma Baru Pembelajaran Sejarah di Era Revolusi Industri 4.0,* 472-487.
- Wahyu, M. (2021). Airlangga Museum Digital Catalog Media Design for Class X Students of SMAN 1 Plosoklaten Kediri. *Journal of Education, Humaniora and Social Sciences (JEHSS)* , 229-238.
- Warsita, B. (2010). Mobile Learning sebagai Model Pembelajaran yang Efektif dan Inovatif. *Jurnal Teknodik*, 62-73.
- Zubaidah, N., & Musadad, A. A. (2022). History Learning Based on Digital Catalog Media In Increasing Student's Historical Awareness. *International Journal of Educational Research & Social Sciences*, 3(1), 273-278.



TRENDS OF DIGITAL ASSESSMENT IN EDUCATION: A BIBLIOMETRICS ANALYSIS OF THE RECENT DECADE OF RESEARCH

Wandi Wand^{1*}, Irma Rahma Suwarma², Winny Liliawati³, Fani Mardianti⁴
^{1,2,3,4} Department of Physics Education, Faculty of Mathematics and Science Education,
Universitas Pendidikan Indonesia, Indonesia
*wandi@upi.edu

ABSTRACT

Digital assessment plays an important role in education, especially in the context of digital assessment research in Indonesia. Hence, it needs to be explored to gain insight for further research. Using the PRISMA method combined with VOS-Viewer through Scopus data collection, 302 articles were evaluated. Evaluation is carried out by analyzing the number of publications, countries, research disciplines, journals, and research collaborations on digital assessment in education. Co-occurrence mapping is also explored by analyzing knowledge maps. The research results show an increase in the number of articles each year, and the USA is the country with the most articles published. "Social science" is the most research discipline, "Journal of Dental Education" is the journal with the most publications, and Finland and Portugal's work is the most popular collaboration. Further, based on cluster analysis, there are 3 main categories that are most related, namely e-assessment, human, and education.

Keywords: *digital assessment, e-assessment, education*

1. INTRODUCTION

Assessment is critically important in supporting the success of education (Kift & Moody, 2009). It serves as a multifaceted tool that goes beyond merely evaluating student performance; rather, it plays a pivotal role in shaping the entire educational process. Assessment serves as a compass, guiding educators in tailoring their instructional approaches to meet the diverse needs of learners (Greenstein, 2010). By continuously assessing student understanding and progress, educators can identify areas of strength and weakness, allowing for timely interventions and personalized support. Moreover, assessment acts as a feedback mechanism, offering valuable insights into the effectiveness of teaching methods and curriculum design (Irons & Elkington, 2021). It not only gauges what students have learned but also informs educators about how well instructional goals are being met. In essence, assessment is a dynamic and integral component of education, providing the foundation for informed decision-making, continuous improvement, and the overall success of the learning journey.

In the ever-evolving landscape of education, the integration of digital assessment has emerged as a transformative force, fundamentally reshaping the dynamics of teaching and learning (Rodríguez-Abitia & Bribiesca-Correa, 2021). The profound impact of digital assessment on educational practices underscores the need for thorough exploration, providing essential insights that can drive and inform future research endeavors. This imperative stems from the pivotal role that digital assessment plays in shaping not only how knowledge is imparted but also how it is evaluated and understood in contemporary educational settings. As educational institutions increasingly embrace technology to enhance pedagogical methods, the multifaceted dimensions of digital assessment warrant a closer examination. Understanding the nuances of this technological intervention is essential for educators, researchers, and policymakers alike, as it influences not only the day-to-day practices within classrooms but also the broader strategies employed to adapt to the demands of the digital era. The significance of this research lies not only in its ability to provide a snapshot of the existing landscape but also in its potential to lay the groundwork for future inquiries. As we delve into the findings, we aim to uncover trends, identify prominent contributors, and discern the thematic clusters that define the discourse around digital



assessment. Through this exploration, we seek to contribute valuable insights that can guide educators, researchers, and policymakers in navigating the evolving intersection of technology and education.

2. METHODS

This study reviewed the current literature using the PRISMA framework (Tricco et al., 2018). The scoping approach was used in accordance with the PRISMA criteria to identify the most relevant papers on digital assessment in education. This method assisted in identifying the important components of critical lessons and categorizing prospective search phrases. Several keyword combination queries were used to get relevant published articles from a well-known and reliable research database, Scopus, in order to identify relevant scientific journals and publications. A database search was conducted using the terms "digital assessment", "e-assessment", "electronics assessment", and "education" to find relevant items. Predefined exclusion and inclusion criteria, as well as quality standards, were employed to narrow the data search. Each filter assures quality, and the next section describes exclusion and inclusion measures.

The literature search was extended to include the recent decade (2013-2023) to ensure that contemporary digital assessments were emphasized. Initially, 642 papers were presented; however, they included a variety of publications such as research articles, reviews, editorials, book chapters, and more. At this stage, 314 documents were selected from a search of the literature that was limited to research articles and reviews. Then, this investigation was confined to only utilizing English. As a consequence, 304 publications were appraised for further review and the application of exclusion and inclusion criteria. The data was then converted to an Excel file, allowing the systematic review to commence.

This evaluation entails a careful analysis of both published original research papers and review articles to identify the most relevant discoveries and provide a full synthesis of past knowledge. To guarantee data organization, the findings, abstracts, and conclusions were divided into various categories. Furthermore, we examined the references cited in the reviewed papers. To avoid repetition, we thoroughly cross-checked the data and removed extraneous research to get the required findings.

After selecting the documents, a two-phase technique was used to assess the quality of the analysis performed on the chosen papers. First, the consistent information was imported into Microsoft Excel to conduct a descriptive analysis of the literature's conceptual knowledge. A complete content analysis was then conducted to outline and evaluate the key research themes, highlighting current investigations in a variety of areas while stressing prospective future research problems and possibilities. material analysis is a research approach that examines documents and texts in order to identify and quantify explicit communication material into specified categories. It utilizes a systematic procedure to generate reproducible and accurate conclusions from texts.

3. RESULTS & DISCUSSION

Analysing bibliometrics is crucial for comprehending patterns or advancements in a field of study. Digital assessment is a study topic that is substantial enough in this context to be investigated using a bibliometric approach. This analysis evaluates the number of publications, the number of participating nations, the number of citations, the number of participating journals, and the number of research collaborations pertaining to digital assessment in education. This method allows us to observe the degree to which digital assessment has taken centre stage in the scientific literature. Research trends, the geographic distribution of interest in the subject, the influence and popularity of linked papers, and the formation of research collaborations are all made easier with the use of bibliometric data. Through comprehension of these components, bibliometric analysis can offer profound awareness of the importance and dynamics of digital assessment topics in educational contexts.

Number of publications per year



The number of publications from 2013 to 2023 tends to increase. This indicates that during this time period, there was an increasing trend in the number of publications. This means that in the period from 2013 to 2023, the number of documents or scientific works published, whether in the form of articles, papers or other types of publications, shows a positive trend and is increasing. This may reflect the growth or intensification of research activities, scientific writing, or contributions in a particular field during that period.

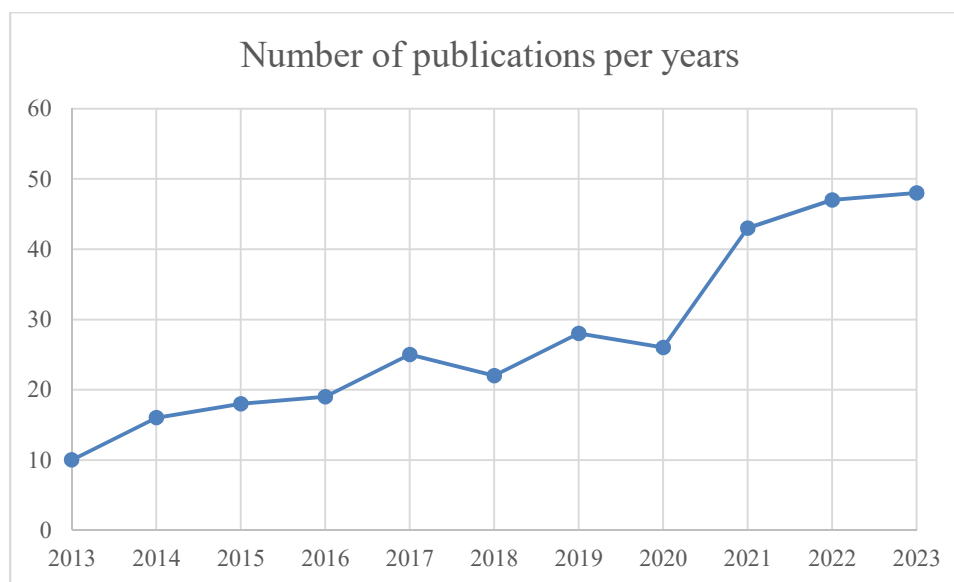


Figure 1. Distribution of Published Documents From 2012 to 2023

From Figure 1 above, it can be seen that there has been a significant increase in research on this topic, especially in the 2020-2021 period. This increase is likely influenced by several significant factors. These factors include the change in national assessment (Indahri, 2021), the renewal of education system (Sibuea, 2020), and the COVID-19 pandemic, which affected all aspects of the education system (Perwitasari et al., 2021). These factors together create conditions that encourage increased interest and urgency in research regarding digital assessment. With changes in national assessments, educational system updates, and the impact of the pandemic, this topic has become increasingly relevant and urgent for research to understand its implications in the educational context.

Top 10 Countries

The contribution and emphasis of research from different regions are best described by examining the correlation between the number of publications on a given topic and the countries. The quantity of publications coming from a nation indicates that nation's level of participation and importance in the field's knowledge development. Understanding the effect and involvement of each nation in examining particular facets of the subject, as well as the global distribution of research, may be gained by analysing the relationship between publication count and a country's publication rate. Furthermore, the degree to which a topic is deemed significant or pertinent in a global setting, encompassing the input of scholars from other regions, can also be reflected in this connection. Overall, the examination of the relationship between publication count and nation-state offers a summary of the dynamics of international cooperation in tackling particular problems or research areas and illustrates the varied ways in which different nations have contributed to the understanding and resolution of global issues.

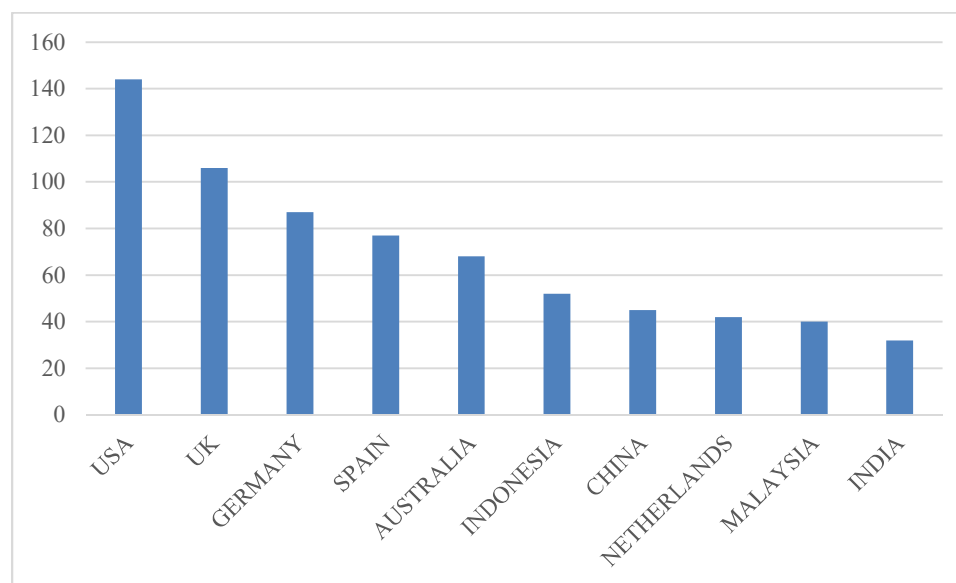


Figure 2. Distribution of Published Documents Among Top 10 Countries (2013–2023)

Figure 2 above shows that the USA has the highest ranking in digital assessment publications, followed by the UK and Germany. Of the 10 highest countries in assessment publications, half of the countries are developed countries and the other half are developing countries. This indicates that the topic of digital assessment in education is equally needed and of interest to various countries, both developed and developing countries. However, the top 3 countries that publish about digital assessments are developed countries. Several higher education institutions in developed countries, such as Cambridge University, have a focus on digital assessment research. So, it is not surprising that developed countries dominate in publications on this topic.

Distribution of published records according to research discipline

Research disciplines are subfields of study or knowledge domains that concentrate on certain issues or challenges. Conceptual frameworks, research techniques, and epistemological perspectives unique to the objectives and nature of that subject are features shared by all research disciplines. Research topics in academia include a wide range of fields, including technology, medicine, the humanities, and social and natural sciences. Comprehending a research discipline is crucial since it allows one to stay up to date with new findings, identify influential ideas, and get involved in the relevant academic community.

Figure 3 provides an overview of the distribution of research disciplines on the topic of digital assessment, and here it can be seen that Social Science (44.4%) is the largest research discipline in this context. The research discipline of Social Science, or social science, covers various aspects of study related to human behavior, society and social interaction. In the context of digital assessment, the Social Science research discipline can be involved in many aspects, such as analyzing the impact of digital assessment on student learning (Sarkar et al. 2017; Loureiro & Gomes, 2022; Tapingkae et al. 2020), evaluating the effectiveness of digital assessment methods in the context of education (Leo et al. 2021), as well as understanding the social and psychological factors that influence the acceptance and implementation of digital assessments (Yen & Chiang, 2021).

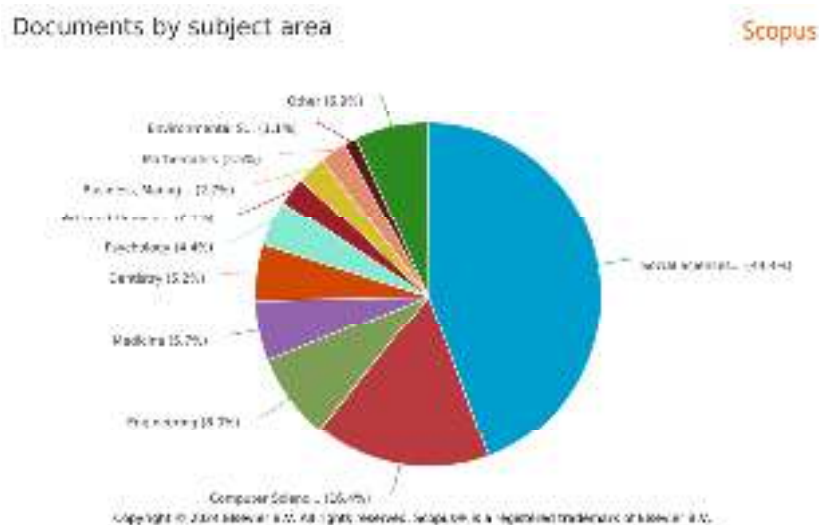


Figure 3. Distribution of Published Records According to Research Discipline (2012–2023)

Research methods in Social Science often involve qualitative and quantitative approaches, with a focus on observation, experiments, surveys, or analysis of social data. Research in this discipline can also involve analysis of educational policies, classroom dynamics, and the role of technology in shaping behavior and social interactions in educational contexts. Seeing that Social Science dominates in digital assessment research, this reflects the importance of understanding the social and human dimensions in the application of technology in the context of modern education. Further analysis in this discipline could provide in-depth insights regarding the impact of digital assessment on students, teachers, and the education system as a whole.

Journal Distribution of Published Records

Each scientific journal has a special scope or focus in a particular field of science. Thus, selecting the right journal is a critical step in publishing research results. The connection between journals and research topics is reflected in the suitability between the scope of the journal and the scope and objectives of the research being conducted. Researchers tend to choose to submit their research results to journals that have a focus or coverage that is in line with their research topic.

The "journal of dental education" is the publication that publishes the most articles about digital assessment, as seen in Figure 4 above. Among the elements that could be to blame are: Specialization of the Journal: The "Journal of Dental Education" might concentrate particularly on dental education. Consequently, this publication might end up being the primary choice for researchers to publish their findings if digital assessment turns out to be a pertinent and significant topic in the context of dental education. 2) publication Reputation: Among scholars and researchers working on the subject of dentistry, this publication may enjoy a positive reputation.

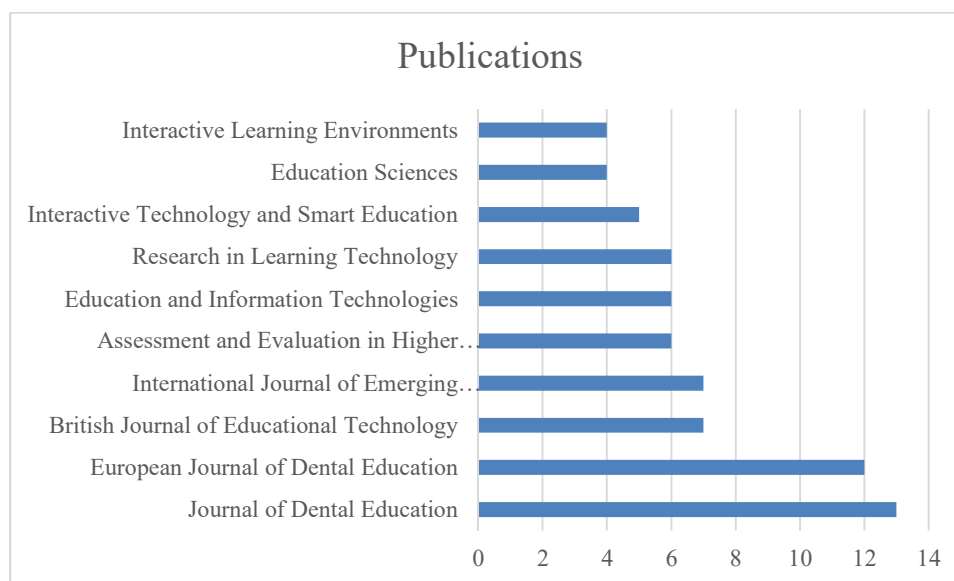


Figure 4. Journal Distribution of Published Records (2013–2023)

Because a journal is regarded as a recognized platform, researchers may choose to publish their work there due to its excellent reputation. 3) Special Forums May Be Available: The "Journal of Dental Education" may have a special section or a number of special issues devoted to digital assessment. Should this be the case, scientists studying these subjects might be more likely to submit their work to those journals. 4) Networking and Collaboration: A higher number of articles may result from the involvement or collaboration of specific researchers or research groups with this journal. Collaboration and networking can promote the publication of digital assessment research in this journal more regularly. The combination of these factors may make the "Journal of Dental Education" a top choice for researchers interested in digital assessment in the context of dental education.

Content Analyze in VOS-Viewer

Understanding the relationships between different elements in scientific publishing datasets and observing publication patterns in a certain research field or topic can be accomplished through content analysis utilizing VOS Viewer. Visual representations that map the relationships between keywords, authors, or journals can be used to visualize these linkages and provide light on the patterns and relationships that exist within them. Typically, distinct hues are assigned to these interactions.

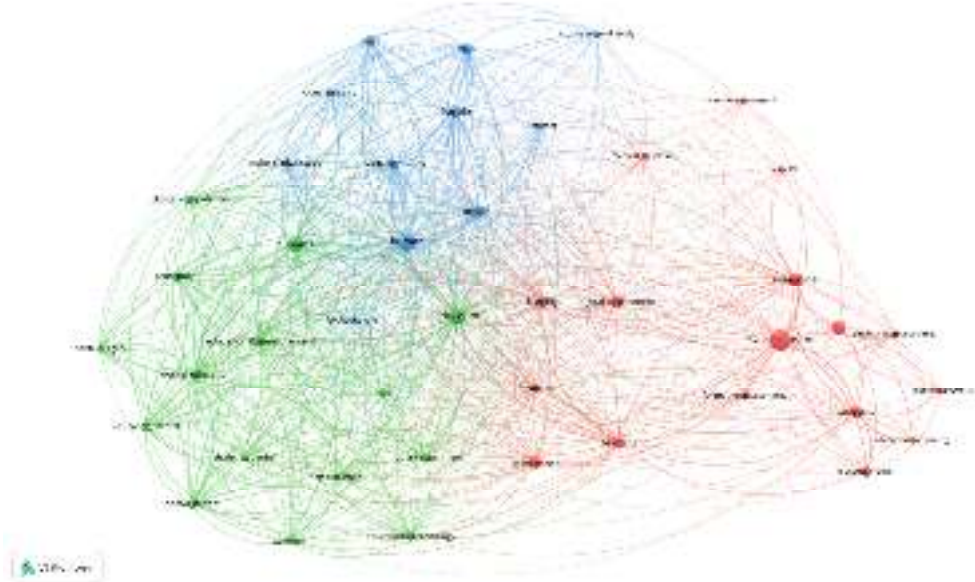


Figure 5. Result of the Content Analyze in VOS-Viewer

Figure 5 above displays three colors, namely red, green and blue which show the clusters in the field. The first cluster (red) is dominated by e-assessment, the second cluster (green) is dominated by education and the third cluster (blue) is dominated by humans. Through this visual image, we can see that online assessment, feedback systems and self-evaluation have blurred circles, which shows that there is still not much research on these topics. So this could be a research gap in the future.

Collaboration World Map

Research trends collaboration among nations is essential for boosting scientific advancement, generating more comprehensive answers, and guaranteeing a major global impact. When scholars from many nations collaborate, a rich and creative research environment is created by bringing together a variety of perspectives, expertise, and resources. This partnership not only expands the field of study but also makes it possible to develop more thorough answers to the challenging issues that the world community faces. Collaboration across nations enhances the validity and relevance of research findings, facilitates the accomplishment of common objectives, and creates a strong foundation of knowledge to address global concerns by exchanging information, data, and resources.



Figure 6. Result of Analyze Collaboration World Map in R Studio

Based on Figure 6, collaboration between countries on the topic of digital assessment is dominated by Finland and Portugal with 4 collaborations. Finland and Portugal, as developed countries, bring their own unique strengths and expertise to this collaboration. Finland, which is known as the world's technology center, has succeeded in creating a very effective education system, producing students who excel especially in the fields of Science and Mathematics (Federick, 2020). Meanwhile, Portugal experienced decentralization of education and gave autonomy to schools (Batista, 2011). It is believed that this collaboration will provide mutual benefits where Finland can provide insight into advanced educational technology, while Portugal can share experiences in implementing educational decentralization and school autonomy. With mutual benefits, this collaboration has the potential to increase mutual understanding, diversify research approaches, and produce sustainable innovation in the implementation of digital assessment in the world of education.

4. CONCLUSION

Digital assessment plays a crucial role in shaping the landscape of education, particularly within the context of ongoing research in Indonesia. Recognizing its significance, a thorough exploration was undertaken utilizing the PRISMA method combined with VOS-Viewer through Scopus data collection, scrutinizing a corpus of 302 articles. The evaluation encompassed a detailed analysis of various parameters, including the annual growth in the number of articles, the leading countries in publication output, prevalent research disciplines, key journals, and collaborative endeavors in the domain of digital assessment within the educational sphere. Co-occurrence mapping further facilitated the exploration of knowledge maps, shedding light on the interconnectedness of research themes. The research outcomes underscore a consistent upward trajectory in the number of articles published annually, with the United States emerging as the frontrunner in terms of prolific contributions. "Social Science" stood out as the predominant research discipline, while the "Journal of Dental Education" took center stage as the most prolific journal in disseminating research on digital assessment. Noteworthy collaborations between Finland and Portugal received acclaim as the most popular collaborative efforts. Furthermore, cluster analysis delineated three principal categories—e-assessment, human aspects, and education—that demonstrate close interrelatedness in the landscape of digital assessment research. This comprehensive exploration not only provides insights into current trends but also lays the groundwork for further advancements in educational practices and the ongoing evolution of digital assessment methodologies.



REFERENCES

- Batista, S. (2011). Educational decentralization and school autonomy: for an analysis of Portugal educational system in a comparative perspective. In *ICERI2011 Proceedings* (pp. 1040-1049). IATED.
- Federick, A. (2020). Finland education system. *International Journal of Science and Society*, 2(2), 21-32.
- Greenstein, L. (2010). *What teachers really need to know about formative assessment*. ASCD.
- Indahri, Y. (2021). Asesmen nasional sebagai pilihan evaluasi sistem pendidikan nasional. *Aspirasi: Jurnal Masalah-masalah Sosial*, 12(2), 195-215.
- Irons, A., & Elkington, S. (2021). *Enhancing learning through formative assessment and feedback*. Routledge.
- Kift, S., & Moody, K. (2009). Harnessing assessment and feedback in the first year to support learning success, engagement and retention. In *ATN Assessment Conference 2009: Assessment in Different Dimensions* (pp. 1-12). Learning and Teaching Unit, RMIT University.
- Leo, S., Alsharari, N. M., Abbas, J., & Alshurideh, M. T. (2021). From offline to online learning: A qualitative study of challenges and opportunities as a response to the COVID-19 pandemic in the UAE higher education context. *The effect of coronavirus disease (COVID-19) on business intelligence*, 203-217.
- Loureiro, P., & Gomes, M. J. (2022). The impact of online peer assessment on student learning in higher education: A systematic review of literature. *EDULEARN22 Proceedings*, 4490-4496.
- Perwitasari, F., Astuti, N. B., & Atmojo, S. (2021, April). Online learning and assessment: challenges and opportunities during pandemic COVID-19. In *International Conference on Educational Assessment and Policy (ICEAP 2020)* (pp. 133-137). Atlantis Press.
- Rodríguez-Abitia, G., & Bribiesca-Correa, G. (2021). Assessing digital transformation in universities. *Future Internet*, 13(2), 52.
- Sarkar, S., Mohapatra, S., & Sundarakrishnan, J. (2017). Assessing impact of technology based digital equalizer programme on improving student learning outcomes. *Education and Information Technologies*, 22(1), 195-213.
- Sibuea, H. Y. (2020). Pembaruan sistem pendidikan di indonesia: perkembangan dan tantangan (education system reform in indonesia: progress and challenges). *Kajian*, 22(2), 151-162.
- Tapingkae, P., Panjaburee, P., Hwang, G. J., & Srisawasdi, N. (2020). Effects of a formative assessment-based contextual gaming approach on students' digital citizenship behaviours, learning motivations, and perceptions. *Computers & Education*, 159, 103998.
- Tricco, A. C, Lillie, E, Zarin, W, O'Brien, K. K, Colquhoun, H, Levac, D, ... & Straus, S. E 2018, 'PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation', *Annals of internal medicine*, vol. 169, no. 7, pp. 467-473.
- Yen, C., & Chiang, M. C. (2021). Trust me, if you can: a study on the factors that influence consumers' purchase intention triggered by chatbots based on brain image evidence and self-reported assessments. *Behaviour & Information Technology*, 40(11), 1177-1194.



ANALYSIS OF MERCURY (HG) CONTENT IN URINE AND ITS IMPACT ON HEALTH DISORDERS OF ILLEGAL GOLD MINING WORKERS IN MALOMBA VILLAGE, DONDO SUB-DISTRICT, TOLITOLI DISTRICT

Sakinah^{1*}, Tri Santoso², Sitti Aminah³, Sri Hastuti Virgianti P⁴

¹²³⁴Tadulako University, Indonesia

*sakinawahid02@gmail.com

ABSTRACT

Mercury is a heavy metal element that very easily enters the bodies of living creatures and joins the food chain. The living creatures most likely to be directly exposed to mercury are traditional miners who use the amalgam method to extract gold ore. The danger of poisoning posed by mercury for humans can be diagnosed through analysis of mercury levels in urine. Furthermore, this research aims to determine mercury levels in the urine of gold mine workers and to obtain information regarding the mercury content in the urine and the health problems of gold mine workers. The method used in this research was the calibration curve method with Cold Vapor Atomic Absorption Spectrophotometry (CV-AAS) analysis and descriptive methods from the results of questionnaire interviews. The results show that the mercury levels in mine workers have exceeded the threshold value set by WHO of 4 ppb while the highest mercury level obtained is 44.1 ppb, the lowest mercury level is 8.38 ppb and the control sample is 6.32 ppb, and there are 2 respondents that have symptoms of mercury exposure, namely respondent OP showing symptoms of mercury exposure in the form of frequent tingling, itching, easy fatigue, headache and eye irritation, and respondent YP showing symptoms of mercury exposure in the form of tremors, frequent tingling, itching, weakness of taste buds, difficulty swallowing, diarrhea, and headache. Based on the research results, it is found that the bodies of mining workers in Malomba Village show symptoms of exposure to mercury.

Keywords: Mercury (Hg), Urine, Gold mine workers, Tolitoli

1. INTRODUCTION

Hg (Mercury) is one of the heavy metal elements in the form of a liquid phase at room temperature (25°C), volatile, and found in nature even though the levels are very low. Naturally, mercury has the property of easily binding and settling in waters, which causes the metal to easily enter the bodies of living things and join the food chain (Suteja, et al. 2019). Metal mercury is usually widely used in gold mining activities.

Amalgamation is one of the processes in gold mining that uses mercury. Mercury is used as an auxiliary material in the gold processing process which is in accordance with its nature, namely binding, in this processing process mercury binds gold so that it is easily separated from other particles. If this mercury is not managed properly, it will have an impact on polluting not only the environment but for the gold miners themselves. One of the negative impacts for a mine worker is the high level of mercury in the body. Mercury (Hg) can enter the human body through mercury-contaminated food, through the respiratory organs or lungs and finally by absorption through the skin, all of these processes will enter the blood to the kidneys, then excreted into urine (Novarianti, 2013).

High mercury levels in the bodies of small-scale gold mine workers are one of the impacts of the absence of adequate personal protective equipment (PPE) facilities at work, as well as poor hygienic practices. Therefore, miners, especially artisanal miners, need to be trained to know the dangers of eating and drinking in the work area, the need to use personal protective equipment, and improve work methods to minimise exposure in the workplace (Dartey et al. 2013).



Mercury exposure in the body can be determined by measuring pollutant levels in body tissues, such as hair, blood, urine, nails and breast milk. Measurement of these body tissues is known as Biological Markers or biomarkers that will help in the assessment of exposure to a pollutant. One of the biomarkers that can be used to assess mercury exposure to the body is through the measurement of urine samples. According to Baeum, et al (2011), urine is a good biomarker for acute exposure to inorganic mercury. Mercury levels in urine can be detected after approximately 2-3 weeks of exposure. Examination of mercury levels in urine can be done by the Atomic Absorption Spectrophotometer (SSA) method (Fong, et al. 2007).

Traditional gold mining is found in various places in Indonesia, one of which is in Malomba Village, Dondo Sub-District, Tolitoli District. However, this gold mining is included in unlicensed gold mining (PETI). The gold content in the area attracts local residents to conduct gold mining because the location of the mining activity is only 500 metres from residential areas in Malomba Village (Rosita, 2022). The gold processing produces waste that has the potential to cause a decrease in environmental quality ranging from pollution of surface water, groundwater, to the risk of health problems for miners and people living around the mining site. Waste from gold processing is disposed of in the river. The river is used daily by the Malomba Village community as clean water, watering crops and a source of drinking water for livestock of the community living around the river (Rosita, 2022). This could result in gold mining workers in Malomba Village, Dondo Sub-district, Tolitoli District being contaminated with mercury in their bodies, hence the need for this research to measure mercury levels in the urine of illegal gold mining workers and its impact on health problems.

2. METHODS

This research is a type of laboratory experimental research to determine the levels of mercury metal in the urine of gold mine workers and using questionnaires to describe the impact of mercury (Hg) content in urine with health problems of gold mine workers. The samples used in this research came from mining in Malomba Village, Dondo Sub-District, Tolitoli District. Gold mining in Malomba Village is illegal. Therefore, the number of workers cannot be known precisely. Based on this, the sample was taken using accidental sampling technique, where sampling was carried out on respondents who happened to be at the research location (Ariawan, 1998). A total of 9 samples were taken from mine workers who worked at 3 points of the mining location, each point of the mining location was taken 3 samples, and 1 control sample came from people who lived around the mining location but were not mine workers and had never been to the mining location point.

Tools and Materials

The tools used in this research were a 60 mL sample bottle, 10 mL measuring cup, 50 mL volumetric flask, 10 mL measuring pipette, 100 mL erlenmeyer, funnel, a drop pipette, a set of atomic absorption spectrophotometer (AAS).

The materials used in this research are mine workers' urine, concentrated HNO_3 , distilled water, 1000 ppm mercury standard solution and filter paper.

Urine Sampling

The sample bottle that will be used as a place to store urine is sterilised first using 2 mL of HNO_3 solution, then shaken until the HNO_3 solution hits the entire surface of the sample bottle (Rosita, 2022). Next, enter the urine into the sample bottle, after all the urine is collected, 4 drops of 4 M HNO_3 solution are dripped,



and each respondent who provided a urine sample filled out questionnaire data to determine the impact of mercury (Hg) on the health problems of gold mine workers. (Asiah, dkk. 2015).

Sample Preparation

Each sample was taken as much as 20 mL and added 8 mL of concentrated HNO_3 solution. The sample was then allowed to stand for 48 hours, then filtered using filter paper (Asiah, et al. 2015).

Preparation of Standard Solution

The 1000 ppb mercury standard solution was made into a series of standard solutions of 10 ppb, 50 ppb, 100 ppb, 150 ppb, 200 ppb, and 250 ppb. Then measure the absorbance with a wavelength of 253.7 nm and make a calibration curve for mercury (Hg) levels.

Analysis of Mercury Level

Measurement of mercury metal concentration in urine samples was carried out using an atomic absorption spectrophotometer (SSA) at a wavelength of 253.7 nm.

Data Analysis

Concentrations of mercury metal were obtained by analysing sample uptake data using calibration curves and information on the impact of mercury (Hg) in urine on health problems was obtained from distributing questionnaires to respondents.

3. RESULTS & DISCUSSION

Preparation of Standard Solution and Calibration Curve

Mercury (Hg) standard solutions used are concentrations of 10 ppb; 50 ppb; 100 ppb; 150 ppb; 200 ppb; 250 ppb can be seen in Table 1.

Table 1. Calibration curve of mercury

Name	Concentration (ppb)	Absorbance
Standard 1	10	0,0182
Standard 2	50	0,0591
Standard 3	100	0,1053
Standard 4	150	0,1486
Standard 5	200	0,1964
Standard 6	250	0,2414

By using the calibration curve between concentration and absorbance, the regression equation is $y = 0.0009x + 0.0112$, with $r^2 = 0.999$. The calibration curve between concentration and absorbance can be seen in Figure 1.

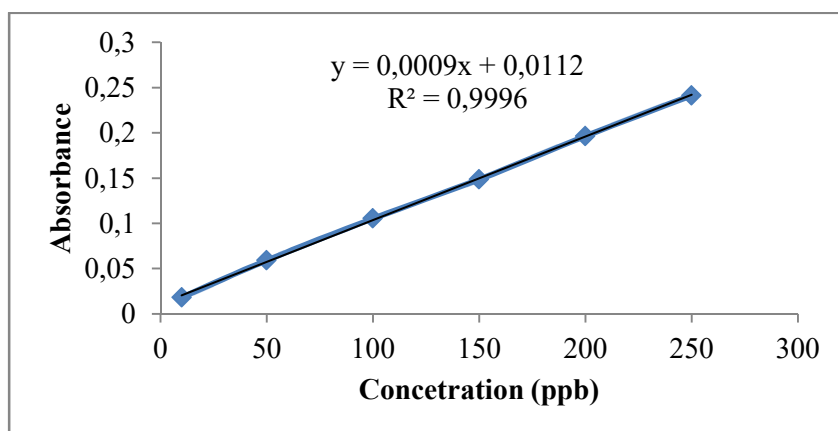


Figure 1. Mercury calibration curve

Mercury Levels in the Urine of Mine Workers

The results of the measurement of mercury (Hg) metal uptake from the urine samples of mine workers can be seen in Table 2.

Table 2. Mercury levels in the urine of mine workers

No.	Location	Sample Code	Absorbance	Mercury Level (ppb)	Average (ppb)
1.	Location 1	AR	0,0437	35,22	48,72
		HW	0,0519	44,10	
		SAK	0,0729	66,84	
2.	Location 2	RK	0,0329	23,53	29,88
		OP	0,0344	25,16	
		RM	0,049	40,96	
3.	Location 3	SJ	0,0189	8,38	19,53
		YP	0,0303	20,72	
		KL	0,0384	29,49	
4.	-	AM	0,017	6,32	-

Based on the data in Table 2, it can be seen that the results of mercury levels in mine workers have exceeded the threshold value (NAB) of mercury in urine set by WHO which is 4 ppb (WHO, 1993), this is because the miners were found to still use traditional methods and without personal protective equipment when processing gold using mercury. The method of processing materials using mercury is still carried out freely by miners, such as in the amalgam process miners do not use any tools for the process, they mix gold-containing rocks with mercury using only their hands, then when the amalgam is heated anyone who is around the burning location can be exposed to mercury vapour from the combustion (Zaharani, et al. 2015). In the control sample, the mercury level in the body has exceeded the threshold value (NAB), this is because the control sample is a community living around the mining site and based on the results of the control sample interview said that the control sample's house had been a place for burning amalgam which caused anyone around the burning site to be exposed to mercury vapor from the combustion (Zaharani et al. 2015). The control sample (non-mine workers)



had the lowest mercury levels among the other samples (mine workers), indicating that non-mine workers are less likely to be exposed to mercury than mine workers. The results of this research are in line with Gundo, et al (2020), that the results of the analysis of mercury levels in miner urine samples have an average mercury level of 0.0250 mg/L, which indicates that it has exceeded the threshold value (NAB) of 0.004 mg/L.

Comparison of mercury levels between location 1, location 2 and location 3 can be seen in Figure 2. Location 1 has very high mercury levels, location 2 has moderate mercury levels and location 3 has low mercury levels.

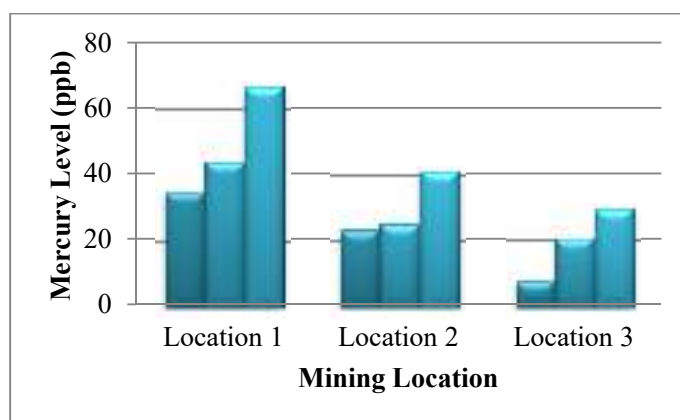


Figure 2. Mercury levels by location

Mine workers in location 1 have very high average mercury levels because the location uses quite a lot of mercury metal to form gold metal grains. Location 2 has a moderate average mercury level because when panning location 2 uses not enough mercury metal because during the formation of gold grains sometimes miners get gold grains that have merged with mercury metal. Meanwhile, mine workers in location 3 have low average mercury levels because the location does not use metal mercury when panning due to the seepage of metal mercury from location 2 so that the gold obtained has formed grains that have been mixed with metal mercury.

Mercury that is discharged into the river as a residue of the amalgamation process in PETI activities will undergo a methylation process with the help of bacteria. The change process requires two chemical reaction steps, namely the oxidation process from Hg^0 to Hg^{2+} , then a chemical reaction that changes the form of Hg^{2+} to CH_3Hg^+ . The chemical reactions that occur in the methylation process are controlled by sulfate-reducing bacteria and other microbes (Alpers & Hunerlach, 2000). Normal metabolism in almost all living organisms will certainly involve methylation reactions so that methyl mercury ions in water bodies will be eaten by aquatic biota and then enter the food chain system (Palar, 2008).

Mercury entering the body other than through the food chain system can also occur due to daily human activities such as consuming river water polluted by mercury, bathing and brushing teeth using mercury-contaminated river water, working in PETI areas and consuming vegetables produced from around rivers polluted by mercury. Prolonged exposure to mercury causes health problems in humans, especially those exposed to mercury-contaminated environmental conditions. Mercury poisoning that usually occurs in communities living around mining sites is usually chronic (EPA, 1984). Communities living around rivers that are tailings of gold processing usually experience mercury poisoning of the methyl mercury type and enter the body through the digestive tract. Organic forms such as methyl mercury are about 90% absorbed by the intestinal wall, this form can also penetrate the blood barrier and placenta so that it can cause teratogenic effects and neurological disorders (Alfian, 2006).



Health Conditions of Mine Workers

The impact of mercury (Hg) in urine on health problems was obtained by distributing questionnaires to respondents. The questionnaire on the impact of mercury (Hg) content in urine on health problems consists of 10 questions using a Guttman scale with Yes and No answer options, Yes answers are given a score of 1 and No answers are given a score of 0. The results of the interview on the health conditions of mine workers can be seen in Table 3.

Table 3. Total results of questionnaire data

Respondent Code	Answer Choice Result	
	Yes	No
HW	0	10
SAK	4	6
AR	4	6
SJ	4	6
RK	1	9
OP	5	5
YP	7	3
RM	3	7
KL	1	9
AM (-)	0	10

The data from the questionnaire with a Guttman scale was then analysed whether mercury has an impact or no impact on the health of mine workers. Data results with a percentage $< 50\%$ indicate that mercury has no impact on the health of mine workers, while data results with a percentage $\geq 50\%$ indicate that mercury has an impact on the health of mine workers. The percentage results using the Guttman scale can be seen in Table 4.

Table 4. Percentage Results Using the Guttman Scale

Respondent Code	Data Result Percentage (%)	Category
HW	0	No Impact
SAK	40	No Impact
AR	40	No Impact
SJ	40	No Impact
RK	10	No Impact
OP	50	Impact
YP	70	Impact
RM	30	No Impact
KL	10	No Impact
AM (-)	0	No Impact



The health conditions of mine workers due to mercury exposure are divided into two categories, namely impact on mine workers' health problems and no impact on mine workers' health problems. Based on Table 4, there are 2 respondents who show symptoms of mercury exposure, namely OP and YP, and 8 other respondents do not show symptoms of mercury exposure. OP showed symptoms of mercury exposure in the form of frequent tingling, itching, fatigue, headache and eye irritation, while YP showed symptoms of mercury exposure in the form of tremors, frequent tingling, itching, weakness of taste buds, difficulty swallowing, diarrhoea and headache.

Factors that can determine whether or not mercury can have an impact on the body are as follows: (1) The type of mercury concerned. Mercury in nature is divided into three forms: metallic mercury, organic mercury, and inorganic mercury. According to Oda and Ingle (1981), organic mercury, especially methyl mercury, is more toxic than other mercury compounds. Mercury, both metal and methyl mercury (CH_3Hg^+), usually enters the human body through digestion, either from fish, shellfish, shrimp, or mercury-contaminated waters. However, when in metal form, most of it can usually be excreted. The rest will accumulate in the kidneys and nervous system which will one day be disturbing if the accumulation increases. Mercury in the form of metal is not so dangerous, because only 15% is absorbed by the human body, but once exposed to nature, under certain conditions it can react with methane from the decomposition of organic compounds to form toxic methyl mercury. In the form of methyl mercury, most of it will accumulate in the brain. Because the absorption is large, it can cause various disorders in a short time. To explain how mercury enters the human body, mercury that enters the water easily bonds with the chemical element chlorine in seawater. Bonding with chlorine ions to form inorganic mercury (HgCl) easily enters plankton and can move to other marine life, then undergoes changes by microorganisms into organic mercury (methyl mercury) in sediments on the seabed. The nature of methyl mercury that can accumulate in the body of living things is what brings disease (Kristianingrum, 2009). (2) The amount of mercury absorbed. How much mercury enters the body is also a determining factor. High exposure doses tend to have a greater negative impact than low doses. (3) Age or developmental stage of the exposed person (foetus is most vulnerable). Age may affect the presence of mercury in the body, Because the increasing age, the greater the risk of accumulation of mercury exposure, especially at the age of growth and old age, because at an advanced age the function of organs such as the kidneys, liver and brain has decreased, while in children the organs are still in the process of growth both in function and size so that they are vulnerable to substances that enter these organs (Reza, et al. 2016), this relates to OP and YP respondents who are at an advanced age, namely OP aged 44 years and YP aged 46 years. (4) Duration of exposure. The longer a person is exposed to mercury, the more mercury is absorbed into his body (Hananingtyas, 2013). Respondent YP has worked as a gold miner for 13 years, while OP for 3 years. (5) Route of exposure (inhalation, ingestion or skin contact). Mercury generally enters the body through air, water or food which is absorbed in varying amounts. Meanwhile, the human body cannot process forms of methyl mercury so mercury remains in the body for a relatively long time and can cause health problems (Prihantini & Hutagalung, 2018).

4. CONCLUSION

Based on the results of the research that has been carried out, it can be concluded as follows: (1) The mercury content in the urine of gold mine workers in Malomba Village, Dondo Sub-District, Tolitoli District has exceeded the threshold value (NAB) set by WHO which is 4 $\mu\text{g/L}$, the results of mercury levels obtained in mine workers at location 1 are RM by 40.96 ppb; AR by 35.22 ppb; HW by 44.1 ppb, the results of mercury levels in mine workers at location 2 are RK by 23.53 ppb; OP by 25.16 ppb; RM by 40.96 ppb, the results of mercury



levels in mine workers at location 3 are SJ by 8.38 ppb; YP by 20.72 ppb; KL by 29.49 ppb; and control sample AM (-) by 6.32 ppb. (2) Of the 9 samples of mine workers analysed, 2 samples were in the category of showing symptoms of mercury exposure, namely OP and YP, and the other 7 samples were in the category of not showing symptoms of mercury exposure. Symptoms of mercury exposure felt by mine workers are tremors, frequent tingling, itching, weakness of taste buds, difficulty swallowing, diarrhoea, fatigue, headaches, asthma, and eye irritation.

5. ACKNOWLEDGMENTS

The author is grateful to the chemistry education study programme, teacher training and education faculty, tadulako university. As well as all parties who have helped and contributed to the author's life that cannot be listed one by one in this sheet.

REFERENCES

- Alfian Z. 2006. *Mercury: Between the benefits and effects of its use on human health and the environment. Professor's Inaugural Speech*. USU.
- Alpers, C, N, and Hunerlach, M, P. (2000). *Mercury contamination from historic gold mining in California*. U.S. Geological Survey. USGD Fact Sheet FS-061-00, p. 5.
- Asiah, N., Alfian, Z., Anwar, J., Siregar, Y., & Bangun, D. (2015). Effect of work duration on mercury (Hg) levels in the urine of gold mine workers (Case study in Panton Luas Village, Sawang District, South Aceh Regency). *Journal of Chemical Education*, 7(2), 8-9.
- Baeum, Jenifer. Stephan Bose - O'Reilly. Raffaella Mateucci Gothe. Beate Lettmeir, Gabriele Roeder, Gustav Drasch, and Uwe Siebert. (2011). Human biomonitoring data from mercury-exposed miners in six artisanal small-scale gold mining areas in Asia and Africa. *Journal Minerals 2011*, 1, pp 122 - 143.
- Dartey, E., Sarpong, K., Darko, G., & Acheampong-Marfo, M. (2013). Urinary arsenic and mercury levels in artisanal miners in some communities in the Obuasi Municipality of Ghana. *Journal of Environmental Chemistry*, 5(5), 113-118.
- EPA. 1984. *Mercury health effects update, Health Issue Assessment*. US Environmental Protection Agency, Washington D.C. (Report No. EPA-600/8-84-019F).
- Fong, B. M. W., Siu, T. S., Lee, J. S. K., & Tam, S. (2007). Determination of mercury in whole blood and urine by inductively coupled plasma mass spectrometry. *Journal of analytical toxicology*, 31(5), 281-287.
- Gundo, ISD, Polii, BJ, & Umboh, JM. (2020). Mercury content in artisanal gold miners. *Indonesian Journal of Public Health and Community Medicine*, 1(3), 13-18.
- Hanangnityas, Izza, et al. (2013). Relationship between mercury (Hg) exposure and thyroid function disorders in traditional gold miners in Jendi village, Selogiri district, Wonogiri Regency. *Indonesian Journal of Environmental Health*, 12(1), 58-63.
- International Agency for research on cancer World Health Organisation. (1993). *Monographs on the evaluation of carcinogenic risk to humans*. Vol. 58.
- Kristianingrum, S. (2009). Review of simple, selective, preconcentration, and spectrophotometric determination of mercury analysis techniques. In *Proceedings of the National Seminar* (Vol. 16).
- Novarianti, N. (2013). *Analysis of risk factors for mercury (Hg) exposure in gold miners in Kawatuna Village, Palu City, Central Sulawesi*. (Doctoral dissertation, Hassanuddin University).



- Oda, C.E. and Ingle, J.D. (1981). Continuous flow cold vapour atomic absorption determination of mercury. *Anal Chem.* Vol.53, p 2030-2031.
- Palar H. (2008). *Heavy metal pollution and toxicology*. Jakarta: Rineka Cipta.
- Prihantini, N. N., & Hutagalung, P. (2018). Health problems due to mercury exposure in workers in the cosmetics industry. *Widya Scientific Journal*, 5(1), 56- 61.
- Reza, et al. (2016). Analysis of differences in potential risks of mercury exposure in communities in Tahi Ite Village, Rarowatu District, Bombana Regency. *Scientific Journal of Public Health Students*, 1(4), 1-13.
- Rosita, M. (2022). *Analysis of mercury metal (Hg) in Janja River water in the mining area of Malomba Village, Dondo Subdistrict, Tolitoli Regency*. Thesis, Tadulako University. Palu.
- Suteja, Y., Purwiyanto, A. I. S., & Agustriani, F. (2019). Mercury (Hg) in surface waters of Banyuasin River Estuary, South Sumatra, Indonesia. *Journal of Marine and Aquatic Sciences*, 5(2), 177-184.
- Zaharani, F., & Salami, I. R. S. (2015). Mercury content in urine and hair as an indication of mercury exposure to unlicensed gold mine (PETI) workers in Pasar Terusan Village, Muara Bulian sub-district, Batang Hari district, Jambi. *Journal of Environmental Engineering*, 21(2), 169-179.



DETERMINATION OF FLAVONOID CONTENT IN TAPAK DARA ROOT DECOCTION (*CATHARANTHUS ROSEUS*)

Nurmasita G. Labolo^{1*}, Baharuddin Hamzah², Purnama Ningsih³, Irwan Said⁴

^{1,2,3,4}Tadulako University, Indonesia

*nurmasitalabolo1@gmail.com

ABSTRACT

Catharanthus roseus is a plant that grows wild and is widely used by people as an ornamental plant. This plant is known to have antibacterial, antioxidant, antifungal, anthelmintic, antineoplastic, antihyperglycemic, anticancer, antidiarrheal and antiviral activities so it is used to treat various diseases such as malaria, constipation, cancer, diuretics, diabetes mellitus, cholesterol, and hypotension. This research aims to determine the levels of flavonoids in the roots of the tapak dara plant (*Catharanthus roseus*) with varying concentrations of 5%, 10% and 15%. The method used in this research is the dekokta method. Determination of decok flavonoid levels in the roots of the tapak dara plant (*Catharanthus roseus*) done by adding AlCl₃ reagent, then analyzed using a UV-vis spectrophotometer with a wavelength of 431 nm. The average yield of tapak dara plant root flavonoids obtained with a concentration of 5% was 0.18±0.0015 mg/L, 10% was 0.76±0.0020 mg/L and 15% was 2.31±0.0015 mg/L. The conclusion of this study shows that the greater the sample concentration, the greater the flavonoid content.

Keywords: *Catharanthus roseus*, Roots, Flavonoids, UV-vis Spectrophotometry.

1. INTRODUCTION

Indonesia is one of the countries located in the tropics with enormous biodiversity, rich in plant raw materials that are efficacious for health. Along with the development, there has been a lot of research and development of plants that are efficacious for health. WHO (*World Health Organization*) data shows 70-80% of the world's population uses herbal medicine as an alternative treatment, found in research which states that medicinal plants contain flavonoids (Karimi et al., 2013).

Flavonoids are one of the natural compounds found in many plants and foods that promise to treat various diseases such as cancer, inflammation, and cardio-vascular dysfunction. Flavonoids have a very important activity, namely as an antioxidant in preventing wounds caused by free radicals (Bustanul & Sanusi, 2018).

One plant that has the potential to be used for the utilization of natural antioxidants is the tapak dara plant (*Catharanthus roseus*). Tapak dara (*Catharanthus roseus*), which has been considered a wild and cheap flower, is now starting to be looked at and favored by many people (Noer et al., 2018) because tapak dara (*Catharanthus roseus*) is one of the natural ingredients that has been widely researched and reported to have many properties in curing various diseases, including as an anticancer, urinating, lowering blood pressure and stopping bleeding, while tapak dara roots contain alkaloids, saponins, flavonoids and tannins (Verrananda et al., 2016).

Tapak dara is a shrub that has a reddish-colored stem that is round, woody at the base, short-haired, and has a lot of branching. Leaves are single, the leaf surface is shiny and hairy, with pinnate leaf bones. Compound trumpet-shaped flowers emerge from the tips of stalks and leaf axils. The flower crowns are five in number and the periwinkle flowers are red, easy red, light purple, and white (Figure 1) (Andalia et al., 2019).



Figure 1. Tapak dara Plant (*Catharanthus roseus*)

According to (Hadriyani, 2022) tapak dara is known to contain flavonoids and tannins that can have analgesic effects. Flavonoids have analgesic activity because flavonoid compounds have activity similar to aspirin, which inhibits the formation of inflammatory mediators through inhibition of the cyclooxygenase enzyme so that it will reduce the production of prostaglandins by arachidonic acid, thereby reducing pain.

According to (Nayak & Pinto Pereira, 2006) in various regions people also use tapak dara (*Catharanthus roseus*) to treat headaches, burns, and traditional medicine for diabetics. In addition, empirically tapak dara is also known to have properties as analgesic (anti-pain) and anti-inflammatory (anti-inflammatory). This is also based on the many studies on the utilization of tapak dara leaf extract as anti-inflammatory (Putri et al., 2019) wound healing and antipyretic drugs whose effectiveness has been tested in mice and rats (Puspita Dewi et al., 2013) Some people have also used tapak dara as a muscle pain reliever, nosebleed medicine, and swelling relief due to wasp stings (Koul et al., 2013).

The roots of the tapak dara plant are often used by the community as a treatment by drinking the boiled water, but it is not yet known exactly how much flavonoid content is contained in the roots of the tapak dara plant (*Catharanthus roseus*). Therefore, the decoction of the roots of the tapak dara plant is used as a medicine, it is necessary to determine the right dose for its use (Kabesh et al., 2015).

Therefore, it is necessary to conduct a study that aims to determine the flavonoid content of decoction on the roots of tapak dara (*Catharanthus roseus*). It is hoped that the results of this study can provide information on the ability of antioxidants as an antidote to free radicals.

2. METHODS

This study uses the decoction method to extract the active content that is soluble in water. Meanwhile, to determine the flavonoid levels contained in the roots of tapak dara (*Catharanthus roseus*) with different sample concentrations, the UV-Vis spectrophotometric method was used. The results obtained after extraction with the dekokta method are brownish samples, sample extracts are not too thick and also not too liquid and have a distinctive smell like herbal medicine.

2.1. Tools and Materials

The equipment used in this study are blender, sieve, sample storage container, erlenmeyer, 1 unit of decoction pot, 100 ml volumetric flask, 25 ml volumetric flask, 10 ml volumetric flask, test tube, test tube rack, water bath, thermometer, filter paper, drop pipette, 5 ml measuring pipette, 10 ml measuring pipette, suction rubber, funnel, 100 ml beaker, stirring rod, spatula, analytical balance, digital balance, UV-Vis spectrophotometer, cuvette, aluminum foil and stopwatch (Ahmad et al., 2015).



The materials used in this study were powdered simplisia of tapak dara root (*Catharanthus roseus*), water/aquades, quercetin solution, ethanol 96%, aluminum (III) chloride 10%, potassium acetate 1 M (Ahmad et al., 2015).

2.2. Work Procedure

Preparation of root simplification of tapak dara plant (Catharanthus roseus)

Root samples of tapak dara (*Catharanthus roseus*) were taken in Lasoani Village. Next, wet sorting was done by washing with clean running water, then chopping, then drying for 3 days without direct sunlight. After that the sample was mashed using a blender, then sifted using a sieve. Furthermore, the sample is stored in a container (Ahmad et al., 2015).

Root preparation of tapak dara plant (Catharanthus roseus)

The dried powder samples were extracted using the decoction method. The decoction concentration variations tested were 5%, 10%, and 15%. A total of 5 grams of sample and 95 grams of water were put into erlenmeyer 1, 10 grams of sample and 90 grams of water in erlenmeyer 2, and 15 grams of sample and 85 grams of water in erlenmeyer 3. (Furthermore, to anticipate the decoction to remain 100 grams, each erlenmeyer was added 20% of the sample and 20% of the water from each erlenmeyer. For example, in erlenmeyer 1, 20% of 5 grams of sample and 20% of 95 grams of water are added and so on). Then the sample is put into the top pot. Next, put the pot and its contents into the bottom pot that already contains water. After that, the bottom pot is heated over direct heat and allowed to boil (meaning the temperature reaches 1000 C). Heating is done for 30 minutes from the time the water in the lower pot boils (the temperature of the upper pot reaches 90°C), while stirring occasionally. Then the decoction extract is filtered with filter paper to take the filtrate. The filtrate obtained will then be analyzed for flavonoid content (Ahmad et al., 2015).

2.3. Quantitative Analysis of Flavonoids

Preparation of Quercetin Standard Solution

Standard solution was prepared by weighing 10 mg of quercetin, then dissolved with ethanol up to 10 mL in a volumetric flask as a standard solution of quercetin concentration of 1000 µg/mL. Then 10 mL was taken and dissolved in 100 mL of ethanol as 100 µg/mL quercetin standard solution. Then a series of quercetin standard solution of 0, 1, 2, 3, 4 and 5 µg/mL was made. How to make a series of 1 µg/mL solution is using the dilution formula, the results obtained as much as 0.25 mL of quercetin standard solution in 100 µg/mL added with ethanol up to 25 mL (so on). From each concentration of standard solution, 0.5 mL was pipetted and put into a test tube, then added with 1.5 mL of 96% ethanol, 0.1 mL of 10% aluminum (III) chloride, 0.1 mL of potassium acetate 1 M and 2.8 mL of distilled water. After that, the solution was shaken and then allowed to stand for 30 minutes, then measured the absorbance using a UV-Vis spectrophotometer at a wavelength of 431 nm. Then a calibration curve was made by connecting the absorption value as the coordinate (Y) and the concentration of the standard solution as the abscissa (X) (Ahmad et al., 2015).

Preparation of Blank Solution

Blank solution was made by taking 0.5 mL of distilled water, then added with 1.5 mL of 96% ethanol, 0.1 mL of 10% aluminum (III) chloride, 0.1 mL of potassium acetate 1 M and 2.8 mL of distilled water. Then allowed to stand for 30 minutes and measured the absorbance at a wavelength of 431 nm (Ahmad et al., 2015).

Determination of Total Flavonoid Level in Decoction

Each decoction sample was pipetted as much as 25 mg and then dissolved in 25 mL of 96% ethanol to obtain a concentration of 1000 µg/mL. Taking as much as 0.5 mL of test sample was added with 1.5 mL of 96% ethanol, 0.1 mL of 10% aluminum (III) chloride, 0.1 mL of potassium acetate 1 M and 2.8 mL of distilled water.



Then incubated for 30 minutes. The absorbance of the quercetin standard solution was measured using a UV-Visible spectrophotometer at a wavelength of 431 nm. The average of three measurements was calculated and the flavonoid content was expressed with the equivalence of quercetin standard comparison (Ahmad et al., 2015).

2.4. Data Analysis Technique

Total Flavonoid Content

Total flavonoid levels are calculated with the linear regression equation of the calibration curve to be measured. The linear regression equation of X against Y. $Y = a + bX$.

3. RESULTS & DISCUSSION

3.1. Research Results

This study uses the decoction method to extract the active content that is soluble in water. Meanwhile, to determine the flavonoid levels contained in the roots of tapak dara (*Catharanthus roseus*) with different sample concentrations, the UV-Vis spectrophotometric method was used. The results obtained after extraction with the dekokta method are brownish samples, sample extracts are not too thick and also not too liquid and have a distinctive smell like herbal medicine.

3.2. Determination of Absorbance of Quercetin Standard Solution

The absorbance measurement results of quercetin standard solution as a comparison using UV-VIS spectrophotometer at a wavelength of 431 nm, with concentrations of 0 µg/mL, 1 µg/mL, 2 µg/mL, 3 µg/mL, 4 µg/mL, and 5 µg/mL are presented in Table 1.

Table 1. Results of absorbance standard solution

Concentration (µg/L)	Absorbance
0	0.000
1	0.019
2	0.036
3	0.051
4	0.065
5	0.078

3.3. Preparation of Standard Curve for Quercetin Standard Solution

The standard curve is made by connecting the absorbance value of quercetin standard solution as the coordinate (y) and the concentration of the standard solution as the abscissa (x) contained in Table 1 so as to obtain the regression equation $Y = 0.0155x + 0.0027$ shown in Figure 2.

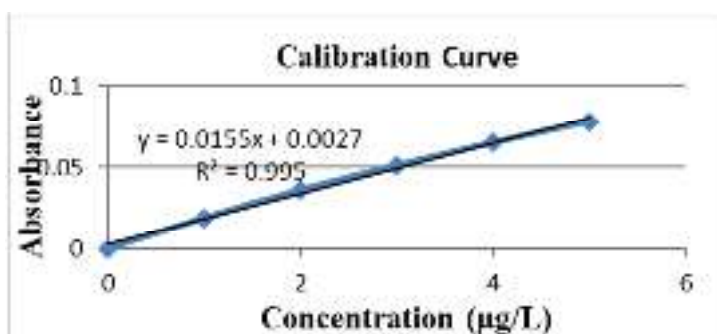


Figure 2. Calibration curve of quercetin at maximum wavelength (431 nm)

3.4. Flavonoid Content in Decoction of Tapak dara (*Catharanthus roseus*) Plant

The results of the analysis of flavonoid levels of tapak dara plant decoction (*Catharanthus roseus*) based on sample concentration can be seen in (Table 2) as a 5% concentration, (Table 3) as a 10% concentration and (Table 4) as a 15% concentration as follows.

Table 2. Results of Flavonoid Level Analysis of Tapak Dara Plant (*Catharanthus roseus*) at 5% concentration

Treatment to	Absorbance (Y)	Average Absorbance	Average flavonoid content $y=ax+b$
1	0.007	0.0056±0.0015	0.18 mg/L
2	0.004		
3	0.006		

Table 3. Results of Flavonoid Level Analysis of Tapak Dara Plant (*Catharanthus roseus*) at 10% concentration

Treatment to	Absorbance (Y)	Average Absorbance	Average flavonoid content $y=ax+b$
1	0.0017	0.0146±0.0020	0.76 mg/L
2	0.013		
3	0.014		

Table 4. Results of Flavonoid Level Analysis of Tapak Dara Plant (*Catharanthus roseus*) at 15% concentration

Treatment to	Absorbance (Y)	Average Absorbance	Average flavonoid content $y=ax+b$
1	0.037	0.0386±0.0015	2.31 mg/L
2	0.039		
3	0.040		

In this study, the average flavonoid results obtained by 5% decoction concentration is 0.18 mg/L, 15% concentration is 0.76 mg/L and 15% concentration is 2.31 mg/L, so it can be concluded that the higher the concentration of a sample extracted, the higher the flavonoid content. This is because the higher the flavonoid content, the more molecules contained in the root extract of tapak dara (*Catharanthus roseus*) as a medicinal plant so that the molecules that will absorb light at a certain wavelength are also more. Thus resulting in higher



absorbance values, absorbance as a quantitative analysis is carried out based on Lambert-Beer Law which states that absorbance with flavonoid levels has a linear relationship, namely the higher the measured absorbance, the higher the flavonoid content contained in a plant (Gusnedi, 2013).

4. CONCLUSION

Based on the results of the research that has been done, it can be concluded that the average flavonoid content of the roots of tapak dara (*Catharanthus roseus*) with the decoction method at a concentration of 5% is 0.18 ± 0.0015 mg/L 10% is 0.76 ± 0.0020 mg/L and 15% is 2.31 ± 0.0015 mg/L.

5. ACKNOWLEDGMENTS

The author is grateful to the chemistry education study program, faculty of teacher education and science, Tadulako University. As well as all those who have helped in completing this research.

REFERENCES

- Ahmad, A. R., Juwita, J., & Ratulangi, S. A. D. (2015). Penetapan Kadar Fenolik dan Flavonoid Total Ekstrak Metanol Buah dan Daun Patikala (*Etlingera elatior* (Jack) R.M.SM). *Pharmaceutical Sciences and Research*, 2(1), 1–10.
- Bustanul, A., & Sanusi, I. (2018). *Struktur , Bioaktivitas Dan Antioksidan Flavonoid Structure , Bioactivity and Antioxidant of Flavonoid*. 6(1), 21–29.
- Gusnedi, R. (2013). Analisis Nilai Absorbansi dalam Penentuan Kadar Flavonoid untuk Berbagai Jenis Daun Tanaman Obat. *Pillar of Physics*, 2, 76–83.
- Hadriyani, N. (2022). Analisis Fisikokimia Minuman Fungsional Berbasis Daun Tapak Dara (*Catharanthus roseus*) Dan Daun Stevia (*Stevia rebaudiana* B.) Sebagai Alternatif Analgesik. *Gastronomia Ecuatoriana y Turismo Local*, 1(69), 1–41.
- Kabesh, K., Senthikumar, P., Ragunathan, R., & Kumar, and R. (2015). *Phytochemical analysis of Catharanthus roseus plant extract and its antimicrobial activity Main project View project Degradation of plastics by microbes View project*. 3(2), 162–172.
- Karimi, M., Parsaei, P., Asadi, S. Y., Ezzati, S., Boroujeni, R. K., Zamiri, A., & Rafieian-Kopaei, M. (2013). Effects Of *Camellia sinensis* ethanolic extract on histometric and histopathological healing process of burn wound in rat. *Middle East Journal of Scientific Research*, 13(1), 14–19.
- Koul, M., Lakra, N. S., Chandra, R., & Chandra, S. (2013). *Catharanthus Roseus and Prospects of Its Endophytes: a New Avenue for Production of Bioactive Metabolites. International Journal of Pharmaceutical Sciences and Research*, 4(7), 2705.
- Nayak, B. S., & Pinto Pereira, L. M. (2006). *Catharanthus roseus* flower extract has wound-healing activity in Sprague Dawley rats. *BMC Complementary and Alternative Medicine*, 6, 1–6.
- Noer, S., Pratiwi, R. D., & Gresinta, E. (2018). Penetapan Kadar Senyawa Fitokimia (Tanin, Saponin dan Flavonoid) sebagai Kuersetin Pada Ekstrak Daun Inggu (*Ruta angustifolia* L.). *Jurnal Eksakta*, 18(1), 19–29.
- Andalia, N., Juliana, Ridhwan, M., & Armi. (2019). Pola Sebaran Tapak Dara (*Catharanthus Roseus*) di Lamno Aceh Jaya. *Serambi Konstruktivis*, 1(1), 82–87.
- Puspita Dewi, I., Damriyasa, I., & Anom Dada, I. (2013). Bioaktivitas Ekstrak Daun Tapak Dara (*Catharanthus Roseus*) Terhadap Periode Epitelisasi Dalam Proses Penyembuhan Luka Pada Tikus Wistar. *Indonesia Medicus Veterinus*, 2(1), 58–75.



- Putri, T. W., Suryantini, A., & Utami, A. W. (2019). The Competitiveness of *Stevia rebaudiana* as a Sweetener Alternative in Tawangmangu Subdistrict of Karanganyar Regency. *Agro Ekonomi*, 30(1), 78–93.
- Verrananda M, I., Fitriani, V. Y., Febrina, L., & Rijai, L. (2016). *Identifikasi Metabolit Sekunder Dan Aktivitas Antioksidan Ekstrak Bunga Tapak Dara (Catharanthus Roseus)*. 20–21.



PROMOTING FAMILY LITERACY THROUGH THE FIVE PILLARS OF FAMILY AND COMMUNITY ENGAGEMENT (FACE) ON EARLY CHILDHOOD AT KLAMBIR V KEBUN VILLAGE

Nurbaiti Ali^{1*}, Eka Surya Fitriani², Sisi Rosida³, Izzmi Aulia⁴
¹²³⁴ University of Pembangunan Panca Budi, Indonesia
*nurbaitiali@dosen.pancabudi.ac.id

ABSTRACT

Children in Indonesia are still not very interested in reading. Supporting variables that can affect reading interest are necessary for low reading interest. This research aimed to investigate the ways in which early childhood knowledge, interest, and practices in family literacy are influenced by the five pillars of family and community engagement (FACE). There is no research on how the five FACE pillars affect early childhood understanding of and practices in Klambir V Kebun village families, despite the fact that each of the five pillars is essential to the demands of family literacy development and is well-described in the literature. Thus, grounded theory methodology (Glaser & Strauss, 1967) was incorporated in the present study to investigate the actualities in the family. After completing 5 sessions of in-meeting activities and 10 hours of fieldwork, the results indicate that the use of the five pillars of FACE not only increased the participants' knowledge of the multiple dimensions of family literacy but also positively influenced their interest and love in reading. The contribution of this study also gives parents a broad overview and point of view on creating a successful family literacy culture.

Keywords: FACE, Family Literacy

1. INTRODUCTION

Children in Indonesia are still not very interested in reading. Supporting variables that can affect reading interest are necessary for low reading interest. If a child grows up in a literate environment, it is thought that their literacy development begins at birth (Bennett-Armistead, Duke, & Moses, 2005). Children develop their motivation to read and their understanding of language and the outside world by being exposed to literacy-rich environments. Researchers believe that early introduction to literacy-rich surroundings can predict children's future academic success (Bennett-Armistead et al., 2005).

When real cultural literature and resources are incorporated into parent and child literacy experiences, student performance on high-stakes examinations can be elevated (Piazza, Rao, & Protacio, 2015). Families, even bilingual families, can minimize negative academic effects such as low-test scores and prepare their children for school responsibilities by implementing home literacy practices that correspond with school standards. By doing this, they could help their kids develop meaningful multilingual connections with their family and texts, as well as English reading competency (McConnochie & Figueroa, 2017).

Family literacy is "the ways parents, children, and extended family members use literacy at home, at work, at school, and in their community life," according to the Florida Reading Association (2014). The researchers should concentrate family literacy instruction not only on what family members do with their children at home but also on how cultural and social situations impact a child's literacy development because family literacy involves factors that go beyond what is done at home between parents and children.

If a child grows up in a literate environment, it is thought that their literacy development begins at birth (Bennett-Armistead, Duke, & Moses, 2005). Children develop their motivation to read and their understanding of language and the outside world by being exposed to literacy-rich environments. Researchers contend that early exposure to literacy-rich surroundings can predict children's subsequent academic success (Bennett-Armistead et al., 2005). It is significant to remember that early literacy development in children might vary for a number of reasons. For instance, there is a correlation between low book quality and inadequate learning materials for kids



and poor family and neighborhood socioeconomic status (Neuman & Celano, 2001). The development of a child's early literacy skills can therefore be influenced by various factors, including schools and teachers, the quantity and quality of books available, individual learners' abilities, and community-wide efforts to promote early literacy (Kids Count, 2010; Paratore, Cassano, & Schickedanz, 2011; Snow & Juel, 2005).

Participation in the family plays a significant role in predicting children's social and intellectual success. Children tend to work harder in school, have more positive personality traits, and have better relationships with their peers when they know their parents are interested in their education and are willing to help when needed (Bogensneider & Johnson, 2004; Bouffard & Stephen, 2007; Henderson & Berla, 1994; Henderson & Mapp, 2002). Schools must work to create strong school-family partnerships in order to involve parents or guardians in their children's education (Epstein, 2011). Creating a welcoming environment, appreciating everyone's contribution, setting clear objectives, and being conscious of social and educational obstacles that prevent family members from participating are all part of these initiatives (Henderson & Mapp, 2002; Warger, Eavy, & Associates, 2009).

Therefore, outside assistance is necessary for low-income children to avoid falling behind their peers, particularly during the summer. Scholars contend that children's educational attainment is significantly impacted by home libraries (Evans, Kelley, Sikora, & Treiman, 2010). Through initiatives like "Reach Out and Read" and "Reading is Fundamental," teachers can collaborate with parents to ask for book contributions (RIF). Teachers might advise parents to use public or school libraries to support their children's literacy development if they find it difficult to have a home library. Newspapers, family recipes, and storytelling are examples of materials or activities that are excellent for promoting family literacy. In the classroom, educators can use research-backed strategies to improve students' reading abilities, set aside time for independent reading, and take faithfulness into account when helping difficult children from socioeconomically disadvantaged backgrounds (Allington, 2013).

Extended learning opportunities, such as summer and after-school programs, offer a way to keep kids away from delinquent behaviors and to reinforce the skills they have learned in school (Little, 2009). High-quality expanded learning opportunities have been linked to lower rates of dropout and disciplinary issues in kids as well as better learning outcomes and social interactions with peers and adults (Council of Chief State School Officers, 2011; Little, 2009; Vandell, Reisner, & Pierce, 2007). Despite the numerous advantages of expanded learning programs, schools and charitable groups are unable to enrol children in them if parents are unaware of them.

Involving parents in their children's literacy development has been identified as one of the most effective supports for children's academic success so this study aimed to promote family literacy through the Five Pillars of Family and Community Engagement (FACE) on Early Childhood at Klambir V Kebun Village.

2. METHODS

The five pillars of FACE were used in the course design of the family literacy course where this study was done. The researcher was teaching this course to a total of 5 families at Klambir V Kebun village. "Family Literacy" was an intensive course of one credit hour. The class discussions and exercises centered around one of the five FACE pillars every week. One session lasted 30 minutes, including a 5-minute break, and covered each pillar. Over the course of two months, there were eight sessions in total (one session per week for eight weeks). In class, there were talks, group projects, and discussion leaders.

This study investigated the effects of the five FACE pillars using the grounded theory methodology (Glaser & Strauss, 1967). Grounded theory research design employs qualitative methods to develop or adapt a theory (Creswell, 2015).



3. RESULTS & DISCUSSION

The results of this study confirm that the participants used these evidence-based techniques in their fieldwork and gained a better grasp of them. An increase in the number of engaged students at the literacy center was facilitated by the use of evidence-based approaches.

This result implies that the participants were more prepared to face difficulties when parents did not appear to be actively involved in their children's education as they developed a repertoire of family participation abilities.

Numerous attendees voiced their worries about the arrangement of the books and the level of skill of the instructors at the literacy center. Additionally, a significant number assisted parents in creating home libraries and provided them with educational resources and opportunities for study (Evans et al., 2010).

Following studies attempts may examine the quality of extended programmes, including their timetable and book arrangement, as observed by the respondents, to ascertain the extent to which these factors influence the frequency with which parents bring their children to the programmes on time and consistently.

Families and their children will benefit when fieldwork experiences are included into the curriculum and good mentorship relationships are introduced at the outset of the course.

4. CONCLUSION

In conclusion, frameworks for promoting family literacy at Klambir V Kebun village could be greatly influenced by the five pillars of FACE. Opportunities must be provided for the community to understand that family literacy encompasses more than just the literacy-related activities that parents and guardians engage in with their children at home. It is more likely that the community will be able to effectively encourage the growth of family literacy. The project's results are also quite encouraging in that they suggest that parent coaching methods could have a beneficial effect on children's literacy development.

REFERENCES

- Alexander, K. L., Entwisle, D. R., & Olson, L. S. (2007). Lasting consequences of the summer learning gap. *American Sociological Review*, 72(2), 167–180.
- Allington, R. L. (2013). What really matters when working with struggling readers? *The Reading Teacher*, 66(7), 520–530.
- Allington, R., & McGill-Franzen, A. (2010). Addressing summer reading set back among economically disadvantaged elementary students. *Reading Psychology*, 31(5), 411–427.
- Bennett-Armistead, S., Duke, N., & Moses, A. (2005). *The importance of literacy-rich activities and environments for young children*. Literacy and the youngest learner: best practices for educators of children from birth to 5. New York, NY: Scholastic.
- Bernhard, J. K., Winsler, A., Bleiker, C., Ginieniewicz, J., & Madigan, A. L. (2008). “Read my story!” Using the early authors program to promote early literacy among diverse, urban preschool children in poverty. *Journal of Education for Students Placed at Risk*, 13, 76–105.
- Biemiller, A., & Boote, C. (2006). An effective method for building meaning vocabulary in primary grades. *Journal of Educational Psychology*, 98(1), 44–62.
- Bogensneider, K., & Johnson, C. (2004). *Family involvement in education: How important is it? What can legislators do?* In K. Bogensneider & E. Gross (Eds.), *A policymaker's guide to school finance: Approaches to use and questions to ask* (Wisconsin Family Impact Seminar Briefing Report No. 20, pp. 19–29). Madison, WI: University of Wisconsin Center for Excellence in Family Studies.
- Bouffard, S. M., & Stephen, N. (2007). Promoting family involvement. *Principal's Research Review*, 2(6), 1–8.



- Dantas, L. M., & Manyak, C. P. (2010). *Home-school connections in a multicultural society: Learning from and with culturally and linguistically diverse families*. New York, NY: Routledge.
- Delpit, L. (1988). The silenced dialogue: Power and pedagogy in educating other people's children. *Harvard Educational Review*, 58(3), pp. 280–298.
- Duke, N. K., & Carlisle, J. F. (2011). *The development of comprehension*. In M. L. Kamil, P. D. Pearson, E. B. Moje, & P. Afflerbach (Eds.), *Handbook of reading research*, Vol. IV (pp. 199–228). London, UK: Routledge.
- Edwards, P. A. (2004). *Children's literacy development: Making it happen through school, family, and community involvement*. Boston, MA: Allyn & Bacon.
- Edwards, P. A. (2011). *Differentiating parent supports*. In S. Redding, M. Murphy, & P. Sheley (Eds.), *Handbook on family and community engagement* (pp. 113–116). Lincoln, IL: Academic Development Institute. Retrieved from <http://www.schoolcommunitynetwork.org/downloads/FACEHandbook.pdf>
- Epstein, J. L. (2011). *School, family, and community partnerships: Preparing educators and improving schools* (2nd ed.). Boulder, CO: Westview.
- Erickson, F. (1986). *Qualitative methods in research on teaching*. In M. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 119–161). New York, NY: MacMillan.
- Evans, M., Kelley, J., Sikora, J., & Treiman, D. (2010). Family scholarly culture and educational success: Books and schooling in 27 nations. *Research in Social Stratification and Mobility*, 28, 171–197.
- Ferguson, C., & Rodríguez, V. (2005). *Engaging families at the secondary level: What schools can do to support family involvement*. Austin, TX: SEDL.
- Florida Reading Association. (2014). *The federal definition of family literacy*. Retrieved from http://www.flreads.org/Family-Literacy/factsheet_federaldef.pdf



EFFECTIVENESS OF CHILDREN'S LANGUAGE AND COGNITIVE DEVELOPMENT THROUGH SINGING METHOD IN EARLY CHILDREN AT AT-TAQWA ISLAMIC KINDERGARTEN

Maya Oktaviani^{1*}, Citra Setya Rahmansyah², Rika Fitria Utami³, Elsa Nur Fidelia⁴, Restu Dyah Sulistyaningrum⁵, Syuhada Lathifah⁶, Tegar Fabiantoro Nistelrooy⁷

¹Family Welfare Education Study Program, Faculty of Engineering, Universitas Negeri Jakarta, Rawamangun Muka Street, East Jakarta, 13220 Indonesia

²³⁴⁵⁶⁷Community Education, Faculty of Education, Universitas Negeri Jakarta, Rawamangun Muka Street, East Jakarta, 13220 Indonesia

*maya.oktaviani@unj.ac.id

ABSTRACT

Singing activities are one of the methods used in early childhood education. This basic idea is how singing activities influence cognitive and language development. This research aims to determine the effectiveness of the singing method for cognitive and language development in early childhood. The research was conducted at At-Taqwa Islamic Kindergarten, Rawamangun, East Jakarta, with a sample size of 12 children and 1 class teacher. The research was conducted in May 2023. The research method used was a qualitative method, where researchers made observations of students in class and interviews with class teachers. The research results show that the singing method effectively develops cognitive and language abilities in early childhood. This result is proven by the observations that students at At-Taqwa Islamic Kindergarten meet the Child Development Achievement Level Standards. Interviews between researchers and class teachers also strengthened the research results that around 80-90 per cent of students had clear and good articulation in the language aspect through singing activities. Then, in the cognitive aspect, students can think logically, solve problems, and learn good symbolic thinking through singing and other supporting methods. Stimulation of language and cognitive development in children still needs to be continued and improved by teachers at school and parents at home. There needs to be good cooperation between the family and the school environment in helping children to achieve optimal development.

Keywords: cognitive development, early childhood, education, language development

1. INTRODUCTION

Education is a humanitarian process, from now on known as humanizing humans (Pristiwanti et al., 2022). Education is a means and facility for forming and teaching children to grow maturely and independently, and it can improve attitudes, knowledge, and behaviour. Through education, children will develop their skills. Development can be interpreted as a journey towards an eternal and permanent process leading to an organization at a much higher level based on learning, growth, and maturation (L. Sari & Zulaikha, 2020). Development involves biological, cognitive, and socio-emotional processes. Cognitive processes refer to changes in an individual's thinking, intelligence, and language (Santrock, 2014). Cognitive development in children cannot be separated from language development.

Language effectively communicates and expresses individual feelings and thoughts through symbols (Fadliyah et al., 2021). Children can convey their intentions, goals, thoughts, or feelings to others by learning a language (L. Sari & Zulaikha, 2020). Language potential must be developed in preschool children because, with good language skills, children can develop academically and interact well in their social environment (Paujiah et al., 2022). In general, language development can be divided into three types, namely expressive abilities (speaking and writing), receptive abilities (listening and reading), and literacy (a child's ability to read and write, which is mastered before the child learns how to read and write). Language skills are included in what is seen, heard, and felt. Usually, the children will start to talk and be able to convey what is happening to them. This cognitive



development can train the child's memory of experiences or events experienced by the child; then, the mind will develop to digest from one incident to another and make scientific or natural reasons.

The environment influences children's personality and language development (Khoiriyati & Fansurullah, 2019). A conducive environment will lead children towards polite speech and can influence a person's character and behaviour. Several factors, such as family and school, are associated with developing language skills in early childhood (Washington-Nortey et al., 2020). Unfortunately, many parents still need an understanding of their role in stimulating early childhood language development (M. Sari, 2018). The parenting pattern parents apply will undoubtedly influence how parents provide and choose education for their children (Brantasari, 2022).

Meanwhile, many preschool teachers read books educationally in schools without strengthening understanding and encouraging more complex language use in children (Alatalo & Westlund, 2021). A survey conducted at Pertiwi Tuban Kindergarten found that only 23% of children could talk about their experiences and daily activities (Fadliyah et al., 2021). There are at least eight teacher roles that can improve children's language development, such as teachers as facilitators, mentors, and evaluators (Basri et al., 2023). Teachers and parents must facilitate students' enthusiasm for learning by using media or learning methods (Rahman et al., 2023). The learning process in early childhood should be carried out to provide basic concepts that are meaningful to children through authentic experiences that enable children to show activity and curiosity optimally (Wulandari & Imania, 2022).

Research results of Schmerse et al. 2018) show that the quality of the home learning environment predicts the development of grammar skills. The research results by Fadliyah et al. (2021) show that finger puppet stimulation significantly affects children's language development. Apart from that, picture and written educational cards are practical and can be used as language stimulation media for preschool-aged children (Firdaus et al., 2019). Other research results show that children's language development (starting from age 3) significantly predicts perspective-taking skills (Emen & Aslan, 2019). Children can more easily understand and receive stimulation when the language learning process is done in a fun and exciting way, one of which is through music (Mutoharoh et al., 2022).

Music is integral to early students' teaching and learning process because children like to listen to, sing, and learn with songs (Rachmawati & Husin, 2022). Music is usually used as an accompaniment in learning activities using the singing method. The singing learning method uses poetry songs adapted to the material to be taught (Rachmawati & Husin, 2022; Wulandari & Imania, 2022). Singing can also increase vocabulary (Dea et al., 2020; Fatimah et al., 2024). The lyrics in each verse of the song enable children to imagine and create movements that can improve children's logical thinking skills.

The research results show that school-aged students enjoy learning Arabic by singing and more easily remember the vocabulary taught by the teacher (Rachmawati & Husin, 2022). Children can develop language and perfect vocabulary (Wulandari & Imania, 2022). So, further analysis is needed regarding the impact of using singing methods on early children, especially students in kindergarten. This research was conducted to determine early children's language and cognitive abilities at the At-Taqwa Islamic Kindergarten.

2. METHODS

This research uses qualitative methods, which emphasize observing phenomena and the substance of the meaning of these phenomena. The research was conducted at At-Taqwa Islamic Kindergarten Rawamangun, East Jakarta, within one month, May 2023. The research sample consisted of 12 students and 1 class teacher. Samples were selected using the saturated sample technique.

The strength of the words and sentences greatly influences qualitative research's analysis and sharpness. Data was collected using interview techniques. An interview is a data collection technique through a one-way verbal question-and-answer process, meaning that the questions come from the person interviewing, and the answers are given by the interviewee (respondent). Apart from that, researchers also used observation techniques. Observation is a data



collection technique carried out through observation, accompanied by notes on the condition or behaviour of the target object. Testing the validity of the data was carried out using triangulation methods.

3. RESULTS & DISCUSSION

Result

Singing activities have become a learning method for all students at At-Taqlwa Islamic Kindergarten. The singing method conveys information covering social, religious, and other fields. For example, singing is used to learn to count, learn the names of prophets, learn about religion and divinity, remember, and even learn morals and social issues. So, singing activities at At-Taqlwa Islamic Kindergarten are used as a language and cognitive development method in children, not just as entertainment for children while learning activities occur.

Based on the results of classroom observations, the singing method has a good influence on training students' articulation and pronunciation in class. Around 80-90 per cent of students already have clear articulation when speaking. This singing activity is also used to motivate less active children in class. Based on the results of interviews with teachers, this method successfully increased the motivation of students who needed to be more active and enthusiastic in class. Apart from singing, At-Taqlwa Kindergarten carries out one activity to develop students' language and cognitive abilities, namely the language month program.

Apart from singing, teachers also use other methods, such as demonstrations, stimulus responses in the form of questions, and role-playing, to develop students' cognitive abilities. Teachers use worksheets and teaching aids that can help teachers to facilitate learning in the classroom. The variety of media and methods used by teachers at the At-Taqlwa Islamic Kindergarten means that children can understand and carry commands. Apart from that, their numeracy skills were also considered quite good. Children understand numbers from 1 to 20 and addition from 1 to 10. Using various media and methods also means that children do not get bored quickly and have high initiative during the learning process. Through singing activities, children are trained to understand cause and effect. Children learn to solve problems independently and apply new knowledge and concepts to existing knowledge.

The following are the results of observations of early childhood children at the At-Taqlwa Islamic Kindergarten based on standards for early childhood development achievement levels in language (table 1) and cognitive (table 2) aspects.

Table 1. Early Childhood Language Development Achievements

No	Language Development	Assessment Indicators				
		Very Not Good	Not Good	Fairly Good	Good	Very Good
1.	Expressive				V	
2.	Receptive				V	
3.	Literacy			V		

In general, language development can be divided into three types, namely expressive abilities (speaking and writing), receptive abilities (listening and reading), and literacy (the child's ability to read and write, which is mastered before the child learns how to read and write). Based on the results of observations in class, children at At-Taqlwa Islamic Kindergarten already have good speaking and writing skills. Children can talk to peers and teachers and write letters and numbers. Their vocabulary is quite diverse. In terms of receptive abilities, children understand what other people are saying. They get this by listening to other people and taking turns speaking. The teacher stimulates expressive and receptive abilities through the singing method. In terms of literacy skills, children have good pre-writing skills. The teacher stimulates this skill in a class by making lines, cutting, and drawing.



Table 2. Early Childhood Cognitive Development Achievements

No	Cognitive Development	Assessment Indicators				
		Very Not Good	Not Good	Fairly Good	Good	Very Good
Learning and Problem Solving						
1.	Solve problems flexibly and socially acceptable				V	
2.	Applying knowledge in a new context				V	
Logical Thinking						
1.	Differences, classifications, pattern			V		
2.	Take the initiative, plan				V	
3.	Knowing cause and effect				V	
Symbolic Thinking						
1.	Get to know, mention					V
2.	Using the concept of number				V	
3.	Know letter			V		
4.	Presenting various objects and imagination in the form of pictures				V	

Based on Child Development Achievement Level Standards, the cognitive aspect includes three abilities: learning and problem-solving, logical thinking, and symbolic thinking. Children have flexible and socially acceptable problem-solving skills and apply knowledge in new contexts to a reasonable degree. Children can take initiative and plan and recognize cause-and-effect relationships well. However, the skills to differentiate, classify, and form patterns are still reasonably good. Children can recognize and name objects around them very well, use simple number concepts and present objects and their imaginations in the form of pictures well. Some children still do not know letters.

Discussion

In life and the community environment, every child can develop in his/her way and be different from other children. Listening and speaking skills are learned before entering school, while reading and writing skills are generally learned (Anggraini, 2020). Generally, language development in children is divided into three parts:

1. Children start with babbling when they are 0-1.
2. Children begin to say several words and expand the vocabulary they hear from the people around them when they are 1-2.5 years old.
3. Children can interpret frequently spoken words at the age of 2.5-5 years.



The research results show that children's expressive and receptive abilities are good, although their literacy abilities have only reached a pretty good level. This result aligns with the non-requirement of the calistung curriculum (reading, writing, arithmetic) for kindergarten students. The focus of learning in kindergarten has changed to playing while learning in a fun atmosphere, without any academic pressure. This activity aligns with research results by Mutoharoh et al. (2022) that children can more easily understand and receive stimulation well when the language learning process is carried out in a fun and exciting way, one of which is through music.

In kindergarten, music is a vehicle for children to learn to express thoughts and feelings as individuals and as group members (Anggraini, 2020). The lyrics in each verse of the song enable children to imagine and create movements that can improve children's logical thinking skills. In this activity, children will usually interpret each stanza of the song lyrics, musical arrangements, and beats, which can increase children's concentration and interest in doing this activity. Singing can also increase vocabulary (Dea et al., 2020; Fatimah et al., 2024).

The research results show that, on average, children's cognitive development is reasonable. This cognitive development can train the child's memory of experiences or events experienced by the child. Then, their mind will develop to digest from one incident to another and reason scientifically or naturally. Cognitive and language abilities in children can be developed by singing. By singing, children can convey their feelings to peers. Apart from that, it can also increase children's self-confidence.

The learning process using media and innovative learning activities allows children to interact as much as possible with peers, thereby improving children's speaking abilities (Fauziah & Rahman, 2021). Overall, the results of this study confirm previous research that by singing, children will more easily remember the vocabulary taught by the teacher (Rachmawati & Husin, 2022) and can develop language and perfect vocabulary (Wulandari & Imania, 2022). Regardless of the development achieved by early childhood, children still need stimulation to achieve their subsequent development. Adults around children need to stimulate children to explore and use vocabulary acquired during previous stages of development (Zikri, 2016). Children need to be introduced to interest and curiosity in reading to have essential motivation (Ceyhan & Yıldız, 2021).

4. CONCLUSION

Children's language and cognitive development is critical. Children can develop their perceptions according to what they see, feel, and hear. Language skills include what is seen, heard, and felt. Usually, children will start to talk and be able to convey what is happening to them. Children's language and cognitive abilities can be developed by singing. Singing activities are not part of the curriculum, but singing activities were chosen as one of the learning methods used by teachers at At-Taqwa Islamic Kindergarten. The singing method is used to develop children's language and cognitive skills. Apart from that, the singing focuses on religious songs because At-Taqwa Kindergarten is Islamic. In the cognitive aspect, the media and methods used are demonstrations, singing, stimulus responses (questions), worksheets, props, and role play. Observation results show that children at the At-Taqwa Islamic Kindergarten have met the Child Development Achievement Level Standards. Around 80-90 per cent of students have good articulation in language aspects demonstrated through singing activities. In the cognitive realm, children can think logically, solve problems, and learn to think symbolically.

Stimulation of language and cognitive development in children still needs to be continued and improved by teachers at school and parents at home. Even though the golden age has passed, optimizing children's growth and development can still be continued when children enter school age. There needs to be good cooperation between the family and the school environment in helping children to achieve optimal development.

REFERENCES

- Alatalo, T., & Westlund, B. (2021). Preschool teachers' perceptions about read-alouds as a means to support children's early literacy and language development. *Journal of Early Childhood Literacy*, 1–23. <https://doi.org/10.1177/1468798419852136>



- Anggraini, N. (2020). Peranan orang tua dalam perkembangan bahasa anak usia dini. *Metafora: Jurnal Pembelajaran Bahasa Dan Sastra*, 7(1), 43–54. <https://doi.org/10.30595/mtf.v7i1.9741>
- Basri, F., Sahib, H., & Kaharuddin. (2023). Peran guru dalam meningkatkan keterampilan berbicara siswa pada pembelajaran bahasa indonesia. *Journal of Innovation Research and Knowledge*, 2(8), 3043–3053.
- Brantasari, M. (2022). Pola asuh orang tua terhadap perkembangan bahasa anak usia dini. *Murhum: Jurnal Pendidikan Anak Usia Dini*, 3(2), 42–51. <https://doi.org/10.37985/murhum.v3i2.119>
- Ceyhan, S., & Yıldız, M. (2021). The effect of interactive reading aloud on student reading comprehension, reading motivation and reading fluency. *International Electronic Journal of Elementary Education*, 13(4), 421–431. <https://doi.org/10.26822/iejee.2021.201>
- Dea, L. F., Setiawan, A., & Asmiyati, L. (2020). Upaya meningkatkan kemampuan bahasa anak usia 4-5 tahun melalui metode bernyanyi menggunakan media kartu gambar. *Murhum: Jurnal Pendidikan Anak Usia Dini*, 1(1), 53–64. <https://doi.org/10.37985/murhum.v1i1.6>
- Emen, M., & Aslan, D. (2019). The relationship between perspective taking skills and language development in preschool children. *Journal of Education and Educational Development*, 6(1), 25–42. <https://doi.org/10.22555/joeed.v6i1.2159>
- Fadliyah, L., Susanto, J., & Rukanah. (2021). Stimulasi finger puppet terhadap perkembangan bahasa anak pra sekolah. *Jurnal Penelitian KEsehatan Suara Forikes*, 12(4), 459–462.
- Fatimah, F. N., Larasati, S. A., Aulia, P., & Lubis, H. Z. (2024). Penerapan dan dampak bernyanyi di kelas pada anak usia dini di TK IT Nurul Ilmi. *Jurnal Pendidikan Tambusai*, 8(1), 180–186.
- Fauziah, F., & Rahman, T. (2021). Meningkatkan perkembangan bahasa anak usia dini melalui metode bercerita. *J-SANAK: Jurnal Kajian Anak*, 2(2), 108–114.
- Firdaus, K. N., Indahwati, L., & Wati, L. R. (2019). Perbedaan efektifitas antara stimulasi bahasa dengan metode glenn doman melalui kartu edukasi bergambar dan kartu edukasi tulisan terhadap perkembangan bahasa anak usia prasekolah di Kelompok B TK Al-Jihad Kota Malang. *Journal of Issues in Midwifery*, 3(3), 88–96. <https://doi.org/10.21776/ub.joim.2019.003.03.4>
- Khoiriyati, S., & Fansurullah, N. (2019). *Peran lingkungan terhadap perkembangan bahasa anak*. OSF Preprints. <https://doi.org/https://doi.org/10.31219/osf.io/j5qcv>
- Mutoharoh, Q., Triningsih, R. W., & Aryani, H. R. (2022). Musik sebagai stimulasi perkembangan bahasa pada anak usia dini: literature review. *Jurnal Pendidikan Kesehatan*, 11(1), 1–15. <https://ojs.poltekkes-malang.ac.id/index.php/jpk/article/view/2969>
- Paujjah, T. S., Muslihin, H. Y., & Rahman, T. (2022). Peran lingkungan dalam menstimulasi perkembangan bahasa serta menumbuhkan karakter anak usia dini. *Pelangi: Jurnal Pemikiran Dan Penelitian Islam Anak Usia Dini*, 4(1), 103–122.
- Pristiwanti, D., Badariah, B., Hidayat, S., & Dewi, R. S. (2022). Pengertian pendidikan. *Jurnal Pendidikan Dan Konseling*, 4(6), 7911–7915.
- Rachmawati, R. A., & Husin, H. (2022). Penerapan metode bernyanyi dalam meningkatkan penguasaan kosakata bahasa arab di Panti Asuhan Nurul Jannah. *Berajah Journal*, 2(2), 223–230. <https://doi.org/10.47353/bj.v2i2.81>
- Rahman, A., Rambe, A. R., & Triana, R. (2023). Peran guru dan orang tua dalam perkembangan peserta didik. *PEMA (Jurnal Pendidikan Dan Pengabdian Kepada Masyarakat)*, 2(2), 149–158. <https://doi.org/10.56832/pema.v2i2.302>
- Santroek, J. W. (2014). *Child Development* (Fourteenth). McGraw-Hill Education.
- Sari, L., & Zulaikha, F. (2020). hubungan stimulasi orang tua, pola asuh dan lingkungan dengan perkembangan bahasa anak usia prasekolah di PAUD Kota Samarinda. *Borneo Student Research (BSR)*, 1(3), 2235–2242.



- Sari, M. (2018). Peran orang tua dalam menstimulai perkembangan bahasa anak usia dini. *AULADA: Jurnal Pendidikan Dan Perkembangan Anak*, 1(2), 37–45.
- Schmerse, D., Anders, Y., Flöter, M., Wieduwilt, N., Roßbach, H. G., & Tietze, W. (2018). Differential effects of home and preschool learning environments on early language development. *British Educational Research Journal*, 44(2), 338–357. <https://doi.org/10.1002/berj.3332>
- Washington-Nortey, P. M., Zhang, F., Xu, Y., Ruiz, A. B., Chen, C. C., & Spence, C. (2020). The impact of peer interactions on language development among preschool english language learners: a systematic review. *Early Childhood Education Journal*, 49–59. <https://doi.org/10.1007/s10643-020-01126-5>
- Wulandari, A., & Imania, H. (2022). Upaya guru dalam mengembangkan bahasa melalui metode bernyanyi pada anak usia dini di tk sahabat qur'an. *Indonesian Journal of Islamic Early Childhood Education (IJIECE)*, 7(1), 84–93.
- Zikri, R. (2016). Peran orang tua dalam mengoptimalkan perkembangan bahasa anak fase golden age. *al-lisan: Jurnal Bahasa*, 1(1), 1–22.



THE APPLICATION OF SCHOOL-BASED MANAGEMENT IN EMPOWERING THE COMPETENCY OF MAHYAL ULUM ACEH VOCATIONAL SCHOOL TEACHERS

Jalaluddin^{1*}, Insan Nuhari², Marwan³, Khairiati Umami⁴

¹²³⁴Physical Education Department of University Serambi Mekkah, Banda Aceh, Indonesia

*jalaluddin@serambimekkah.ac.id

ABSTRACT

The goal achieved is to find out the implementation of school-based management, know the variety of empowerment of teacher potential, and know the supporting and inhibiting factors of the implementation of school-based management in empowering teacher competencies at Mahyal Ulum Aceh Besar Vocational School. The type of research used is qualitative which is descriptive. The data collection methods used are observation, interviews and documentation. The data analysis technique is a qualitative descriptive analysis, namely data reduction, data presentation, data interpretation, and conclusion. The results showed that the implementation of SBM in the empowerment of teacher competencies was carried out well because of the cooperation between the principal, teachers and staff. This is seen in terms of teacher competence in curriculum management, teacher competencies in education staff management, teacher competencies in student management, teacher potential in financial management, as well as the potential of teachers in providing facilities and infrastructure. The supporting factors are first, government support in the form of providing BOS funds, allocation of local government funds and granting authority in school management. Second, teacher support in the form of teaching staff who are qualified Undergraduate and Masters certified teachers. And third, student support in the form of an increasing number of students and voluntary assistance from students' parents. The inhibiting factors are infrastructure and funds are still limited and the role of the community is not yet optimal.

Keywords: School-Based Management, Empowering Teachers, Teacher Competency

1. INTRODUCTION

Education is basically a conscious effort to develop a personality that lasts a lifetime. Education also means the process of helping individuals both physically and spiritually towards the formation of the main personality (quality personal). The quality of the human being in question is a harmonious, harmonious, and balanced person in spiritual, moral, social, intellectual, physical aspects and so on.

According to Suderajat (2005), Education is basically a conscious effort to develop a personality that lasts a lifetime. Education also means the process of helping individuals both physically and spiritually towards the formation of the main personality (quality personal). The quality of the human being in question is a harmonious, harmonious, and balanced person in spiritual, moral, social, intellectual, physical aspects and so on.

According to Tilaar (2004), in recent times, we have been introduced to the "New" approach in school management that is referred to as school-based management (school-based management) or abbreviated as MBS. The emergence of this idea was triggered by dissatisfaction with education managers at the operational level of the limitations of the authority they had to be able to manage the school independently.

In Indonesia, the idea of implementing this approach emerged later in line with the implementation of regional autonomy as a new paradigm in the operation of the school. During this time, schools are only an extension of the central government bureaucracy to organize political education affairs. School managers do not have much leeway to operate their schools independently. All policies regarding the implementation of education in schools are generally held at the central government level or in part in vertical agencies and schools only accept what they are. What are the content of the education curriculum in schools is a central affair, the principal and the teacher must carry it out in accordance with the implementation instructions and technical instructions?



According to Mulyasa (2003), School-Based Management (MBS) is seen as an alternative to the general pattern of school operation that has been concentrating authority in the head office and regional offices. School-based management is a strategy to improve education by delegating the authority of important decision-making from the centre and regions to the school level. This school-based management is basically a management system in which a school is an important decision-making unit regarding the administration of education independently. School-based management provides greater control opportunities for school principals, teachers and parents for the education process in their schools.

According to Mulyasa (2007) The application of education management through SBM must also be able to provide guarantees so that teachers can develop their ideas in the tasks/staff of educators to develop themselves professionally as implementing education, especially at the instructional and institutional levels in carrying out the duties and responsibilities assigned to the teacher. In addition, MBS can also provide feedback on the contribution of teachers, including adequate work incentives in accordance with what is done or done, the development and reward of good teaching, taking into account the rights of the teacher they receive to contribute to decision making relating to them and improve relationships and good communication between teachers and other education parties such as parents and management and educational officials.

Some facts of the events above researchers conclude that some teachers are still lacking in mastering teaching materials, managing teaching and learning processes, managing classes and using technological media or learning resources. And the teacher is still less than optimal in leading the class, and managing learning interactions. But even so, there are still teachers in this school who have not been maximized to show and improve their competence as teachers. However, the school remains consistent always trying to make the teacher remain quality and improve their competence.

2. METHODS

This research is descriptive research with a qualitative approach. Research is based on the consideration that what will be sought is what will give a picture or describe the more conflicted social reality as a concrete social phenomenon. According to Sugiyono (2003), qualitative research is data in the form of words, schemes and images. This research activity was carried out to get the desired data in accordance with the problems to be discussed. Judging from the type of data in this study, the author uses a qualitative approach. What is meant is knowing or describing the reality or event that will be examined by describing in the form of words and language, in a special context that is natural and by utilizing various scientific methods.

Qualitative research does not use population and samples because this study is sourced from data. Determining data sources in qualitative research is one of the important steps expected so that the data is precise and useful for problem-solving in this study.

The data sources needed in this study are as follows:

1. Primary data source

Primary Data Sources are data sources obtained by researchers directly from informants relating to the problems to be examined. Primary data is data obtained or collected directly in the field by people who conduct research. In this study, primary data was obtained from interview data with school principals, teachers, and staff of SMK Mahyal Ulum Aceh Besar.

2. Secondary data

Secondary data is data that does not directly provide data to data collectors, for example through other people or writing. This data is usually in the form of personal data, photographs of activity documentation to official documents from various government agencies. In connection with secondary data that is expected to have a connection with the focus of research, among others, documents on students, personnel, facilities and infrastructure, school achievements and so forth.



Method of Data Collection

The determination of choosing a method is one of the requirements for the success of the research, because the quality of the research results depends on the quality of the data obtained. To obtain valid data and can be accounted for, this research uses methods: observation, interviews, and documentaries.

- a) According to Arikunto (2006) Observation is the basis of all science. Scientists can only work based on data, namely the facts about the world of reality obtained through observation. In this study, the observation method was used to collect by observing the research location and the environment around the Mahyal Ulum Aceh Besar Vocational School.
- b) Interview is a way of collecting data used to obtain information directly from the source. The interview technique used is a structured interview means an interview where the researcher when conducting face to face with respondents uses the interview guidelines that have been prepared previously. In this case the author will conduct direct interviews with the Principal of Mahyal Ulum Aceh Besar Vocational School.
- c) According to Sugiyono (2012) Documentation is intended to obtain direct data on the place of research including relevant books, activity reports, photographs, and data that are relevant to research. The document is a record of events that have passed. Researchers collect documents that can be in the form of writing, pictures, or monumental works from someone.

Data collection instrument

The research instrument is a tool used to measure the events (research variables) of nature and social observed. Research is a tool or facility used by researchers in collecting data so that the work is easier, and the results are better, in the sense of more careful, complete, and systematic so that it is easier to process.

The instrument in this study was the writer himself. The author prepares interview guidelines containing questions that are tailored to the subject matter in the study and addressed to the Principal of Mahyal Ulum Aceh Besar Vocational School. The subject matter can develop if the writer finds other information related to the principal. The problem during the interview took place.

Data analysis methods and data analysis

Data Analysis Method Namely the process of searching and compiling systematically data obtained from the results of interviews, field notes and documentation by organizing data in the category, describing it into units, arranging into patterns, choosing which is important and then analyzed and concluding so that Easy to understand yourself and others.

Data analysis tools in this study are qualitative descriptive analysis. Qualitative descriptive analysis is data collected in the form of words, images, and not numbers so that the research report will contain data quotes to provide a picture of the presentation of the report. The data comes from the interview, photos, and personal documents.

With the presence of qualitative descriptive methods, data analysis techniques are carried out through 3 stages, namely:

- a) Data reduction, namely the process of selecting, centralizing attention to simplification, abstracting and transformation of raw data or rough data that arise from written records in the field. In other words, the data reduction process is carried out by researchers continuously when conducting research to produce as much data as possible.
- b) Presentation of data, namely the preparation of complex information into a systematic form, so that it becomes more selective and simple and provides the possibility of drawing data conclusions and taking action. With this data presentation, the researcher is ready with simplified data and produces systematic information.



- c) Conclusion, which is the final stage in the data analysis process. In this section the researcher expresses the conclusions of the data that has been obtained from observations, interviews/interviews, and documentation. With the conclusion the researcher will feel perfect because the resulting data is really valid or maximum.

3. RESULTS & DISCUSSION

a. Educator/teacher

Teachers who are often also called educators, are one of the elements in the world of education that plays an important role in giving guidance to students, especially in Mahyal Ulum Aceh Besar, is expected can give professional attention and guidance with the use the right method to create a conducive atmosphere in learning process.

To be able to carry out the learning process well, the condition of the educator and students needs to be known. The situation of educators and students at Mahyal Ulum Aceh Besar is as follows:

Table 1. The condition of the teacher/staff

Teacher/staff				Amount
Still		Not fixed		12
PNS	Non PNS	PNS	Non PNS	
Men	Women	Men	Women	
3	-	-	9	

Source: SMK Mahyal Ulum Aceh Besar

b. Students

In the world of formal education, students are objects or targets mainly to be educated, students are one of the basic components in an educational institution.

Table 2. The condition of students and class school years 2020/2023

Class/ Program	The number of students	
	Men	Women
X TKJ	58	
X TKJ Women		86
X TSM	97	
XI TKJ	78	
XI TKJ Women		107
XI TSM	93	
XII TKJ	128	
XII TKJ Women		130
XII TSM	95	

Source: SMK Mahyal Ulum Aceh Besar



From the table above, it can be concluded that a greater number of male students are interested in the TSM major because they like the subject and the motorbike engineering vocational major is more dominant among female students.

A. Implementation of School-Based Management in Empowering Teacher Competencies at Mayal Ulum Vocational School, Aceh Besar

In an educational institution/institution, whether the institution is under the auspices of the government (State) or independent (Private), primary, secondary or tertiary level, of course requires good (effective and efficient) school management. Because good management is expected to contribute to improving the quality of education, it will directly influence and determine the effectiveness of the curriculum, learning equipment, teaching time and the learning process.

Erma Suryani, S. Pd as Principal at Mahyal Ulum Aceh Besar Vocational School said that:

"The form of implementing SBM in this school is to give authority and responsibility to teachers and we never hinder teachers who want to take part in activities as long as the activities can increase students' insight, for example the teaching and learning process activities are carried out outside the school which are related to learning material".

The form of implementing school-based management as discussed by the Principal above is giving authority and responsibility to teachers to improve their competence both in presenting material, managing classes, being able to conduct evaluations at the end of the lesson, to understand the extent of the teacher's ability to understand students. and the extent to which students are able to understand the material.

Cut Meilisa, S. Pd, as Deputy Principal said that:

"By implementing this concept, in this case the SBM concept, we as educators will be given full responsibility to plan, implement and develop school programs so that the desired goals can be achieved."

Meanwhile, to focus more on goals, Mahyal Ulum Aceh Besar Vocational School focuses on the goals of implementing school-based management by advancing several indicators, including improving the quality of education through school independence and initiative in managing and empowering available resources; increase the awareness of school residents and the community in the implementation of education through participatory decision making; increasing school responsibility to parents, the community and the government regarding the quality of their schools; increasing healthy competence between schools regarding the quality of education to be achieved.

B. Empowering Teacher Potential at Mahyal Ulum Vocational School, Aceh Besar

1. Teacher competency in curriculum management

Erma Suryani, S.Pd as the Principal of Mahyal Ulum Vocational School, Aceh Besar, said that: "in



curriculum planning, teachers play a very important role, because the teachers will implement the curriculum."

"The teachers at this school are directly involved in implementing the curriculum, because the teachers know what the needs of their students are. And teachers here are given the authority to adapt the existing curriculum to the needs at Mahyal Ulum Aceh Vocational School. Zahrina, S. Pd, as a Mathematics teacher at Mahyal Ulum Vocational School, Aceh Besar, confirmed the statement from the Principal and said that: "it is true, the teachers at this school are involved in planning, implementing and curriculum development."

In curriculum planning, the principal and teachers here formulate the syllabus and teaching program. Meanwhile, in implementing the curriculum, for example, in the implementation of teaching and learning activities, students can take part in activities related to subjects which they think are lacking, to face the UAS/UAN class III, additional hours of lessons (tutoring) are held, while for classes I and II if lacking in mastery of the material, a remedial/improvement program is carried out.

2. Teacher Potential in Education Personnel Management

Management of teaching staff at the Mahyal Ulum Aceh Besar Vocational School is an activity to determine employee needs, in this case what is meant is determining teachers and employee staff. The management of teaching staff at the Mahyal Ulum Aceh Besar Vocational School is carried out through recruitment activities, namely by seeking and obtaining as many prospective employees who meet the requirements as possible and then selecting the best and most capable candidates.

This effort is a manifestation of the Implementation of School-Based Management to obtain teachers and staff as human resource components who will later work at Mahyal Ulum Vocational School, Aceh Besar. Educators who have been accepted will later receive employee coaching and development through training to improve, maintain and improve employee performance.

The results of interviews regarding how to recruit and select teachers and staff are as follows.

Mrs. Erma Suryani, S.Pd said that:

"The school in recruiting and selecting teachers and staff means that if there is a subject where there are not enough teachers, the school will recruit the prospective teachers, based on the readiness of the prospective teachers both physically and mentally, as well as their commitment to developing the school."

Safrina, S. Pd as a BK teacher, said that:

"In this school, both permanent and honorary teachers are required to undergo training."

The system used for training at Mahyal Ulum Aceh Besar Vocational School is by using a rolling system, meaning that each permanent and honorary teacher has the same opportunity to participate at different times/alternately. With training, each teacher has knowledge insight from the training they have participated in, apart from that, each teacher can share with other teachers regarding the content of the training so that all teachers can apply the knowledge they have obtained to be applied to the learning system at Mahyal Ulum Vocational School, Aceh Besar with a better learning pattern. innovative, and creative in accordance with the



learning curriculum.

Dedi Saputra, S. T. as an employee/staff of SMK Mahyal Ulum Aceh Besar confirmed the statement from the Principal or teacher: "It is true, we are fully responsible for making the report." In personnel administration at Mahyal Ulum Vocational School, Aceh Besar, teachers are not involved, but before sending, teachers can check the data to avoid errors.

3. Teacher Potential in Student Management

In an effort to implement school-based management, Mahyal Ulum Aceh Besar Vocational School also carries out student management or student management, namely in the form of structuring and regulating activities related to accepting new students at Mahyal Ulum Aceh Besar Vocational School. Student management at Mahyal Ulum Aceh Besar Vocational School aims to organize various activities in the field of student affairs so that learning activities at the school can run smoothly, orderly and so that the goal of Mahyal Ulum Aceh Besar Vocational School is achieved to produce an Islamic generation that is not only superior in general insight but also in terms of religious values.

In this case, Erma Suryani, S.Pd as Principal of SMK Mahyal Ulum Aceh said that:

"The form of teacher involvement in the new student admission system is that all teachers are involved in the new student committee which can carry out technical tasks starting from recording admissions to reporting on task implementation, and during the orientation period the teacher's task is to make new students quickly adapt to the school environment new."

Cut Meilisa, S. Pd as Deputy Principal said that:

"It's true, in admitting new students we are directly involved. We want all new students to be able to know and get to know the teachers at Mahyal Ulum Aceh Vocational School."

Admission of new students is an important activity for a school because it is the starting point for determining the smooth running of school tasks and the educational relay process at school and the success of a school. Acceptance of new students at Mahyal Ulum Aceh Vocational School is carried out ahead of the new academic year through selection based on Al-Quran reading scores and knowledge scores.

4. Teacher Potential in Financial Management

Financial management is all activities related to structuring the sources, use and accountability of education funds in schools.

Erma Suryani, S.Pd said that:

"Teachers are not directly involved in financial management at this school, but there are several teachers who know information about financial expenses and income at this school."



Cut Meilisa added:

"Yes, at this school there are several teachers who know about financial administration at this school, including myself. "I myself have previously attended training related to financial management."

Educational support funds in the form of scholarships received by students to support their educational costs. Funds from the community in the form of tuition assistance/contributions, namely funds for students such as paying for uniforms, books, ATK, and transport. Apart from tuition fees, there are also development funds in various fields such as facilities and infrastructure, learning tools, media, and so on. Contributions from the local regional government are donations received by the school from the local regional government where the school is located. is at. Voluntary funds are usually offered to parents of certain students who are generous and willing to make voluntary donations without any strings attached.

4. CONCLUSION

Based on the data presentation and discussion of the research results described in the previous chapter, the following conclusions can be drawn from this research:

1. The results of implementing MBS at Mahyal Ulum Vocational School, Aceh Besar are effective because the results obtained from implementing MBS can support the achievement of school programs.
2. Empowerment of teacher potential at Mahyal Ulum Aceh Besar Vocational School has been carried out well, this can be seen from the perspective of teacher potential in curriculum management, teacher potential in staff and student affairs, teacher potential in financial management, as well as teacher potential in facilities and infrastructure. Teachers are involved whenever there are activities or programs that support the school to become better and the school's goals to be achieved.

5. ACKNOWLEDGMENTS

Thank you to the Principal of Mahyal Ulum Aceh Besar Vocational School, teachers, staff and all students for supporting in the data collection of this research.

REFERENCES

- Arikunto, S. (2006). *Prosedur penelitian suatu pengantar Praktik*. Jakarta: Bina Aksara. ISBN: 978-979-518-998-5
- Sudrajat, H. (2005). *Manajemen peningkatan mutu berbasis sekolah*. Bandung: CV. Cipta Cekas Grafika.
- Mulyasa, E. (2003). *Manajemen berbasis sekolah*, Jakarta: Rosda.
- Mulyasa (2007). *Manajemen berbasis sekolah: konsep, strategi dan implementasi*, Bandung: Remaja Rosdakarya,
- Sugiyono (2003). *Metode penelitian pendekatan kuantitatif, kualitatif dan R&D*. Bandung. Alfabeta
- Tilaar. H. A. R (2004). *Manajemen pendidikan nasional: kajian pendidikan masa depan*. Bandung: Rosdakarya.



THE ROLE OF WOMEN INDIGENOUS COMMUNITIES IN EDUCATION

(An Overview Of Women's Roles In Kasepuhan Sinar Resmi)

Titi Nurhayati¹, Uyu Wahyudin², Iip Saripah³, Jony Rahmat Pramudia⁴

¹Politeknik Kesehatan Kemenkes Bandung,

¹²³⁴Universitas Pendidikan Indonesia

*titinurhayati@upi.edu

ABSTRACT

The role of women is very important in instilling the noble value of maternal culture and the noble value that should be preserved even though the era has changed where there are challenges of modernization. Response to globalization while maintaining the noble value of culture requires efforts to instill and form characters that can adapt to changes by maintaining local wisdom because education is a civilizing process that cannot be separated from the role of women to make it happen. This field research uses survey methods or observations in the field or research location to obtain data as a primary source.

While the secondary data is sourced from excavation and search of books, internet, FGD and, other records that are considered to have a relationship and can support this study. The research approach used is a sociological, historical, and normative approach. The role of women can be seen in daily life in the indigenous community of Kasepuhan Sinar Resmi in maintaining and implementing the noble cultural values of the community "ibu bumi bapa langit, guru mangsa" which basically in their lives, people should preserve nature in rice culture community.

Keywords: Indigenous, women, culture

1. INTRODUCTION

Indigenous women as part of the native community have an extraordinary role in nation building. In addition to being the frontline protector and custodians of the cultural values and local wisdom of the Nusantara archipelago, they also have a major role in economic resilience, play a social role, and preserve the natural environment. Unfortunately, many indigenous women still receive stigma and discrimination due to the strong patriarchal culture, are less involved in the development processes, experience gender-based violence, and are entangled in poverty, and other problems.

This study will illustrate how the role of women in indigenous communities in maintaining the noble values of culture and custom. Empowerment is the degree of autonomy and self-determination within communities and societies. It enables them to represent their interests in a responsible and self-determined manner, acting on their own authority. It is the process of becoming stronger and more confident, especially in controlling one's life and claiming their rights. Empowerment is the process of obtaining basic opportunities for marginalized people, either directly or through the help of non-marginalized people who are willing to share their own access to those opportunities. It also includes actively thwarting attempts to deny those opportunities. Empowerment also includes encouraging, and developing skills for self-sufficiency, focusing on eliminating future need for charity or welfare within individual groups. Rappaport (1984) states: "Empowerment is seen as a process: the mechanism by which people, organizations, and communities gain mastery over their lives." This process may be difficult to initiate and implement effectively. Empowerment in the context of society is the ability of individuals who compound with society and who build the empowerment of the community concerned. A society where most of its members are physically and mentally healthy, and well-educated will certainly have high empowerment (Awang 2010:45).

Limited knowledge and differences between men and women are increasingly exacerbating women in Indonesia. This makes women powerless. For example, in terms of customs that apply in indigenous communities, namely patrilineal, matrilineal and bilateral. In patrilineal societies such as Batak ethnicity,



In Lampung and Flores ethnicities,, the son will be the heir as well as the successor head of the father's family. Even though women play a dominant role in making a living by taking care of fields, houses and other workers. In decision-making, women have no right to give advice or opinions. Whereas (the male uncle) has the governing power, often the uncle also takes part in the inheritance and even controls it. In bilateral societies, such as in Java, it is more important to accept the ragil or smallest child who used to accompany the parents.

Facts and Analysis '*Membumikan Mimpi Tujuan Pembangunan Berkelanjutan dalam Tinjauan Perempuan Adat*' in 2020 which shows that as many as 67.4% of indigenous women have never been involved in development consultations that take place in their respective indigenous territories, 33% stated that they have or have had difficulties in obtaining nutritious food, 87.8% perceived that poverty still occurs in their communities, 38.9% stated that child marriage still occurs in indigenous communities, and 14.6% stated that physical/sexual violence from husbands or boyfriends experienced by indigenous women. This analysis is the result of a study conducted by "PEREMPUAN AMAN" with 1,116 indigenous women as participants and involving 31 indigenous communities in 44 villages.

2. METHODS

This field research uses observations in the field or research location to obtain data as a primary source. While the secondary data is sourced from excavation and search of books, internet, FGD and, other records that are considered to have a relationship and can support this study. The research approach used is a sociological, historical, and normative approach. The historical sociological approach is a way of approaching a phenomenon that occurs in society by giving more importance to the patterns of relationships in the site of social life and the normative approach is used to see whether there is a match between the data obtained from the results of research with customary norms. Meanwhile, data collection is carried out by interviews and questions and answers systematically, both directly and indirectly with respondents. The observation was conducted by direct observation of matters related to the object and subject of research by systematically recording the phenomenon of the phenomenon being studied. Observation is a conscious effort carried out systematically, with standardized procedures.

3. RESULTS & DISCUSSION

The indigenous people of Kasepuhan Sinar Resmi are the indigenous community of Sirna Resmi Village in Cisolok District in Sukabumi Regency. It is located in the vicinity of Mount Halimun Salak National Park. Its hereditary stories reveal that the Kasepuhan community is the remnant of the Pakuan Pajajaran Kingdom.

The indigenous people of Kasepuhan in this area consist of three areas i.e., Cipta Gelar, Sinar Resmi and Cipta Mulya indigenous people located in Cisolok, Sukabumi area, which is one of the traditional villages of Kasepuhan Banten Kidul that still strongly maintains cultural preservation in the area that includes the Ciletuh Geopark.

The indigenous people of Kasepuhan Sinar Resmi is a community with all its local wisdom that in their daily lives carry out traditional social culture that refers to the characteristics of Sundanese culture in the 18th century. Kasepuhan Sinar Resmi is one of eleven kasepuhan in South Banten region. This community lives from generation to generation, this identity is still maintained and strengthened as a manifestation of gratitude and respect for ancestors born from an uninterrupted historical process in the course of time to continue to uphold the dignity and right of origin as cultural identity and national cultural heritage. With the system handed down by their ancestors, the indigenous people of Kasepuhan Sinar Resmi organize their entire lives both as individuals and as distinctive social and religious groups, which differ from one another. These systems are maintained and fought for as a source of the spirit of life contained in the customary system that is still cultivated and preserved.

Along with the times and the rate of growth in all fields and in response to this, one of the priority programs within the Indigenous People Union of Kasepuhan Banten Kidul is holding the Seren Taun Traditional Ritual Event which is a responsive attitude to the aspirations of the indigenous people around Kasepuhan Sinar Resmi, as evidence of an active role in the framework of efforts to improve the quality of human resources and



respect for the ancestral heritage by maintaining and preserving the characteristics of its Customary Culture. The basic foundation of Adat cannot be separated from the support of regional or central premarital programs that should be developed in the fields of: 1) strengthening brotherhood, 2) awareness of religious education, character and maintaining cultural customs.

The indigenous people of Kasepuhan Sinar Resmi have never been separated from several philosophies in life that have been integrated into the soul of their people. The philosophy that guides people's lives. In social life, the basis of Kasepuhan customary law is the philosophy of life, "*tilu sapamilu, dua sakarupa, hiji eta eta kenah*", which literally means 'three in one face, two are similar, forms, that one is that too'. This value system contains the understanding that life can only take place well and peacefully if it is fulfilled with three conditions, namely: *tekad*, *ucap* dan *lampah*, (intention or thought, speech and action) should be in harmony and accountable to *incu-putu* (descendants of kasepuhan citizens) and elders (parents and ancestors) soul, body and behaviour, should be consistent and ethical. The traditional beliefs of *sara*, *nagara*, and *mokaha* should be harmonious and not contradictory to one another. *Sara* means that society will always respect ancestral traditions towards the creator of the universe. *Nagara* (Sundanese) means that people will always follow the regulations set by the state. *Mokaha* (Sundanese) means everything that regulates social life between humans

In addition to guidelines in socializing between communities, the Kasepuhan community has interactions with nature. Through the philosophy of "Mother Earth, Father Sky, Queen Land ", the people should maintain the integrity of the earth and everything in it so that the balance of nature is maintained. Based on these philosophies, Kasepuhan community has the belief to continue to maintain what has been passed down by their ancestors, both maintaining relationships with other humans and maintaining relationships with nature. One of the ancestral legacies that is still applied in Kasepuhan people's life is the agricultural system of fields/huma (*rurukan*) and rice fields which are carried out once a year. This agricultural system is not just an agricultural activity that generally leads to productivity, but it is more oriented towards a strong interaction between society and God, society and society and nature. In managing the agricultural system, from preparing the land to resting the land, it is always followed by a series of accompanying traditional ceremonies or rituals that have been inherited by the ancestors.

The people of Ciptagelar, Sinar Resmi and, Cipta Mulya are communities with a culture of fields and a mixture of rice fields, so they can be called rice culture people. Rice culture people believe that rice is just like humans. Rice is considered to have a spirit and soul and its life cycle and body parts are similar to those of humans. Growing rice is not a livelihood for the Kasepuhan people, but rather a part of life. The characteristics of the community are self-sufficient, peaceful, and highly respectful of manners. Their outlook on life and behavior cannot be separated from the rites of rice culture. This rice culture community has some unique values and beliefs about rice. In the twenty general principles of rice culture societies in South, Southeast and East Asia according to Hamilton (2003) in Kusdiwanggo (2017), one of them explains the relationship between rice and women i.e. the fertility of the Goddess of Rice is manifested in the fertility of women, so the personification of the Goddess of Rice is a woman. In Kasepuhan community, local food institutions play a major role in realizing the family economy. This can be seen in the large role of *leuit* for the community. *Leuit* is not only a place to store agricultural products but also a household food security. The process of agricultural exploitation also pays attention to the role of women. Agricultural activities provide balanced tasks to women so their role in development is quite large. Local communities also determine the direction of sustainable independence. Local communities traditionally have rules that preserve the environment so that resources are preserved from damage. Kasepuhan community only has one harvest cycle a year. This agricultural pattern is based on the traditional view that land is associated with a mother who gives birth once a year.

Traditional rituals performed

Traditional rituals carried out in kasepuhan prioritise the role of women in maintaining cultural preservation, among others:

Procession for Field (Huma) and Rice Field Agriculture. The agricultural system in Kasepuhan Sinar Resmi is divided into field (*huma*) and *padI* fields. Both have differences in the process from preparing the land for cultivation to resting the land that has been used.



There are several main activities that must be carried out by Kasepuhan people, namely:

- 1) Ngaseuk: the start of rice planting activities by putting seeds into the aseuk hole.
- 2) Beberes Mager: a ritual to protect the rice from pests. This activity is carried out by hunters in Abah's field (the field owned by the kasepuhan) by reading prayers. This activity is carried out around the month of Muharram.
- 3) Ngarawunan: a ritual to ask the contents of rice to grow fertile, perfect and without interference. This activity is carried out by all incu putu to ask for prayers to abah through the pamakayaan section. Ngarawunan is performed after the rice is three months to four months old.
- 4) Mipit: Rice harvesting is first done by Abah as a sign of the harvest season.
- 5) Nutu: Pounding the harvested rice.
- 6) Nganyaran: cooking rice using the first harvested rice, two months after the harvest.

After all agricultural activities are completed, a Tutup Nyambut activity is held which signifies the completion of all agricultural activities in the rice fields marked by a celebration. One of a series of important agricultural activities regarding the main rice field farming system after Seren Taun ceremony is Turun Nyambut. Turun Nyambut activity is a sign of the start of the period to plough the rice fields and prepare the land to be planted with rice again. This ceremony is done to celebrate the harvest of that year and as entertainment for people who have worked for one year in agriculture. The series of events began with deliberation first involving all incu putu to determine the amount of budget needed. After the deliberation is over, a handover of the pilgrimage is carried out. The overtime kolot (village head) and ranggeyan's head gathered to discuss the amount of cost borne per person for the concurrent costs to be handed over to Abah. After the handover of the pilgrimage, Abah made a pilgrimage to the karamat (astana) of his ancestors

After the deliberation is complete, the handover of the Ponggokan is carried out. Kolot lembur (head of the village/hamlet) and the head of the Ranggeyan gather to discuss the amount of costs borne per person for Serentaun costs to be handed over to Abah. After Serah Ponggokan, Abah makes a pilgrimage to the Karamat (Graveyard) of his ancestors.

Ibu Bumi, Bapak Langit, and Guru Mangsa vs Food Intensification Program

The main livelihood of the community is farming both in the fields and rice fields. The agricultural pattern of the Kasepuhan people relies on hereditary knowledge about how to farm which depends on the existence of beliefs in nature. The concept of ibu bumi bapa langit, (*The mother is interpreted the same as the earth, while the father is likened to the sky*, and Guru mangsa.its means teacher prey”

Kasepuhan people grow local grains which they call pare ageung. They recognize not less than 100 species of rice. But generally, the community utilises around 50 species. Kasepuhan Sirna Resmi people still maintain the traditional way of farming. They tile the land and plant it once a year. They did this in honour of Mother Earth. This earth is a living thing. Therefore tradition teaches about agricultural rites. Before cultivating the land, they perform a ceremony. According to their beliefs, to cultivate the land, it is necessary to make an excuse since this earth is a creature that has been polluted. That's what they do. Officially their religion is Islam and there is a mosque in the middle of the village. But they still give rites or offerings to Dewi Sri. Rice in the concept of kasepuhan is interpreted as Dewi Sri (Mother), so starting from planting to harvesting and cooking and eating it using certain respect procedures.

As Berkes states, the main strengths of local knowledge systems in this aspect are 1) Self-interest, in the sense that local knowledge is an important key to conservation efforts, because its strength comes from 'within' and not from 'outside'. 2. Accumulative knowledge systems, in the sense that local knowledge is an accumulation of centuries of ecological adaptation patterns of local communities 3) Knowledge has the potential to help design effective resource conservation efforts, due to local support and high levels of adaptation and practicability considerations.

The six dimensions are: 1) social development, 2) economic development, 3) political development, 4) cultural development, 5) environmental development, 6) personal/spiritual development.



However, other societies will reflect a different picture and require different priorities in the development process. The important point is that the six aspects of community development are very important and to have a truly healthy and functioning society, it is necessary to achieve a high level of development for all six dimensions as a whole. Community development program developers should pay attention to these six dimensions and the goal should be to maximize development on all dimensions. Schuler, Hashemi and Riley (Edi Suharto: 2008) developed several empowerment indicators, which they referred to as the Eindex or empowerment index:

a) Freedom of mobility: the ability of the individual to go outside the home or region of residence, This level of mobility is considered high if the individual is able to go alone. b) The ability to purchase 'small' commodities: the ability of the individual to purchase items of daily needs (rice, kerosene, cooking oil, seasonings); needs himself. For the above indicators, high points are awarded to individuals who can make their own decisions without asking their spouse for permission; especially if they can buy these items using their own money. c) Involved in making household decisions: able to make decisions alone or with husband/wife regarding family decisions, d) Relative freedom from family domination, e) Legal and political awareness.

Nugroho (2008) states that there are four empowerment indicators i.e.:

- 1) Access, in the sense of equal rights in accessing productive resources in the environment.
- 2) Participation in utilising these limited assets or resources.
- 3) Control, i.e. that men and women have equal opportunities to exercise control over the use of these resources.
- 4) Benefits, that men and women should equally enjoy the results of resource utilization or development together and be equally successful.

To know the focus and objectives of empowerment operationally, it is necessary to know various empowerment indicators that can show whether someone is empowered or not. So that when an empowerment program is delivered, all efforts can be concentrated on what aspects of the target change (e.g. poor families) need to be optimized.

UNICEF (nd) proposes 5 dimensions as a benchmark for the success of community empowerment, consisting of well-being, access, critical awareness, participation and control. The five dimensions are dynamic categories of analysis, each other is related synergistically, mutually reinforcing and complementary. Here is a more detailed description of each dimension: 1) Welfare. This dimension is the level of community welfare measured by the fulfilment of basic needs such as clothing, shelter, food, income, education and health. 2) Access. This dimension concerns equity in access to resources and the benefits generated by the presence of resources. The absence of access is a barrier to improved welfare. The gap in this dimension is caused by the absence of equal access to resources owned by those in higher social classes compared to those from lower social classes, the powerful and controlled, the centre and the periphery. Resources can be time, energy, land, credit, information, skills, and so on. 3) Critical awareness. The inequality that occurs in people's lives is not a natural order that has existed for a long time or is solely God's will but is structural as a result of institutionalized discrimination. Community empowerment at this level is in the form of public awareness that the gap is a social formation that can and must be changed. 4) Participation. Empowerment at this level is when the community can be involved in various institutions in it. That is, the community takes part in the decision-making process and thus their interests are not neglected. 5) Control. Empowerment in this context is if all levels of society take control of existing resources. That is, with available resources, all levels of society can fulfil their rights, not just a few people in power who enjoy resources, but all levels of society as a whole. The community can control and manage its resources. Adapting Dewi Kumiasih's (2010) presentation on Sundanese leadership, in general, it can be described by the characteristics of totalitarian transcending, transforming entrepreneurship, and charismatic transactional. These three aspects are associated with four dimensions of power: power within, power to, power over and, power with. An interesting thing found in Sundanese leadership is the proverb "nyalindung ka gelung" whose meaning is to depend on others, not have an attitude. The broader meaning of the expression "nyalindung ka gelung!" is not willing to try, to rely on the income of the wife, or parent-in-laws. "Nyalindung" means to take shelter, surrender, or entrust life to something or someone because those who use "gelung" are usually women



(wives). This interpretation indicates that when the leadership of the husband or man does not run optimally, women have extraordinary power to maintain the continuity of the organization. The potency of women's leadership if it is given, can make a significant contribution.

In the sub-ethnic archipelago, there are agrarian communities that began to emerge after a period of hunting and gathering. There are four phases of prehistoric life in Indonesia (Vroklage in Kennedy, 1939). Based on the four phases of prehistoric life in Indonesia, the third phase began to realize agrarian life (Kusdiwanggo, 2017). Farming on dry land is a continuation of horticultural life (gathering) while farming on wetlands begins after planting on dry land. People who grow crops on dry land are field farmers and in wetlands are rice field farmers.

During the third phase, Indonesian people began to stop moving. Both field farmers and rice farmers decided to settle down and began to pay attention to the environment around them. Agrarian society lives not far from its agricultural environment (Boelaars, 1984). The pattern of life of the Indonesian people in each phase shapes the mentality of the people in that phase. The shape of the house with its layout, the mass layout of the building, and the spatial pattern of the settlement are formed from the culture of its inhabitants (Rapoport, 1969).

4. CONCLUSION

The role of women in indigenous communities is very important to maintain the culture that is carried out for generations. The role of women as mothers in the family makes them the main and first teacher to instill and preserve the noble values of the culture as the philosophy adopted, i.e. *ibu bumi bapa ratu* in social life to always uphold "*tilu sapamilu, dua sakarupa, hiji eta eta keneh*", Rice in Kasepuhan concept is interpreted as Dewi Sri (Mother), so from planting to harvesting and cooking and eating it uses certain respect procedures that cannot be separated from the large role of women. The role of women greatly influences the offspring of the next generation called *incu putu* in instilling noble cultural values that believe in the creator, submit to government regulations and coexist with the community well as the philosophy of *Sara Nagara Mokaha*.

REFERENCES

- Aliansi Masyarakat adat Nusantara. (2020). *Symposium pentingnya penjaminan hak Perempuan*
<https://Perempuan.aman.or.id>
- Boelaars. (1984). *Kepribadian Indonesia modern*, Jakarta PT Gramedia
- Ciptagelar (1984) *Studies in empowerment introduction to the issue prevention in human services* 3(2). USA
- Dewi Koerniasih 2010. *Kepemimpinan politik orang sunda*, Majalah Ilmiah Unikom (5)123
- Kennedy, R. (1939). The "Kulturkreislehre" Moves into Indonesia. *American Anthropologist*, 41(1), 163-169.
- Kusdiwanggo (2014). *Fenomena sakuren komunitas adat*. Ciptagelar temu ilmiah IPLBI
- Kusdiwanggo (2017). *Rekonstruksi pangheucakan sebagai bangunan agriculture Masyarakat budaya padi*
- Nugroho.MD,2008 *Pergeseran jender pada interior rumah tinggal dikawasan jeron benteng Yogyakarta*, lintas ruang 2
- Priadi, S (nd). *Kepemimpinan perempuan bernilai kesundaan dibidang Pendidikan*, Universitas Negeri Yogyakarta, <https://staffnew.uny.ac.id>
- Rapoport, A. (1969). *House form and culture*, Englewood Cliffs, NJ Prentice -hall
- UNICEF (nd) *Progress for every child in SDG era (Executive Summary)*.



DIFFERENCES CAPABILITY OF STUDENTS IN COLLABORATIVE ONLINE LEARNING

Ratu Amilia Avianti^{1*}, Zulfiati Syahrial², Mahdiyah³, C. Rudy Prihantoro⁴, Rany Anggrainy⁵, Diah Armeliza⁶
¹²³⁴⁵⁶ Universitas Negeri Jakarta, Jakarta, Indonesia
*ratuamilia@unj.ac.id

ABSTRACT

The online and offline learning strategy accompanied by giving assignments at the end of Mechatronics learning so far has had several records, one of the most prominent is that student involvement in the learning process tends to continue to decline. Research activities begin with; (1) randomly selecting two classes from a total of three Mechatronics lecture classes, and assigning one class as the experimental group, and the other class as the control group; (2) giving an initial test (pre-test) to students in the experimental group/class and students in the control group; (3) applying Collaborative Online Learning strategies in the experimental class, and direct instructional online learning strategies in the control class; (4) measuring the Mechatronics learning outcomes of students in the experimental class and students in the control class. Collaborative online learning can have a better impact on improving Mechatronics learning outcomes. This is because collaborative online learning encourages students to be more active, gain more knowledge, and get students used to discussing. This nature of offering learning to share information will give students the courage to express themselves both behaviorally and verbally. There is an interaction effect between online learning strategies and prior knowledge of Mechatronics learning outcomes. This means that online learning strategies and prior knowledge are two factors that determine student Mechatronics learning outcomes. Therefore, in planning learning, teachers need to pay attention to the individual characteristics of students so they can determine appropriate learning strategies. An important note in this research shows that collaborative online learning is not only appropriate to teach for students who have high initial abilities but is also appropriate to teach for students who have low initial abilities.

Keywords: higher education, collaborative online learning, learning outcome, learning strategy, mechatronic

1. INTRODUCTION

Higher education in Indonesia applies for practical learning internships in the business / industrial world. Especially vocational education is carried out for one semester, causing problems in the process of implementing theoretical courses in class. This two-year internship program is carried out using *online learning methods*. The learning results so far have been obtained using formative and summative evaluations in the form of multiple-choice tests. Although the results are different between the pre-test and post-test, it is not yet conclusive whether the student will be able to solve the problem. Therefore, the learning method needs to combine online learning with problem-based learning, which is then evaluated with problem-solving test instruments. But from several studies on MOOCs, online learning methods on MOOCs experience many who drop out of school. Therefore, the combination of learning methods is also with collaborative learning methods. The research that has been conducted aims to obtain information on the influence of collaborative online learning in problem-solving on learning outcomes shown by learning engagement, and answers to solutions to problems.

Collaborative learning can conceptually be adapted from the concept of cooperative learning. Referred to as cooperative learning if this model is applied to elementary and secondary education students/students, while if this model is applied to adult learning (students) it is called *Collaborative learning*. Thus, in this study, the notion of *collaborative learning* can be explained by the concept or understanding of *cooperative learning*. According to Arends (2009), *cooperative learning* is a learning model characterized by a cooperative structure of



tasks, goals, and feedback. Learners in cooperative/collaborative learning are encouraged, directed, or conditioned to work on the same task together and they must coordinate their efforts to complete a task.

Two or more individuals depend on each other for the rewards they will share if they succeed as a group. Collaborative learning has the following learning features; (a) learners work in teams to achieve learning objectives; (b) teams consisting of low, medium, and high achieving learners; (c) the *reward* system is group or individually oriented. Collaborative learning has several variations of models, including; the Student Teams Achievement Divisions (STAD) model, Jigsaw model, Group Investigation (GI) model, structural strategy model, Think-Pair-Share model, and Numbered Heads Together model.

Collaborative online learning (COL) is a synchronous online learning strategy, (*synchronous online*) in which the learning process is inserted into collaborative learning segments. The COL steps are as follows; (a) teachers open synchronous *online* classes using *video-conferencing* platforms; (b) Teachers deliver teaching materials online at a predetermined time to students in class (synchronous), with lectures, presentations, and question-and-answer methods; (c) The teacher divides students into 4 or 5 groups, and divides large classes into small classes as many as the number of groups in the class, and distributes the link of each class to the group that must be in that class; (d) The teacher assigns assignments to each group in each class that must be completed within a certain time during the online class; (e) The teacher visits each class via the shared class link and checks the progress of group assignments in each class; (f) Each group of students presented the results of their group work in a large class attended by all groups. The positive aspect of COL is cooperation and decision-making that influence each other giving rise to social dependence. These aspects include 1) communication, 2) the process of task distribution, 3) perceptions of other groups, and 4) work facilities (Shimizu, et.al, 2022).

2. METHODS

The research method is quasi-experimental. The research was conducted from January to June 2023 at Jakarta State University. The research design is as follows:

Table 1. Factorial Design Experiment Design 2x2

<div>Treatment Variables (A)</div> <div>Attribute Variables (B)</div>	Collaborative Online Learning Strategy (A1)	Direct Instructional Online Learning Strategy (A2)
High Starting Ability (B1)	A1B1 [Y]11k k = 1, 2, ..., n ₁₀	A2B1 [Y]21k k = 1, 2, ..., n ₁₀
Low Starting Ability (B2)	A1B2 [Y]12k k = 1, 2, ..., n ₁₀	A2B2 [Y]21k k = 1, 2, ..., n ₁₀

Information:

- A1 : student groups treated with *collaborative online learning strategies*
A2 : Group of students treated with *direct instructional online learning strategies*
B1 : Groups of students with high starting ability
B2 : Groups of students with low starting ability student group
A1B1 : Mechatronics learning outcomes with *collaborative online learning strategies* that have a high initial ability



- A2B1 : Mechatronics learning outcomes with *direct instruction online learning strategies that have high initial ability.*
- A1B2 : Mechatronics learning outcomes with *collaborative online learning strategies that have low initial ability.*
- A2B2 : Mechatronics learning outcomes with *direct collaborative online learning strategies that have low initial ability.*

Based on the types of research variables that exist, this experimental research was carried out using the *Treatment by Level experimental design* (Supardi, 2016, pp. 348-351). The dependent variable (Y) of this study was the learning outcome test score Mechatronics. The independent variable consists of two variables; (1) treatment variables, and (2) attribute variables. The treatment variable consists of an experimental variable and a control variable. An experimental variable is the collaborative online learning *strategy*, and a control variable is the direct online learning strategy. Attribute variable is the student's initial knowledge related to basic knowledge of Mechatronics. These attribute variables are divided into two categories, namely high initial knowledge, and low initial knowledge.

Students participating in mechatronics lectures in 2023 were respondents. There are 3 classes, namely 1 experimental class, 1 class as a control class, and 1 other class as a trial class. The number of respondents was 40 students, namely 20 students in the experimental class, and 20 students in the control class. The conceptual definition is the result of learning mechatronics is the ability of students after learning mechatronics theory in a certain time to be able to obtain cognitive competencies ranging from identifying problems, analyzing problems, designing, and demonstrating electronic control circuits in transmission systems and 1-phase electric motor rotation. The operational definition of mechatronics learning outcomes is the ability of students to meet the competence to elaborate the basic concepts of mechatronics, identify how sensors, actuators, and electronic-based controllers work, analyze mechanical, hydraulic, and pneumatic transmission control systems, design and demonstrate a series of motor rotation controllers 1 phase. The nine aspects of ability have different score weights, based on their cognitive level, to identify the weight 8%, demonstrate 10%, analyze 15%, and design 20%.

Table 2. Data on Initial Ability and Mechatronics Learning Outcomes based on Statistical Measures.

Initial Ability (B)		Online Learning Strategy (A)				Σ	
		Collaborative (A ₁)		Direct Instructional (A ₂)			
		X _i	Y _i	X _i	Y _i	X _i	Y _i
High starting Ability (B ₁)	N	10	10	10	10	20	20
	\bar{X}/\bar{Y}	63,19	80,32	61,81	72,70	62,50	76,51
	Mo	65,63	80,00	62,50	71,43	62,50	71,43
	Me	65,63	80,00	62,50	74,29	62,50	77,14
	SD	6,40	5,43	7,93	5,55	7,03	6,75
	Min	50,00	71,43	46,88	62,86	46,88	62,86
	Max	71,88	88,57	71,88	80,00	71,88	88,57
Low (B ₂)	N	10	10	10	10	20	20
	\bar{X}/\bar{Y}	56,25	74,29	59,03	76,19	57,64	75,24
	Mo	50,00	71,43	46,88	74,29	53,13	74,29
	Me	56,25	71,43	56,25	74,29	56,25	74,29



Initial Ability (B)	Online Learning Strategy (A)				Σ	
	Collaborative (A ₁)		Direct Instructional (A ₂)			
	X _i	Y _i	X _i	Y _i	X _i	Y _i
SD	8,12	6,55	10,18	7,00	9,05	6,65
Min	43,75	65,71	46,88	65,71	43,75	65,71
Max	68,75	85,71	75,00	88,57	75,00	85,57

Table 3. Summary of Hypothesis Test with ANOVA

Sumber Varians	JKy res	Db	RJK yres	Fo	F-table $\alpha = 0,05$
Antar A	98.00	1	98.00	9.64	4.20
Antar B	28.13	1	28.13	2.77	4.20
Interaksi A x B	103.67	1	103.67	10.20	4.20
Initial knowledge (X)	902.11	1	902.11	88.74	4.20
Deep	315.13	31	10.17		
Total	544.92	34			

^{**} = Significant ($F_{\text{calculate}} > F_{\text{table}}$ on alpha 0.05)

^{ts} = insignificant ($F_{\text{calculate}} < F_{\text{table}}$)

Information:

db = free degree

JK_{res} = Number of squares of residues

RJK_{res} = Average sum of squares of residues

The results of the calculation of variance analysis (Table 4.14) on the source of variance of AxB interaction significantly there is an interaction between learning strategies and initial abilities as evidenced by $F_{\text{calculate}} = 10,20 > F_{\text{table}} = 4,20$; then it is necessary to do further tests with the Tukey Test, and the calculation results are presented in Table 4.

Table 4. Summary of Advanced Tests with Tukey Tests

Criterion	Hypothesis	Q _{count}	Q _{table}	Decision
Rejected H ₀ if Q _c > Q _t Accepted H ₀ if Q _c < Q _t	H ₀ : $\mu_{11} \leq \mu_{21}$ H ₁ : $\mu_{11} > \mu_{21}$	6,33	4,41	H ₀ Rejected
	H ₀ : $\mu_{12} \geq \mu_{22}$ H ₁ : $\mu_{12} < \mu_{22}$	0,11	4,41	H ₀ Accepted



	$H_0: \mu_{11} \leq \mu_{12}$ $H_1: \mu_{11} > \mu_{12}$	1,47	4,41	H_0 Accepted
	$H_0: \mu_{21} \geq \mu_{22}$ $H_1: \mu_{21} < \mu_{22}$	4,96	4,41	H_0 Rejected

Table 5. Residual Average Test Calculation Results

No.	Group	\bar{Y}	\bar{Y} (Corrected)
1	A ₁	77.30	77.52
2	A ₂	74.44	74.22
3	B ₁	76.98	75.42
4	B ₂	74.76	76.32
5	A ₁ B ₁	80.32	78.31
6	A ₁ B ₂	74.29	76.74
7	A ₂ B ₁	72.70	71.58
8	A ₂ B ₂	76.19	76.86

Observational data shows student involvement in collaborative online learning and direct online learning groups as follows:

Table 6. Number of Student Activities

No.	Experimental Class		Control Class	
	A ₁ B ₁	A ₁ B ₂	A ₂ B ₁	A ₂ B ₂
1	30	28	14	14
2	30	30	13	14
3	31	30	13	13
4	30	32	17	16
5	31	32	16	16
6	30	30	17	16
7	30	29	15	15
8	31	30	14	14
9	32	32	13	13
10	30	30	12	12
Sum	305	303	144	143



No.	Experimental Class		Control Class	
	A ₁ B ₁	A ₁ B ₂	A ₂ B ₁	A ₂ B ₂
Average	55.45	55.09	26.18	26.00
Maximum	32	32	17	16
Minimum	30	28	12	12

Table 7. One Sample Statistics

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
A1B1	10	30,50	,707	,224
A1B2	10	30,30	1,337	,423
A2B1	10	14,40	1,776	,562
A2B2	10	14,30	1,418	,448

Table 8. One Sample Test

One-Sample Test						
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
A1B1	136,400	9	,000	30,500	29,99	31,01
A1B2	71,639	9	,000	30,300	29,34	31,26
A2B1	25,634	9	,000	14,400	13,13	15,67
A2B2	31,887	9	,000	14,300	13,29	15,31

3. RESULTS & DISCUSSION

The results of the variance analysis test and Tukey test can be explained as follows:

1. Differences in mechatronics learning outcomes between students who use *collaborative online learning* and *direct online learning strategies*

The results of the ANOVA calculation (Table 3) on the source of variance between A show that the value $F_{\text{calculate}}$ as big as $9,64 > \text{value } F_{\text{table}}$ By 4.20 at $\alpha = 0.05$, the null hypothesis is rejected Or there are differences in mechatronics learning outcomes between students taught with collaborative online learning and direct online learning strategies. Furthermore, the acquisition of the average score of learning outcomes of student groups taught with *collaborative online learning strategies* $\bar{Y}_{A1} = 77,30$ and student groups taught with *direct online learning strategies* $\bar{Y}_{A2} = 74,44$.

2. Differences in mechatronics learning outcomes of students who have high and low initial abilities (*main effect*)



The results of ANOVA calculations (Table 3) on the source of variance between B show that $F_{\text{calculate}} = 2.77 < F_{\text{table}} = 4.20$ at $\alpha = 0.05$ then H_0 was accepted and H_1 was rejected, or there was no difference in mechatronics learning outcomes between students who had high and low initial abilities. On the other hand, the average value of learning outcomes of students who have high initial ability scores is higher than the average value of learning outcomes of students who have low initial ability, but statistically, the difference is not significant. In other words, the learning outcomes of students who have high initial abilities with low are not much different or the same. So the research hypothesis states that there is a difference between the mechatronics learning outcomes of students who have high initial abilities, the same learning outcomes and those with low initial abilities.

3. The interaction between online learning strategies and initial abilities on mechatronics learning outcomes (*interaction effect*)

The results of the ANOVA calculation (Table 3) on the source of variance of Interaction A x B show that the $F_{\text{calculate}}$ price is $10.20 >$ the F_{table} value is 4.20 at $\alpha = 0.05$, then H_0 is rejected and H_1 is accepted. This means that learning strategies have an influence on mechatronic learning outcomes depending on initial ability, and vice versa. Thus the research hypothesis states that there is an interaction between learning strategies and initial abilities on learning outcomes.

4 Differences in mechatronics learning outcomes of students who use collaborative online learning and Direct online learning strategies, in students who have high initial abilities (*simple effect*)

The results of further tests with the Tukey test in Table 3 show that the comparison of mechatronics learning outcomes of students who use collaborative online learning and direct online learning in students who have high initial abilities obtained $Q_{\text{calculate}}$ values = $6.33 > Q_{\text{table}} = 4.41$ at $\alpha = 0.05$, H_0 was rejected and H_1 was accepted, thus it can be said that the mechatronics learning outcomes of students who use collaborative online learning are higher than the value of learning outcomes Students who use direct online learning strategies in students who have high initial abilities.

Based on the average residual test results (Table 4) obtained values $\bar{Y}_{(\text{res})A1B1} = 78,31 > \bar{Y}_{(\text{res})A2B1} = 71,58$, This means that the mechatronics learning outcomes of students who learn using collaborative online learning strategies are higher than the learning outcomes of students who learn with direct online learning in students who have high initial abilities. These results also show that students who have high initial abilities will be very appropriate to be applied with collaborative online learning strategies. Thus, it can be concluded that the mechatronics learning outcomes of students who learn with collaborative online learning are better than the learning outcomes of students who learn using direct online learning for students who have high initial abilities. Furthermore, the research hypothesis that states that mechatronics learning outcomes for students who use collaborative online learning are higher than students who use direct online learning, in students who have high initial abilities are tested for truth.

5. Differences in mechatronics learning outcomes of students who use collaborative online learning and direct online learning strategies, in students who have low initial abilities (*simple effect*)

Based on the results of further tests with the Tukey test in Table 3, it is known that the comparison of mechatronics learning outcomes of students taught using collaborative online learning and direct online learning strategies in students who have low initial abilities obtained scores $Q_{\text{calculate}} = 0,11 < Q_{\text{table}} = 4,41$ in $\alpha = 0,05$, H_0



accepted and H_1 Rejected, thus there is no difference in mechatronics learning outcomes of students who use collaborative online learning and direct online learning in students who have low initial abilities.

Based on the average residual test result (Table 4) obtained values $\bar{Y}_{(res)A_1B_2} = 76,74 > \bar{Y}_{(res)A_2B_2} = 76,86$. Thus, it can be concluded that there is no difference in mechatronics learning outcomes of students who learn with collaborative online learning and direct online learning, for students who have low initial abilities. Furthermore, the research hypothesis that states that the mechatronics learning outcomes of students who learn with collaborative online learning are lower than students who use direct online learning, in students who have a tendency to low initial abilities show untested. Table 6 shows that there are differences in student activity in providing responses in the form of problem-solving answers to questions given by lecturers. From the difference test to class groups A_1B_1 , A_1B_2 , A_2B_1 , A_2B_2 , using the t-test, there are mean difference results of 30,500, 30,300, 14,400, and 14,300 which means that in the group of students who learn with collaborative online learning strategies grow higher activeness than direct online learning.

Data analysis of the results of the study showed that the learning outcomes of Mechatronics students who participated in learning with collaborative online learning (experimental class), were higher than students who participated in learning using direct online learning (control class). These empirical results are in line *with the concept of collaborative online learning*, which is learning that combines online independent learning, and face-to-face learning with the presence of teachers (teachers) in the classroom. This combination according to the Sloan Consortium effectively and efficiently reduces learning time.

Computer-aided online learning, especially to deliver brief explanations in workshops (shop-talk) and essential competency demonstration videos, makes learning materials can be studied repeatedly at any time according to student needs. Access to learning materials packaged in digital format as independent learning materials outside the classroom, helps students to study teaching materials early and do practice assignments and repeat them at any time so that students have *the prior knowledge* (supporting knowledge) needed for Mechatronics practice.

Self-study materials in digital formats, such as this video, cannot be included in teaching materials for direct online learning in the form of printed materials. This is the advantage of *computer-aided online teaching materials*. Demonstration videos can make it easier for students who take part in collaborative online learning to learn essential competencies repeatedly as desired. Through this video, students' understanding of the technique of operating a lathe becomes better. Students' understanding of the concept of Mechatronics is a good initial knowledge for the practice of compiling work steps in each Mechatronics practical task.

Higher Mechatronics learning outcomes are the result of allocating more time to interact with shop-talk materials and essential competence demonstration videos. This is in line with the results of Fisher's research, Rosenshine; Stallings & Kaskowitz, which state that the time allocated and used for a particular task (*academic learning time*) is very closely related to the academic achievement of learners. The classes where learners spend most of their time engaged in academic tasks are those that provide a place for students to achieve the highest academic achievement.

Allocation of more time for task completion independently, by not waiting for examples from friends in this *collaborative online learning class*, directly increases the opportunity to learn, which is the amount of time given by lecturers to students to complete certain academic tasks, and increases time on task, which is the time of involvement or time that students spend doing academic tasks. The allocation of time that causes higher *opportunity to learn* and *time on task*, combined with better prior knowledge (*prior knowledge*) is a factor that makes the Mechatronics learning outcomes of students who participate in learning using collaborative online



learning higher than students who follow learning with direct online learning.

Mechatronics learning outcomes of students who follow learning with collaborative online learning strategies, *higher than those who follow learning with direct online learning, which is predicted because they have better time on task*, is in line with the results or findings of research conducted by Cobanoglu & Yurdakul, that learning using collaborative online learning has a tendency to be more on additional elements of learning time, and learning resources that encourage interaction practices between students or learners with learning resources. Both variables open up a wide range of possibilities contributing to very positive outcomes for *collaborative online learning strategies*.

The results of this study are also in line with the opinions of some experts, and other research results. (Garrison & Kanuka, in Al-Azawei et al., 2017) Collaborative *online learning* has been widely adopted as a compromise between traditional and digital learning. *Collaborative online learning means "the integration of an immersive classroom face-to-face learning experience with an online learning experience"*. The results of research by Pérez-López and Rodríguez-Ariza (in Al-Azawei et al., 2017) also confirm the results of this study, that *collaborative online learning* can positively affect student satisfaction and performance.

The influence of such interaction, the influence of learning strategies on Mechatronics learning outcomes does not depend on the initial ability of students. Based on data that shows the interaction of influences in this study, it can be concluded that to improve Mechatronics learning outcomes students who have high *initial* abilities, it is more suitable to follow learning with collaborative online learning strategies, *while for students it is more suitable to follow Mechatronics learning with direct online learning*. As a consequence of the results of such research, Mechatronics learning is carried out with two strategies at once, *collaborative online learning* and direct online learning.

These empirical findings are in line with the theory of the influence of prior learning on learning. According to Gardner, a person's learning ability is influenced by an individual's innate potential, such as intelligence and prior knowledge. The characteristics of Mechatronics learning materials are identical to the characteristics of learning materials for the Mechanical Engineering expertise program. The compatibility of characteristics between learning materials following learning with collaborative online learning is easier and faster to understand learning materials, has more time to improve mastery of learning materials obtained from friends of group members.

The results of the study that students who participated in Mechatronics learning with collaborative online learning had higher learning outcomes than students who participated in learning with direct online learning, mainly due to better *prior knowledge*. The results of this study are in line with the results of Macbeth (Arends, 2009) research that knowledge is organized into knowledge networks, and previous knowledge filters new information so as to determine whether the information presented or presented will be integrated and stored in student memory. However, the difference in the average learning outcomes of Mechatronics, which is descriptively lower, after statistical analysis, the difference is not significant so that between the two average learning outcomes it is stated that there is no difference.

Mechatronics learning with collaborative online learning is learning that combines face-to-face, and independent online. Online self-study is conducted outside the classroom before face-to-face sessions. The steps, (a) access to teaching materials in the form of basic concepts of turning (text, illustration images); (b) study demonstration videos of work steps at each stage of Mechatronics practical assignments; (c) take computer-based teaching material mastery tests with direct feedback.

Students who take part in Mechatronics learning with collaborative online learning have difficulty in understanding Mechatronics learning materials that must be studied independently (*Autonomous Work Sheet*).



Difficulty understanding new teaching materials can be facilitated when it comes to the guided practice stage in face-to-face learning sessions in class. In guided training activities, there is interaction between lecturers and students, as well as remedial activities to improve mastery of the material, so students need more time to be able to understand teaching materials.

Students are easier to adapt to the conventional learning environment because they get direction, guidance, and intensive mentoring. Students in semester V will gain a better understanding of the learning material so that they are able to adapt to higher material which ultimately achieves higher Mechatronics learning outcomes.

However, in this study, the hypothesis states; Mechatronics learning outcomes of students who participate in learning with collaborative online learning are lower than students who follow learning with conventional strategies rejected or not proven. Regarding the rejection of the hypothesis, several things can be explained:

First, from the descriptive analysis, it can be seen that the Mechatronics learning outcomes of students who take part in learning with collaborative online learning are lower than students who follow learning with conventional strategies. However, the difference or difference in learning outcomes is relatively small, which from the results of statistical analysis is not significant so that the two Mechatronics learning outcomes are declared no different.

Second, the relatively small difference in Mechatronics learning outcomes between students who participated in learning with collaborative online learning and students who participated in learning with a conventional approach can be caused by weakness in internal validity control, especially in controlling the separation between experimental class samples and control classes. The research was conducted at the Machining Workshop of the Department of Mechanical Engineering Education FT UNJ whose implementation follows a regular lecture schedule. The samples of the experimental class and the control class are students of one batch who are taking the Mechatronics course. Outside of class, they see each other every college day. There is a possibility that outside the classroom they interact with each other, learn together, discuss Mechatronics teaching materials and so on so that their activities outside the classroom can affect Mechatronics learning outcomes.

Third, the difference in Mechatronics learning outcomes between students who take part in learning with collaborative online learning and students who follow learning with conventional strategies can be caused by the quality of Mechatronics learning outcomes tests that researchers develop. There is a possibility, even though it has been declared valid from testing content *validity* and empirical validity, and is declared reliable based on reliability analysis, but the test is weak in differentiation power or has low difference power so that it is less able to accurately measure differences in student Mechatronics learning outcomes with a small range.

6. CONCLUSION

First: Collaborative online learning can have a better impact on improving Mechatronics learning outcomes. This is because Collaborative online learning encourages students to be more active, gain more knowledge, and get students used to discussing. Because of its nature that offers to learn, giving (sharing information) will encourage in students to express themselves both in the form of behaviour and verbally. **Second:** There is an influence of interaction between online learning strategies and prior knowledge on Mechatronics learning outcomes. This means that online learning strategies and initial knowledge are two factors that determine student Mechatronics learning outcomes. Therefore, in planning lessons, teachers need to pay attention to the individual characteristics of students so that they can determine the right learning strategy.



Third: Important notes in this study show that collaborative online learning is not only appropriate to be taught for students who have high initial ability but also appropriate to teach for students who have low initial ability. This means that collaborative online learning is able to accommodate differences in individual characteristics of students.

REFERENCES

- Al-Azawei, A., Parslow, P., & Lundqvist, K. (2017). Investigating the effect of learning styles in a blended e-learning system: An extension of the technology acceptance model (TAM). *Australasian Journal of Educational Technology*, h.13-14. <https://doi.org/10.14742/ajet.2741>
- Arends, R. (2009). Learning to teach. In B. Mejia (Eighth Ed.), *The McGraw-Hill Companies*. <https://doi.org/10.4324/9780203053874-29>.
- Fisher, D.; Frey, A. (2007). *Checking for understanding: formative assessment techniques for your classroom*. Arlington, VA: Association for Supervision and Curriculum Development.
- Rosenshine, B.; Meister, C. (1992). The use of scaffolds for teaching higherlevel cognitive strategies. *Educational leadership*, April, 26–33.
- Shimizu, I., Matsuyama, Y., Duvivier, R., and Vleuten, C. (2022). *Perceived positive social interdependence in online versus face-to-face team-based learning styles of collaborative learning: a randomized, controlled, mixed-methods study*. p. 56. <https://doi.org/10.1186/s12909-022-03633-y>.
- Stallings, J. A., & Kaskowitz, D. (1974). *Follow through classroom observation evaluation*, 1972-73. Menlo Park, Calif.: Stanford Research Institute,
- Supardi. *Aplikasi Stastitika dalam Penelitian, konsep statistika yang lebih komprehensif*. Edisi Revisi. (Jakarta: Change Publication, 2016). h.h. 348-351.



DESIGN WORKSHEETS MATH TRAIL TO OUTDOOR LEARNING MATHEMATICS

Ainun Mardia¹, Zulkardi^{2*}, Ratu Ilma Indra Putri³, Kamid⁴

^{1,2,3}Universitas Sriwijaya, Palembang

⁴Universitas Jambi, Jambi

*ainunmardia@uinjambi.ac.id

ABSTRACT

The aim of the research carried out was to produce valid mathematics trail worksheets for outdoor learning. This research is a design research type of development study using two stages of initial evaluation and formative evaluation from Tessmer, namely prototyping, self-evaluation, expert review, one-to-one, small group, and field test. The research discussed in this article has reached the expert review stage. Data collection uses walkthrough and documentation techniques. The results of this research are math trail worksheets that are valid according to the validator's comments and suggestions and have been declared valid by the validator at the expert review stage. In this research, the results were obtained from validators consisting of 3 lecturers and 2 mathematics teachers. From the language aspect, the average validation result was 3.45 in the very valid category, from the appearance aspect, the average was 3.32 in the valid category, and from the presentation aspect, the average was 3.53, very valid. The average of the 3 aspects obtained was 3.45 in the very valid category. In the LKS material, the result was 3.56 in the very valid category and in the problem solving construct, an average of 3.44 was obtained in the very valid category. So the worksheet developed can be concluded to be valid by the validator.

Keywords: learning, mathematics, math trail, outdoor, worksheets

1. INTRODUCTION

Mathematics learning according to Dienes in Hudojo (2005) is learning about mathematical concepts and structures contained in the material studied and looking for relationships between mathematical concepts and structures in it. In essence, learning mathematics is closely related to systematic thinking patterns, namely thinking of formulating something that is done or related to structures that have been formed from existing things.

In the process of learning mathematics, students are accustomed to gaining understanding through experience about the properties possessed and not possessed by a set of objects. Through observation of examples and not examples, students are expected to be able to grasp the understanding of a concept. Furthermore, with this abstraction, students are trained to make estimates, guesses, or tendencies based on experience or knowledge developed through specific examples (generalizations). In the process of reasoning, an inductive and deductive mindset is developed.

The definition of outdoor learning is education that is carried out outside the room which is defined as education in-, for-, and about the environment (Donaldson, 1958). The key words of this definition are in, for, and the surrounding environment which can be interpreted that outdoor education is carried out outdoors, learning that exists in nature and the purpose of this learning is for the benefit of the environment in the future (Priest, 1986). According to Priest, there are 6 main things in outdoor learning, namely a method for learning activities, an experience for students, taking place outdoors, activities requiring all senses, based on the Pliner interdict curriculum, and problems found involving people and natural resources around.

The results of Research by (Pambudi et al., 2021) revealed that learners have difficulty seeing real problems in everyday life and are linked in mathematical models. Similarly, the results of research (Khusna & Ulfah, 2021) reveal that the ability of students to make mathematical models is still lacking. Indoor mathematics learning cannot explore students' mathematical literacy skills but can only transfer knowledge from educators to students (Wardani & Ayriza, 2021). Therefore, learners should be given the opportunity to face real-world situations that suit their daily lives directly (A. N. Cahyono & Ludwig, 2019) and be able to directly apply mathematics lessons directly in their daily lives (Ahsan et al., 2020). This learning method is in accordance with constructivist learning theory. The main point in constructivism theory is how to provide opportunities for



students to understand what they have understood in the learning process by applying and direct practice in everyday life (Suparlan, 2019). Math trails are one of the appropriate techniques to be applied in outdoor learning in mathematics learning (Gurjanow & Ludwig, 2017).

Math trails are a task force along a pre-designed path, which contains a series of stop posts where students must solve math problems around them (Barbosa & Vale, 2020; A. N. , Cahyono & Ludwig, 2017). Real problems must be part of learning mathematics in schools and math trails can be the solution (Jablonski & Ludwig, 2020). Students can see directly the environment around them from a mathematical point of view and immediately find mathematical concepts around them (A. N. , Cahyono & Miftahudin., 2018; Ismaya et al., 2018). After that, learners can immediately apply their math skills in various situations that directly lead to their more contextual mathematical skills and abilities (Barlovits & Ludwig, 2020). Problems on math trails can be solved by following the cycle of mathematical modelling (A. N. Cahyono et al., 2020). Although math trails are not new, the use of technology can help students when experiencing the mathematical modelling process (Molina-Toro et al., 2019). One way to combine the concept of math trails with the use of technology in an advanced learning environment is to use the Math City Map.

Mathematics teaching materials in the form of worksheets are needed by educators and students as a means to support the learning process and as a solution to improve problem solving skills (Istiqomah & Suparman, 2019; Julian & Suparman, 2019) therefore it is important to develop worksheets to support outdoor learning.

2. METHODS

This study uses the development studies method with preliminary evaluation and formative evaluation stages according to Tessmer. The stages are Prototyping, self-evaluation, expert review, One-to-One, Small Group, and Field Test. The article only contains up to the stage of prototyping and self-evaluation, this is because this research is still ongoing and has not ended. The analysis carried out at the preliminary research stage is a needs analysis, namely curriculum and material. learner analysis and software analysis. At this stage worksheets will be designed for outdoor learning which will be used as an initial draft. The next stage is self-evaluation, namely by analyzing the initial draft personally then the results of the analysis are prototype I. Furthermore, the first prototype was given to 5 experts (expert review) consisting of expert validators (lecturers) and practitioner validators (mathematics education teachers) according to (Dewi et al., 2019). Prototype I will be given to 5 learners in class IX (One-to-one stage). In this step prototype I will be assessed, evaluated, and given suggestions from the point of view of face validity (language, appearance, and presentation), content validity (material), and construct validity (problem-solving). The suggestions and criticisms submitted will be input for researchers to carry out revisions and will continue to produce prototype 2, LKPD which has reached the valid criteria.

3. RESULTS & DISCUSSION

Preliminary research

The results of this stage are still low in students' problem-solving abilities, there is no worksheets used in the learning process at school, in the learning process only using textbooks issued by the Ministry of Education and Culture, students need worksheets that supports learning and supports problem-solving skills. The next stage is to design solutions to problems that are worksheets, materials, learning outcomes, and product assessment sheets in accordance with the independent curriculum and problem-solving abilities. The result obtained was an initial draft in the form of prototype I.



Development and prototype phase

Self Evaluation

This step the researcher conducts personal and peer evaluation. At this stage what needs to be revised is the cover in the design to adjust the components on the worksheets. In the revised content section are instructions for using LKPD. The result obtained in this step is to

Expert Review

Prototype I has been produced will be given to experts consisting of expert validators and practitioners. Expert validators are 3 lecturers and practitioner validators are 2 mathematics teachers. The following is a table of the results of validation carried out by experts.

Table 1. Results of Worksheets assessment by validators

Validitas	Face			Content	Construct
Aspects	Language	Display	Presentation	Material	Problem solving
Expert Assessment 1	3,60	3,00	4,00	3,80	3,83
Expert Assessment 2	3,10	3,50	3,57	3,00	3,33
Expert Assessment 3	3,50	3,40	2,93	3,80	3,04
Practising Assessment 1	3,70	3,10	3,57	3,40	3,17
Practising Assessment 2	3,57	3,60	3,57	3,80	3,83
Average aspects	3,95	3,32	3,53	3,56	3,44
Average Validity	3,45			3,56	3,44
Category	Very Valueable			Very Valueable	Very Valueable
Average value validity				3,48	Very Valueable

In table 1, it can be seen that face validity reaches an average value of 3.45 with a very valid category. Content validity obtained an average score of 3.56 with a very valid classification. The worksheets developed has been adjusted to the learning objectives. The average construct validity value is 3.44 in the very valid category because the worksheets has been developed in accordance with the stages of problem solving. After revision based on suggestions and criticisms from validators, this worksheets is declared valid and can be used.



Figure 1. Cover worksheets, Instructions for Use Worksheets, Math Trail Task

4. CONCLUSION

The worksheets designed for math trails in outdoor learning in grade IX Junior High School have been proven valid. The results of the study show that worksheets are valid in terms of face validity, content validity, and construct validity based on validator suggestions and criticisms. This research will proceed to the one-to-one, small group, and field test stages to see the practicality and potential effects of these student worksheets.

REFERENCES

- Ahsan, M. G. K., Miftahudin, & Cahyono, A. N. (2020). Designing augmented reality-based mathematics mobile apps for outdoor mathematics learning. *Journal of Physics: Conference Series*, 1567(3), 032004. <https://doi.org/10.1088/1742-6596/1567/3/032004>
- Barbosa, A. , & Vale, I. (2020). Math trails through digital technology: an experience with pre-service teachers. *Research on Outdoor STEM Education in the Digital Age*, 47–54.
- Barlovits, S., & Ludwig, M. (2020). Mobile-supported outdoor learning in math class: draft of an efficacy study about the Mathcitymap App. In *Research on Outdoor STEM Education in the digital Age. Proceedings of the ROSETA Online Conference in June 2020* (pp. 55–62). WTM-Verlag. <https://doi.org/10.37626/GA9783959871440.0.07>
- Cahyono, A. N. , & Ludwig, M. (2017). Examining motivation in mobile app-supported math trail environments. *10th Congress of European Research in Mathematics Education (CERME 10)*.
- Cahyono, A. N. , & Miftahudin. (2018). Mobile technology in a mathematics trail program: how does it works? *Unnes Journal of Mathematics Education*, 7(1), 24–30.
- Cahyono, A. N., & Ludwig, M. (2019). Teaching and learning mathematics around the city supported by the use of digital technology. *EURASIA Journal of Mathematics, Science and Technology Education*, 15(1). <https://doi.org/10.29333/ejmste/99514>
- Cahyono, A. N., Sukestiyarno, Y. L., Asikin, M., Miftahudin, M., Ahsan, M. G. K., & Ludwig, M. (2020). Learning mathematical modelling with augmented reality mobile math trails program: how can it work? *Journal on Mathematics Education*, 11(2), 181–192. <https://doi.org/10.22342/jme.11.2.10729.181-192>



- Dewi, S. , Rizal, S., & Johar, R. (2019). Pengembangan modul matematika diskrit berbantuan Software wxMaxima. *Jurnal Peluang*, 7(2), 56–65.
- Donaldson, G. E. , & D. L. E. (1958). Outdoor education: A definition. *Journal of Health Physical Education and Recreation*, 29(17), 63–76.
- Gurjanow, I. , & Ludwig, M. (2017). Gamifying math trails with the mathcitymap app: impact of points and leaderboard on intrinsic motivation. *Proceedings of the 13th International Conference on Technology in Mathematics Teaching (ICTMT 13)*, 105–122.
- Hudojo, H. (2005). *Pengembangan kurikulum dan pembelajaran matematika*. Universitas Negeri Malang Press.
- Ismaya, B. F. , Cahyono, A. N. , & Mariani, S. (2018). Kemampuan penalaran matematika dengan math trail project berbantuan MathCityMap. *Seminar Nasional Pendidikan Matematika Ahmad Dahlan*, 17–26.
- Istiqomah, A. N. , & Suparman, S. (2019). Analisis kebutuhan E- LKPD penunjang model discovery learning untuk meningkatkan berpikir kreatif. *Prosiding Sendika*, 712–717.
- Jablonski, S., & Ludwig, M. (2020). Development of an Intensive study programme on outdoor mathematics teaching with digital tools. In *Research on Outdoor STEM Education in the digital Age. Proceedings of the ROSETA Online Conference in June 2020* (pp. 111–118). WTM-Verlag. <https://doi.org/10.37626/GA9783959871440.0.14>
- Julian, R. , & Suparman, S. (2019). Analisis Kebutuhan E-LKPD untuk menstimulasi kemampuan berpikir kritis dalam memecahkan masalah. *Proceedings of The 1 St Steem*, 238–243.
- Khusna, H. , & Ulfah, S. (2021). Kemampuan pemodelan matematis dalam menyelesaikan soal matematika kontekstual. *Mosharafa: Jurnal Pendidikan Matematika*, 10(1), 153–164.
- Molina-Toro, J. F., Rendón-Mesa, P. A., & Villa-Ochoa, J. A. (2019). Research trends in digital technologies and modeling in mathematics education. *EURASIA Journal of Mathematics, Science and Technology Education*, 15(8). <https://doi.org/10.29333/ejmste/108438>
- Pambudi, W. A. S., Mastur, Z., & Kharisudin, I. (2021). Kemampuan penalaran dan representasi matematis siswa dengan model pembelajaran mic berbasis etnomatematika. *Pedagogi: Jurnal Penelitian Pendidikan*, 8(2). <https://doi.org/10.25134/pedagogi.v8i2.4968>
- Priest, S. (1986). Redefining outdoor education: a matter of many relationships. *The Journal of Environmental Education*, 17(3), 13–15.
- Suparlan, S. (2019). Teori Konstruktivisme dalam pembelajaran. *Islamika*, 1(2), 79–88. <https://doi.org/10.36088/islamika.v1i2.208>
- Wardani, A., & Ayriza, Y. (2021). Analisis kendala orang tua dalam mendampingi anak belajar di rumah pada masa Pandemi Covid-19. 5(1), 772–782. <https://doi.org/10.31004/obsesi.v5i1.705>



DECIPHERING THE CULTURAL DIMENSIONS OF MATHEMATICS PROFICIENCY AMONG EDUCATORS

Christiyanti Aprinastuti^{12*}

¹University of Debrecen, Hungary

²Sanata Dharma University, Indonesia

*christiyantia@science.unideb.hu

ABSTRACT

This study determines lecturers' perceptions of cultural impact on math proficiency, going beyond algorithms. The participants were 13 lecturers of prospective primary school teachers training in Indonesia, and we reached information by structured interview. Data was analyzed with a thematic content analysis. The findings unravel educators' unique viewpoints on language, teaching styles, representation in learning materials, and technology use, shedding light on the complexities of fostering a culturally inclusive math education environment. The conclusion synthesizes fundamental discoveries, discusses their implications for educational practices, and calls for an ongoing commitment to integrating educators' perspectives in pursuing equitable and effective mathematical education.

Keywords: *algorithm, cultural, math proficiency, educators' perspective*

1. INTRODUCTION

In the landscape of global education, mathematics stands as a universal language, its principles transcending borders and cultures. However, cultural elements have a complex impact on how mathematics is taught and learned. Research has consistently shown that cultural dimensions significantly influence math proficiency, teaching methods, learning preferences, and the language of mathematical concepts. Hu (2018) found that national culture accounts for a significant portion of the variation in math performance across countries. Fasheh (1982) emphasized the importance of incorporating cultural and societal sources in math education to make it more meaningful and effective. Ferrare (2014) and Aguirre (2013) both highlighted the need for culturally responsive teaching practices, with Ferrare (2014) suggesting that these practices can be seen as opportunities for pedagogical innovation. Aguirre (2013) further proposed a lesson analysis tool that integrates mathematical thinking, language, culture, and social justice to enhance culturally responsive teaching. As educators navigate the dynamic field of mathematics education, recognizing cultural nuances becomes paramount. This introductory section provides a lens into the expansive world of mathematics education, acknowledging its global significance while laying the foundation for exploring cultural intricacies in shaping math proficiency.

Within this context, understanding the profound impact of cultural dimensions on math proficiency becomes a focal point. The significance of this understanding is underscored by the realization that cultural elements shape not only the content but also the methods through which mathematical concepts are conveyed and comprehended (Bishop, 1988; Rosa, 2011). As educators grapple with the diverse tapestry of student backgrounds, the need for an in-depth exploration of these cultural dimensions becomes evident. Beyond the algorithms that traditionally define mathematical pedagogy, a nuanced understanding of educators' perspectives emerges as a central theme in this inquiry.

The research objectives outlined in this study aim to unravel the layers of educators' perceptions concerning the cultural impact on math proficiency. This journey extends beyond the confines of algorithmic approaches, seeking to reveal the nuanced ways in which culture intertwines with the teaching and learning of mathematics. The rationale for delving into these cultural dimensions is rooted in the belief that a more profound understanding can enrich educational practices and contribute to a more inclusive and effective mathematics education environment. By examining educators' perspectives, we aim to bridge the gap between theory and practice, shedding light on the complexities that influence math proficiency in diverse cultural contexts.



2. METHODS

A carefully designed research methodology was utilized to understand educators' viewpoints on the cultural aspects of math proficiency. The focus was on obtaining detailed and insightful perspectives to unravel the intricate cultural influences in mathematics education. The study commenced by engaging 13 educators actively involved in preservice primary school teachers in Indonesia. The selection of participants aimed to capture diverse perspectives, considering varied backgrounds that contribute to cultural diversity in education. Data collection primarily relied on structured interviews to delve deep into educators' perceptions and experiences. The structured format maintained consistency and allowed for a systematic exploration of cultural impacts on math proficiency. Thematic content analysis played a crucial role in interpreting the data and identifying recurring themes and patterns. Ethical considerations ensured that participants were well-informed, provided voluntary consent, and protected their privacy. The subsequent sections unveil key findings from the study, shedding light on the influence of language, teaching methods, learning materials, and technology on math proficiency. The meticulous methodology positions the study to enrich discussions on culturally inclusive mathematics education significantly.

3. RESULTS & DISCUSSION

The researcher derived the following theme analysis results from the participant interviews:

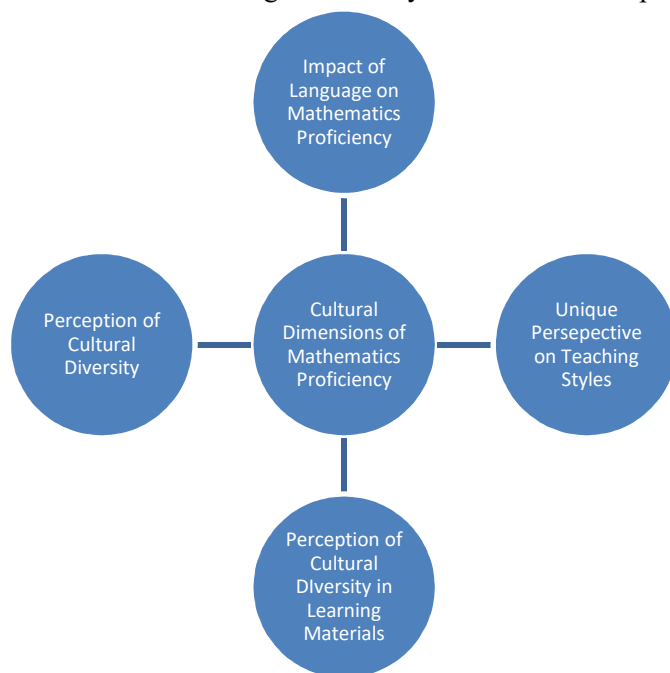


Figure 1. Themes and Subthemes of Cultural Dimensions

Impact of Language on Math Proficiency



The exploration of educators' perspectives unveiled a compelling narrative regarding the significant role language plays in shaping math proficiency. One participant remarked, *"In my experience, language is not just a tool; it is the bridge that connects students to the world of math. The whole mathematical concept becomes elusive when they struggle with the language."* This participant has teaching experience in the classroom with students from remote areas of Indonesia. Sometimes, the students still use their traditional language. This perspective highlights language's critical impact on learners' understanding of mathematical concerns. As Boulet (2007) emphasizes the need for productive and meaningful mathematical discourse in the classroom, this participant's perspective resonates with the broader understanding of language as a fundamental conduit for mathematical learning. It invites us to consider language-sensitive teaching practices as crucial elements in promoting equitable learning experiences. Moreover, it prompts a reflection on how educators can collaboratively address linguistic challenges to enhance overall math proficiency. It is supported by Moffett (2018), who underscores the importance of developing vocabulary and context to articulate their mathematical thinking.

Unique Perspectives on Teaching Styles

Diversity in teaching styles surfaced as a prominent theme, reflecting the influence of educators' cultural backgrounds. An educator shared, *"Teaching is an art, and my cultural background is my palette. I believe in bringing cultural elements into the classroom to make the learning experience richer and more relatable for my students."* This quote captures the connection between cultural heritage and teaching styles. This participant's perspective aligns with the idea that teaching is not a one-size-fits-all endeavour. Acknowledging and incorporating cultural nuances into teaching styles can create a more engaging and inclusive learning environment. As discussed by McAlister-Shields (2021), culturally responsive teaching is a key factor in creating an inclusive and engaging learning environment. It prompts discussions on how educators can embrace diverse approaches, fostering an atmosphere where students from varied backgrounds feel seen and valued. This aligns with the notion that education should be a practice that deals critically and creatively with the reality of diverse student experiences.

Perception of Cultural Diversity in Learning Materials

Insights into educators' perceptions of cultural diversity in learning materials underscored the significance of representation in shaping math education. One participant expressed, *"When students see themselves reflected in the learning materials, it is like a spark. Suddenly, math is not just numbers but a part of their world."* This highlights the positive impact of incorporating diverse cultural elements into learning materials. This participant's observation emphasizes the importance of representation in learning materials. It aligns with the broader understanding that culturally inclusive materials enhance student engagement and comprehension (Underwood, 2011). Educators can collaborate to develop and integrate learning materials that incorporate real-world examples from various cultures. This approach makes mathematics more relevant and fosters a sense of belonging for students from diverse backgrounds.

Educators' Views on Technology Use

The discussion on educators' views on technology use in math education revealed various perspectives. A participant shared, *"I have seen technology break down cultural barriers in math. Virtual tools and multimedia resources help students visualize concepts in ways that transcend cultural differences."* This perspective emphasizes the potential of technology to enhance cultural inclusivity in math education. This participant's perspective on technology highlights its transformative potential when used thoughtfully. It encourages a broader conversation on leveraging technology to bridge cultural gaps, providing students with innovative and culturally sensitive learning experiences. It is confirmed by Ratnam (2020), who underscores the need for interactive intercultural digital



engagement. However, it also acknowledges the need for a balanced approach, prompting discussions on ethical considerations and strategies to ensure that technology integration aligns with cultural sensitivities.

In synthesizing these participant perspectives, the discussion delves into the broader implications for cultivating culturally inclusive math education. It prompts educators and researchers to reconsider teaching practices, materials, and technology integration through the lens of cultural responsiveness, ultimately aiming for a more equitable and effective mathematics education environment.

4. CONCLUSION

In our study on educators' viewpoints regarding the cultural aspects of math proficiency, we have uncovered valuable insights. Educators have emphasized the importance of language, teaching styles, learning materials, and technology in molding mathematical comprehension. Language's impact on math proficiency has been highlighted, with educators recognizing it as a vital link connecting students to mathematics. This underscores the necessity for teaching practices sensitive to language, addressing linguistic obstacles to ensure fair learning opportunities. The diversity in teaching styles, likened to an art form by an educator, underscores the intricate relationship between cultural heritage and teaching methods. This emphasizes the need to appreciate and embrace various teaching styles, fostering an inclusive learning environment where cultural nuances enrich the educational landscape. The significance of cultural diversity in learning materials has been underscored, with educators acknowledging the transformative influence of students seeing themselves represented in educational resources. This insight advocates for developing and incorporating culturally inclusive learning materials to boost student engagement and understanding. Educators' perspectives on technology usage have revealed a range of approaches, emphasizing the importance of leveraging technology thoughtfully to bridge cultural gaps while remaining mindful of cultural sensitivities. This underscores the necessity for a balanced and culturally responsive approach to integrating technology. By synthesizing these insights, it is evident that our exploration transcends the conventional boundaries of mathematics education. It calls for a shift in perspective that embraces cultural inclusivity as a fundamental aspect of effective teaching and learning, prompting a reevaluation of curriculum design, teaching methodologies, and technology integration to reflect the diversity of student experiences.

In summary, our research calls upon educators, policymakers, and researchers to join forces in advancing culturally inclusive mathematics education. The voices of our participants champion a comprehensive approach that values diverse perspectives, embraces cultural richness, and fosters an atmosphere where each student can thrive. Beyond mere algorithms, we set on a path toward an educational terrain that instils mathematical expertise and nurtures a profound appreciation for the cultural dimensions influencing our shared learning expedition.

5. ACKNOWLEDGMENTS

We extend our deepest gratitude to the educators who generously shared their insights and experiences, forming the cornerstone of this research. Their participation and openness have enriched our understanding of the intricate interplay between cultural dimensions and math proficiency. Additionally, we express appreciation for Sanata Dharma University and the University of Debrecen, who facilitated the research process and provided valuable support. This study would not have been possible without the collaborative efforts and contributions of all those involved, and we acknowledge their pivotal role in advancing our exploration of culturally inclusive mathematics education.



REFERENCES

- Aguirre, J.M., & del Rosario Zavala, M. (2013). Making culturally responsive mathematics teaching explicit: a lesson analysis tool. *Pedagogies: An International Journal*, 8, 163 - 190.
- Atweh, B., Clarkson, P., & Nebres, B. (2003). Mathematics education in international and global contexts. *Second international handbook of mathematics education*, 185-229.
- Bishop, A. J. (1988). Mathematics education in its cultural context. *Educational studies in mathematics*, 19(2), 179-191.
- Boulet, G. (2007). How does language impact the learning of mathematics? Let me count the ways. *Journal of Teaching and Learning*, 5(1).
- Carvalho, J.Á. (2012). *Validation criteria for the outcomes of design research*. <https://hdl.handle.net/1822/21713>
- Fasheh, M. (1982). Mathematics, culture, and authority. *For the learning of mathematics*, 3(2), 2-8.
- Ferrare, J.J., & Hora, M.T. (2014). Cultural Models of Teaching and Learning in Math and Science: Exploring the Intersections of Culture, Cognition, and Pedagogical Situations. *The Journal of Higher Education*, 85, 792 - 825.
- Hu, X., Leung, F.K., & Teng, Y. (2018). The influence of culture on students' mathematics achievement across 51 countries. *International Journal of Science and Mathematics Education*, 16, 7-24.
- Makramalla, M. (2022). Commentary: Mathematics education in a globally precarious reality—a simulated dialogue between two key players. *Research in Mathematics Education*, 24, 249 - 261.
- McAlister-Shields, L., Hutchison, L.F., & Jones, B.E. (2021). *Teaching through culture*. In Research Anthology on Empowering Marginalized Communities and Mitigating Racism and Discrimination.
- Moffett, P. (2018). Learning to articulate mathematical thinking. *Early Years Educator*, 20(8), 18-20.
- Ratnam, C., Powell, R.E., Keel, C., & Wickes, R. (2020). *The role of technology is to facilitate and support intercultural engagement*. Monash University. Report. DOI: <https://doi.org/10.26180/5ed6ec5665a8c>
- Rosa, M. & Orey, D. C. (2011). Ethnomathematics: the cultural aspects of mathematics. *Revista Latinoamericana de Etnomatemática*, 4(2). 32-54
- Underwood, P. S. (2009). *Effects of culturally-responsive teaching practices on first grade students' reading comprehension and vocabulary gains*. The Florida State University.



UTILIZING ARTIFICIAL INTELLIGENCE IN EDUCATION TO ENHANCE TEACHING EFFECTIVENESS

M Nasir^{1*}, M Hasan², Adlim³, Muhammad Syukri⁴

Physics Education Department, Syiah Kuala University, Banda Aceh Indonesia

*nasirmara@usk.ac.id

ABSTRACT

Artificial Intelligence in Education (AIED) has been evolving for some time, and the advent of GPT chat at the end of December 2022 has opened up new opportunities, potentials, and challenges in educational practice. Advances in computational technology and information processing have led to widespread applications of Artificial Intelligence (AI) in the field of education. Over the last 20 years, the number of papers on AIED has been steadily increasing, with a dramatic rise since 2015 until the present. In its brief history, AIED has undergone several paradigm shifts. This research aims to explore the use of AI in education by examining the publication trends sourced from metadata from Google Scholar, PubMed, CrossRef, OpenAlex, and Scopus. The development and application of Artificial Intelligence (AI) technology, particularly in education, significantly supports educational reform and profoundly influences the learning styles of learners. Artificial Intelligence in Education (AIED) can assist teachers in preparing teaching materials, presentation media, and accurate evaluations. Furthermore, AIED can help students adapt their traditional learning styles according to their differences, thus realizing intelligent teaching that meets students' learning needs. Teachers' positive perceptions of educational technology (ET) are beneficial for using AI technology to aid teaching positively, which in turn can enhance teaching effectiveness. Overall, the trend of AIED development has successfully empowered learner personalization, enabling learners to think critically and innovatively, and fostering personalized learning.

Keywords: Artificial Intelligence, Education, Teaching, Effectiveness

1. INTRODUCTION

The advancement of computational technology and information processing has inspired the widespread use of artificial intelligence (AI) in the context of education over the past two decades, with a significant increase in the amount of scholarly literature discussing the role of AI in education. The most striking developments have been observed since 2015. Researchers have acknowledged the potential of AI to revolutionize education by providing customized and efficient solutions to enrich the learning process for students (Yahilina, et al., 2023). AI in education refers to the utilization of AI technology or program applications to enhance the quality of teaching, learning, and decision-making processes within the educational context. However, despite the growing interest in AI in education, many educational practitioners still lack a comprehensive understanding of the most effective strategies to fully harness the pedagogical potential of AI in the teaching and learning process, especially in higher education (Samar, Sharma, 2023). The integration of AI technology and education is viewed as one of the important trends that will shape the future direction of education, and research in this domain is influenced by technological advancements and evolving policy directions (Huifeng, et al., 2023). While AI offers opportunities for personalized learning experiences and enhances student engagement, there are still a number of challenges to be addressed, such as ethical considerations and the potential decline of human interaction within the classroom environment (Mbatha et al., 2023).

The emergence of Artificial Intelligence in Education (AIED) has been a significant event, with the introduction of chatGPT in late December 2022 opening up new opportunities, potentials, and challenges in the education arena. Artificial intelligence technology, which includes chatbots such as ChatGPT, Bing, Gemini, and Poe, offers great potential to transform the dynamics of teaching and learning with its ability to simulate human interaction and generate text resembling the outcomes of human communication based on natural language (K.B. et al., 2023). However, the presence of AI in the educational context also brings about a number of ethical and



practical challenges that require serious attention (Tufan, et al., 2023). Thus, the research problem can be formulated as follows: 1. How can artificial intelligence be effectively integrated into the curriculum and learning strategies to improve student learning outcomes while ensuring its use is relevant and enriches the learning process without replacing the essential role of educators? 2. What are the ethical challenges and issues in the implementation of AI technology in education? The implementation of AI in education requires careful evaluation of ethical aspects, integration with existing infrastructure, and optimal development of competencies for educators and learners (Mohammed, 2023). Although the potential benefits of AI such as personalized learning experiences and adaptive testing are promising, it must also be acknowledged that there are shortcomings, such as the possibility of reduced interpersonal interaction in the classroom due to automation triggered by the presence of AI (Ehsan, et al., 2023). Therefore, research is needed to explore the risks and benefits of using AI in the educational context, as well as to ensure that its implementation is carried out responsibly and follows applicable ethical principles. 3. How can educational institutions address the access gap to AI technology, ensuring that all students, regardless of socioeconomic or geographical background, have equal opportunities to benefit from AI-enriched learning?

The first objective of the research is to explore AI that can be used for text generation, image creation, speech synthesis, video creation, presentation media, and assessment tools, and to identify the most effective strategies for integrating artificial intelligence technology into the curriculum and learning processes. This research will focus on developing methods and approaches that enable educators to leverage AI optimally in enhancing the quality of student learning while ensuring its use is consistent with educational goals and sustainable pedagogy. The second objective is to investigate and analyze the ethical challenges and privacy issues arising from the use of AI in the educational context. This research will consider student data collection and processing, and contemplate how educational institutions can implement policies and practices that align with ethical principles and safeguard student privacy. The third objective is to explore and identify solutions to address the inequality of access to AI technology in education. This research employs the literature review study method, which identifies, interprets, and evaluates findings. Literature search involves executing a comprehensive search strategy using the keywords AIED and predefined criteria in various databases and information sources to gather relevant studies. Screening and Selection of Studies: Using inclusion and exclusion criteria to filter and select relevant studies from search results. This process often involves initial assessment based on titles and abstracts, followed by full-text assessment.

2. METHODS

The methods used for data collection involve exploring the use of AI in education by examining the publication trends sourced from metadata in Publish or Perish from Google Scholar, PubMed, CrossRef, OpenAlex, and Scopus. With the abundance of online publications and open-access resources, it's nearly impossible to conduct a comprehensive search even with well-defined criteria. This research is carefully designed to focus on research publications gathered from one of the Publish or Perish web databases and to delineate between research using VOSviewer.

3. RESULTS & DISCUSSION

Artificial Intelligence (AI) technology and its applications in education, as reported in empirical research, include Chatbots, namely Natural Language Processing (NLP): Its applications encompass automated essay grading, language translation, and text summarization. Its benefits include instant feedback to students and improvement in writing skills. Machine Learning (ML) algorithms are used for personalized learning paths and adaptive tutoring systems. Its benefits include adjusting educational content according to individual student needs and improving learning outcomes. Data Retrieval and Learning Analysis play a role in predicting student



performance, identifying at-risk students, and providing course recommendations. The benefits include supporting early intervention, data-driven decision-making, and improving student success rates. Computer Vision: Applied in face recognition for attendance and object recognition for interactive learning experiences. The use of AI in education is continuously evolving, such as the utilization of Virtual Reality (VR) and Augmented Reality (AR): Providing immersive simulations, virtual field trips, and interactive learning experiences. The benefits include increasing student engagement, providing opportunities for experimental learning, and deepening understanding of complex concepts. Intelligent Tutoring Systems (ITS): Offering personalized tutors, adaptive feedback, and skill assessments. The benefits include supporting individualized learning, enhancing student motivation and performance, and providing scalable solutions. Chatbots and Virtual Assistants: Providing assistance in answering student questions, supporting the learning process, and facilitating communication. The benefits include providing instant support, encouraging self-directed learning, and reducing educators' workload. By researching empirical studies on AI technology in education, educators and AI experts can formulate practical guidelines, examples, inspiration, and other insights. This helps facilitate communication and collaboration among stakeholders with various expertise, enabling a comprehensive understanding of AI research and development in education from various perspectives. Some generative AI that can be used in education are listed in Table 1.

Table 1. Some Generative AI and Their Uses

Generative AI Types	Uses
ChatGPT, Bing AI, Google Bard(Gemini), OpenAI's ChatGPT and GPT-4, Google's Bard and LaMDA, Microsoft's Bing, and Meta's LLaMA. Jasper AI, Salin. AI, Poe,	Text generation tool
Leonardo AI, Dall-E 2, Midjourney, Difusi Stabil, AR, VR, Gambar Bing	Image creation tool
Descript, Speechify, Listnr,	Speech synthesis tool
Steve AI, Pictory, Synthesia, DeepBrainAI	Video creation tool
Simplified, Decktopus AI, Gamma, Wepik AI, Slidesgo, ClassPoint	Media Presentation
Quizizz, QuizGecko	Quiz creation tool
Getdigest dll.	Resume

The application of generative AI in education has been extensively researched, as well as the training conducted by researchers related to AI. Therefore, the graphical display of VOSviewer below can be observed:

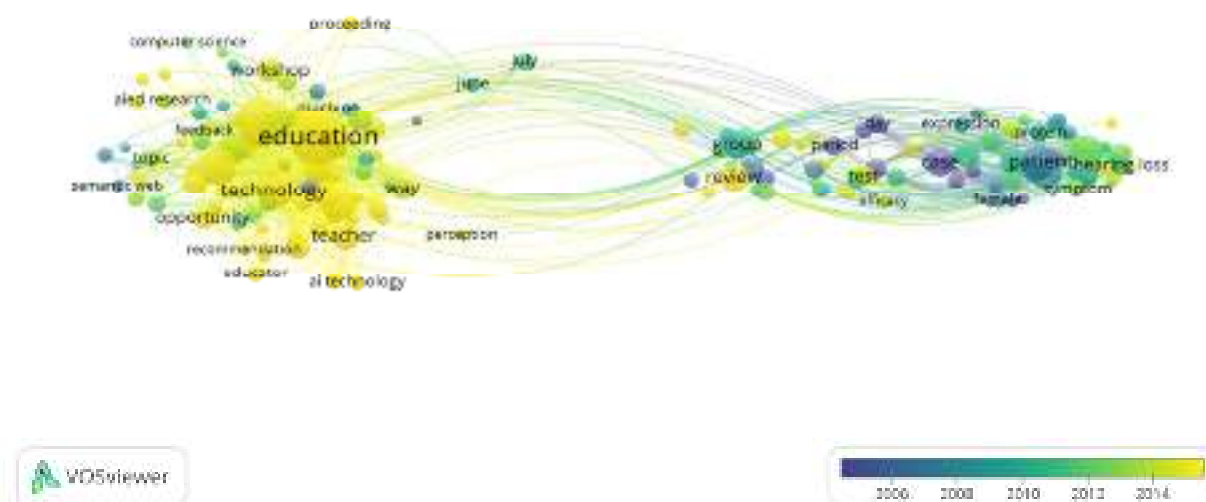


Figure 1. The Graphical Display of AI Use in Education

From the display, it is evident that in relation to education, the advantages and disadvantages of AI in education have been extensively researched and correlated with numerous publications on AIED (Artificial Intelligence in Education) in technology and education journals. There are relatively fewer publications related to testing and efficacy reviews, which is understandable because AI became widely known with the introduction of ChatGPT in late December 2022. Integrating AI-based technology into the educational context requires special attention to the technological knowledge possessed by teachers. Without strong technological knowledge, teachers may not be able to fully utilize the pedagogical opportunities offered by AI (Koehler & Mishra, 2009). One of the main reasons is the lack of comfort in using such technological tools (Joo et al., 2018). However, beyond technical expertise, pedagogical knowledge is also crucial in effectively integrating AI-based technology into the learning process. This is because the role of AI has altered the dynamics of pedagogical knowledge required by teachers. Previous research has provided limited insights into the skills required for AI usage, such as monitoring abilities and timely interventions. To the best of our knowledge, this study is the first to present a comprehensive view of relevant knowledge from both technological and pedagogical perspectives related to AI.

Artificial Intelligence (AI) has the potential to transform learning in the future. Although there are concerns about AI replacing (Voskoglou, 2023). teachers, most participants argue that human teachers still possess unique qualities that make them irreplaceable. AI can be effectively integrated into education to enhance learning without replacing teachers. It can assist in personalized learning, improved assessment, and reduced planning time for teachers. However, there are also risks associated with AI, such as the risk of cheating (Mario et al., 2023). It is important to conduct more empirical research on the impact of AI in education and prepare students for a future where machines will play a leading role. The future of education lies in the synergy between human teachers and AI, where teachers can effectively navigate the integration of AI to ensure a diverse and impactful learning experience, while also enhancing effectiveness (Adair, 2023).



4. CONCLUSION

This article contains a review of research results related to AIED (Artificial Intelligence in Education) from several reputable journals. The article aims to serve as a reference for understanding the role of artificial intelligence in education. According to the main objective of the literature review, AI-based tools promise new opportunities in the context of effective learning and teaching. One promising opportunity offered by AI-based tools is their ability to promote student-centered approaches, enabling each student to access learning materials suitable for their level of understanding and needs through personalization. The anticipated results are expected to enhance student engagement in the learning process while increasing effectiveness.

REFERENCES

- Adair, A. (2023). Teaching and learning with AI: How artificial intelligence is transforming the future of education. *XRDS: Crossroads, The ACM Magazine for Students*, 29(3), 7-9. DOI: 10.1145/3589252
- Ehsan, Latif., Gengchen, Mai., Matthew, Nyaaba., Xuansheng, Wu., Ninghao, Liu., Guoyu, Lu., Sheng, Li., Tianming, Liu., Xiaoming, Zhai. (2023). *Artificial General Intelligence (AGI) for Education*. arXiv.org, DOI: 10.48550/arXiv.2304.12479
- Latif, E., Mai, G., Nyaaba, M., Wu, X., Liu, N., Lu, G., ... & Zhai, X. (2023). Artificial general intelligence (AGI) for education. *arXiv preprint arXiv:2304.12479*. DOI: 10.48550/arXiv.2304.12479
- Huifeng, Zhang., Lixian, Li. (2023). Research status and prospects of artificial intelligence technology applied to education and teaching. *Journal of Education, Humanities and Social Sciences*, DOI: 10.54097/ehss.v14i.8837
- Joo, Y.J., Park, S., & Lim, E. (2018). Factors influencing pre-service teachers' intention to use technology: TPACK, teacher self-efficacy, and technology acceptance model. *Journal of Educational Technology & Society*, 21(3), 48–59.
- Koehler, M., & Mishra, P. (2009). What is Technological Pedagogical Content Knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60–70
- Mario, Fabricio, Ayala-Pazmiño. (2023). *Artificial Intelligence in Education: Exploring the Potential Benefits and Risks*. 593 Digital Publisher CEIT, DOI: 10.33386/593dp.2023.3.1827
- Mbatha, S. Z., Mulaudzi, T. V., Mbita, Z., Adeola, H. A., Batra, J., Blenman, K. R., & Dlamini, Z. (2023). Artificial Intelligence–Enhanced Drug Discovery and the achievement of next-generation human-centered health system. In *Society 5.0 and Next Generation Healthcare: Patient-Focused and Technology-Assisted Precision Therapies* (pp. 155-177). Cham: Springer Nature Switzerland.
- Mohammed, K. R. (2023). *Exploring the landscape of artificial intelligence in education: Challenges and opportunities*. DOI: 10.1109/HORA58378.2023.10156773
- Rizvi, M. (2023, June). Exploring the landscape of artificial intelligence in education: Challenges and opportunities. In *2023 5th International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA)* (pp. 01-03). IEEE. DOI: 10.1109/HORA58378.2023.10156773
- K.B., K., Kumar, T.K.P., Nithiya, S., A., (2023). Implementation of Artificial Intelligence in Education. *International research journal of computer science*, 10(5) DOI: 10.26562/irjcs.2023.v1005.01
- Samar, S. (2023). *Integrating artificial intelligence into education*. *International journal of advanced academic studies*, DOI: 10.33545/27068919.2023.v5.i6a.1004
- Adıgüzel, T., Kaya, M. H., & Cansu, F. K. (2023). Revolutionizing education with AI: Exploring the transformative potential of ChatGPT. *Contemporary Educational Technology*. DOI: 10.30935/cedtech/13152
- Sanabria-Navarro, J. R., Silveira-Pérez, Y., Pérez-Bravo, D. D., & de-Jesús-Cortina-Núñez, M. (2023). Incidences of Artificial Intelligence in Contemporary Education. *Comunicar: Media Education Research Journal*, 31(77), 93-103. DOI: 10.3916/c77-2023-08



- Tufan, Adiguzel., Mehmet, Haldun, Kaya., Fatih, Kursat, Cansu. (2023). *Revolutionizing education with AI: Exploring the transformative potential of ChatGPT*. Contemporary Educational Technology, DOI: 10.30935/cedtech/13152
- Voskoglou, M. (2023). Artificial intelligence and digital technologies in the future education. *Qeios*. DOI: 10.32388/07ve29
- Xu, W., & Ouyang, F. (2022). The application of AI technologies in STEM education: a systematic review from 2011 to 2021. *International Journal of STEM Education*, 9(1), 59.



FACTORS THAT HINDER ENGLISH SPEAKING DEVELOPMENT IN MIA ISLAMIC BOARDING SCHOOL

Maulida¹, Septhia Irnanda^{2*}, Faudi³, Sarair⁴, Lina Farsia⁵, Nurul Inayah⁶

¹²³Universitas Serambi Mekkah, Indonesia

⁴⁵Universitas Muhammadiyah Aceh

⁶Universitas Syiah Kuala

*septhia.irnanda@serambimekkah.ac.id

ABSTRACT

The purpose of this study was to identify the factors that are causing difficulties for female students in grades 1-3 of Ibnu Khaldun MIA Islamic Middle School in Banda Aceh, in learning to speak English. The study involved 48 students, and a Likert-Scale questionnaire consisting of 16 statement items was used as the research tool. The questionnaire assessed personal, peer, teacher, and facility factors. The results showed that the facility factor is the biggest hurdle to learning English speaking skills, followed by peer-related, self-related, and teacher-related factors. The students expressed their dissatisfaction with the lack of facilities to watch videos and other digital learning materials. Additionally, they reported that their peers do not respond in English when they try to speak in English to them and laugh at them for using English. Furthermore, the factors of fear and the lack of vocabulary were also identified as significant self-related factors that hinder successful English-speaking learning. Lastly, the teacher's permission for the students to speak in the Indonesian language and their limited use of English in their interaction with the students are also reported as important roles in restricting the students' English-speaking development.

Keywords: speaking, English learning, boarding school, learning obstacles, EFL

1. INTRODUCTION

Boarding schools are an ideal education system to support foreign language learning or implement language programs (Jauhari, 2017; Ritonga & Nurdianto, 2022). Boarding schools provide an immersive learning environment that helps students develop habits conducive to achieving their academic goals. Islamic boarding schools are no exception and place great emphasis on instilling Islamic values. Typically catering to students in grades 7 and above, these institutions incorporate foreign language education into their curriculum. Students are required to communicate in a specific language, such as English or Arabic, within the boarding school's premises. To ensure compliance with the rules, room supervisors carefully monitor students' language usage, with some schools imposing penalties or fines for speaking their native language, such as Indonesian or any other ethnic language.

There has been controversy surrounding a particular regulation due to the fact that the languages being enforced are not familiar to the majority of the students. Specifically, English is a foreign language that is widely considered difficult to master by Indonesian-speaking learners (Lamb, 2007a; Lamb 2007b; Irnanda & Sarair, 2022). Many boarding schools disregard the fact that the students come from a zero-English environment and mostly are graduates of public primary schools that do not provide basic English lessons. English is not a compulsory subject in Indonesian primary schools (Afifah, 2017), which means that there are no government-trained English teachers available to support English learning at the primary level to ensure that Indonesian 7 graders are ready to learn English at the secondary level (Irnanda, 2021), regardless of the types of institutions they choose. Therefore, the boarding school's foreign-language daily use is more likely to create problems than offer solutions for teaching and learning the English language in Indonesia.

Several studies have examined the effectiveness of the English Education approach in Indonesian Islamic boarding schools. According to Rahayu's study conducted in 2015, students at the Husnul Khotimah boarding school in West Java still lack proficiency in English despite being exposed to the language for nearly 24 hours. This is attributed to various internal and external factors as elaborated as follow:



"The students still lack of understanding of grammatical patterns, incorrect pronunciation, and they (have) limited of vocabulary mastery, minimum opportunities, students interest, mother tongue use, seldom to practice and less discipline, fear of making mistake and environment factors. Besides, they also have a psychological problem such as lack motivation. The main factors of students' problems because the environmental factors which do not support them to implement English in daily language communication. From this factor also have a big effect for students that they lack of motivation and seldom to practice English. These show that students still have many problems of speaking English." (Rahayu, 2015, pp. 1)

Another study by Muhammad & Ashadi (2019) sampled several modern boarding schools in East Java to observe which theoretical principles, mentalist or behaviourist were employed by the school in eradicating their English Use regulation program. The results found that based on the observation and interview, the subject boarding schools use three main activities (1) Vocabulary Drills, (2) Environment Building and (3) the Explicit teaching of grammar (2019, p. 65), which according to the researchers are the combination of both theories and could be categorised as balance based on the Krashen (1981) second language learning theory (2019, p. 65). Yet, it is noteworthy that this study took place in modern boarding schools which normally have relatively above-average quality. Not only do the high-quality schools have students from relatively higher SES backgrounds, but they also comprise well-qualified teaching staff. To understand English-speaking teaching and learning in Indonesian Islamic boarding schools, it is therefore important to investigate the boarding schools from all quality levels and varied regional contexts in Indonesia.

Exploring students' speaking challenges in a life skill program at an Islamic boarding school - Al-Fahd, South Sumatra, Indonesia, Holyandah et al. (2022) reported that students were challenged by a variety of issues that had prevented them from having good speaking skills in English, such as lack of vocabulary, pronunciation and grammatical limited skills and knowledge, as well as the strong mother-tongue interference. Similarly, in several other studies, the problems are low participation and strong mother-tongue code-switching (Amelia & Komariah, 2017; Lestari, 2019; Aulia et al., 2021). Overall, most studies report language-related factors neglecting the other important potential factors such as facility and teacher-related factors. Hence, the present study, using the 7-9 graders of MIA Boarding School of Banda Aceh as the participants, aimed to look at the students' opinions on problems that hinder their English-speaking learning in boarding schools by including two additional factors; the teacher and school facility factors.

2. METHODS

Participants

The participants were 48 female students of grades 7, 8 and 9 of Markaz Al-Islah Al-Aziziyah Islamic Boarding School, Banda Aceh, Indonesia. The total population for these three grades were 57 students. The whole population was encouraged to participate, yet only 48 students filled out the survey.

Instrument

The instrument used in the present study was a Likert-Scale questionnaire. The questionnaire consisted of 16 items that were developed from four factors; the personal, peer, teacher and facility factors. The scale was tested for its normality using Saphiro-Wilk. All items score p-value <0.05. In other words, the questionnaire items are all normally distributed.

Data Analysis

The Likert-Scale was treated as interval data and is presented in the mean form that was calculated using SPSS.



3. RESULTS & DISCUSSION

Figure 1-4 summarises the four factors measured in the survey; the personal, peer, teacher and facility factors. Overall, based on the comparison of the total mean scores for every factor, it is found that the total mean score of the facility factor is the highest among all, followed by peer-related, self-related and teacher-related factors. Below, the result for every factor is presented and discussed from the most hindering factor to the least.

A. The Facility Factor

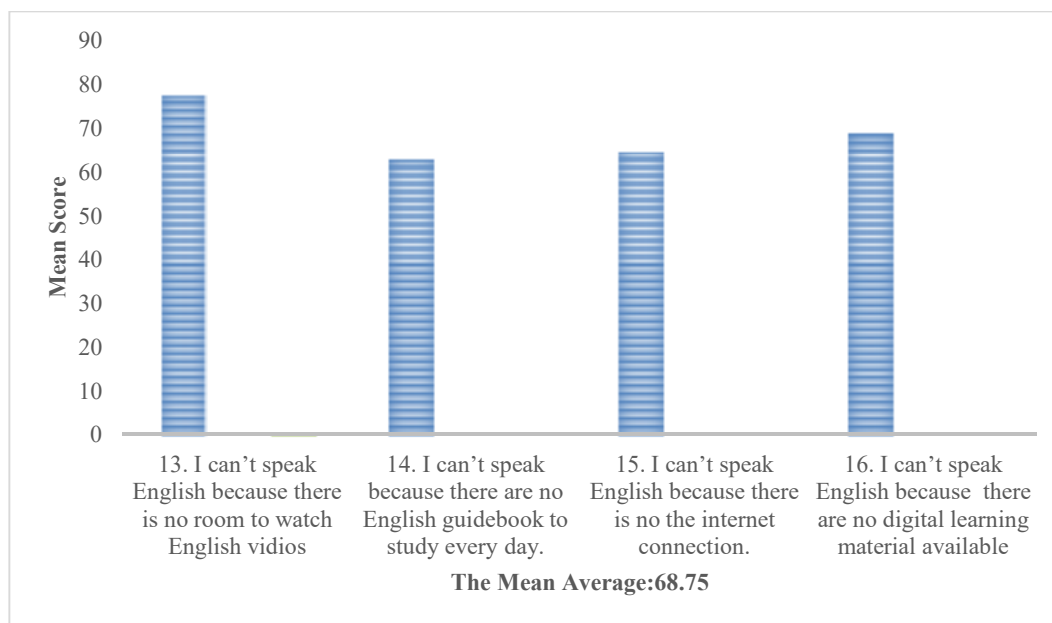


Figure 1. The Facility Factor

The first and most important finding of the present study is that the students believe that the lack of learning facilities is the most hindering factor in their English-speaking learning in boarding school. From the four subfactors listed; English videos, guidebooks, internet connection and digital materials, the lack of English videos is regarded as the most important factor, followed by the unavailability of digital learning materials, the absence of internet connection and the lack of English books. This finding is parallel with what was reported by Yousaf et al. (2021). The study also revealed that learning facilities have a positive impact on students' language learning achievement because it affects the learners' motivation to learn a language. This finding is also relevant to what is mentioned in the Background Section, that most students are unprepared to express themselves in a foreign language daily (Irnanda, 2021) and they express it by pointing out the facility problem as the root problem. Students in MIA are not allowed phones and also do not have a multimedia room that can support more interactive and fun learning. Therefore, being not well-equipped with English language learning resources, it is reasonable that they face hardship in improving their English skills in general and speaking skills in particular. In short, the students feel the need to hear the language, to see how it is used by others in various contexts before they are expected to experiment with it through speaking.



B. The Peer-Factor

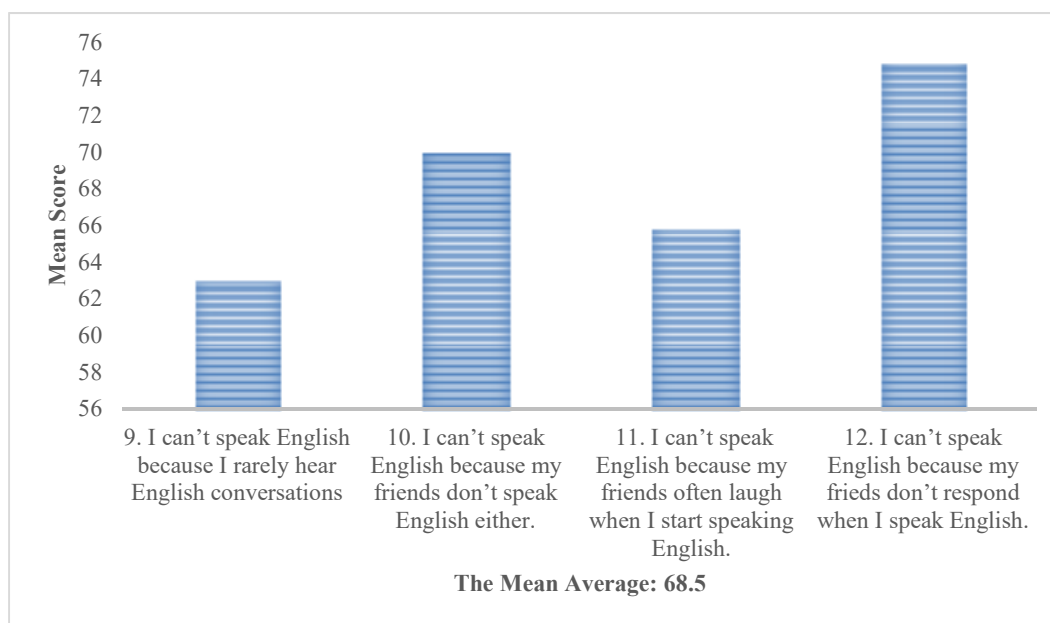


Figure 2. The Peer Factor

The second important factor that hinders the MIA Boarding school students in learning to speak English according to the students themselves is their peers. They believe that they cannot speak English because their friends do not respond when they are being spoken to in English (mean score: 74). Furthermore, they think they cannot speak English because their peers do not speak English either (70), the peers laugh at them if they speak in English (66), and because the community do not speak English to one another (63). From this finding, another reality of language regulation in boarding schools is revealed. The majority of the students have low English knowledge and skills but they are forced to run meaningful communication in English to function in their daily lives. In fact, according to Philp et al. (2013), peers and peer interaction can potentially foster second language learning. However, this peer interaction should be started from classroom settings, such as through roleplay and discussion before the students are confident and independent enough to make use of this peer assistance outside of the classroom.

C. The Personal Factor

From Figure 3, it can be seen that the most determinative personal-related subfactor is vocabulary knowledge. This finding is consistent with what was reported in previous related studies (Holyandah et al., 2022; Amelia & Komariah, 2017; Lestari, 2019; Aulia et al., 2021). Moreover, although the motivational factor is not believed to be that important in preventing them from being good English speakers, it looks like the other factors, such as the lack of facilities and unsupportive social circle (Figures 1 and 2), affect the students' motivation in general to learn English. In addition, two important internal factors, the fear of making mistakes and shyness to speak English are problems universally found in Indonesian EFL contexts. The latter, particularly, is regarded to be cultural rather than psychological by Alwasilah (2002). To find this culture in boarding schools with its peculiar English-speaking habit regulation adds more complexity to the matter.

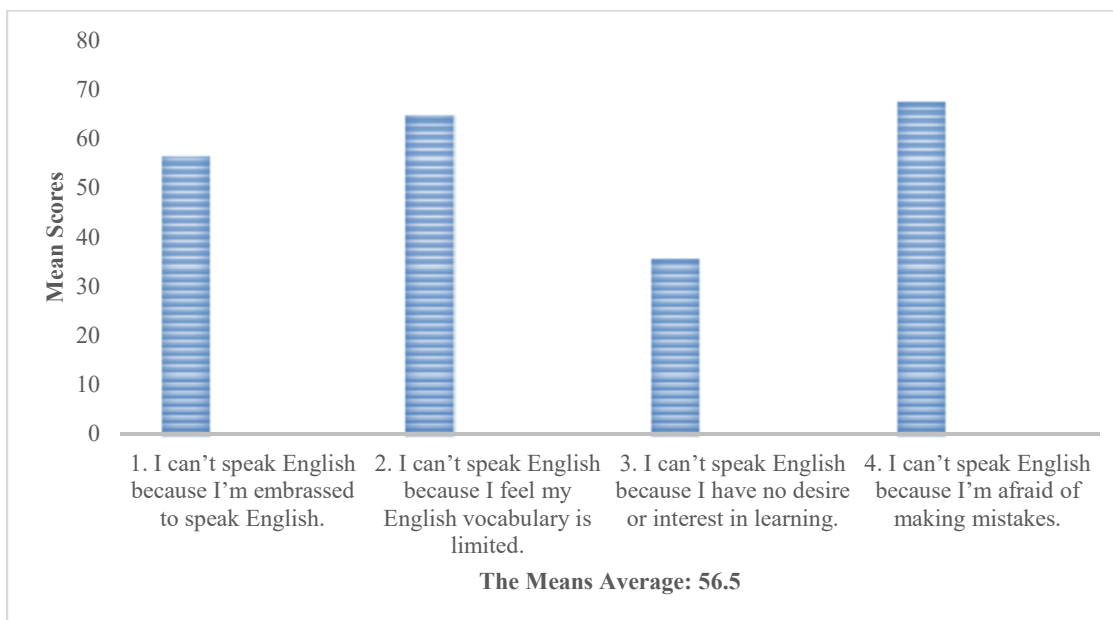


Figure 3. The Personal Factor

D. The Teacher Factor

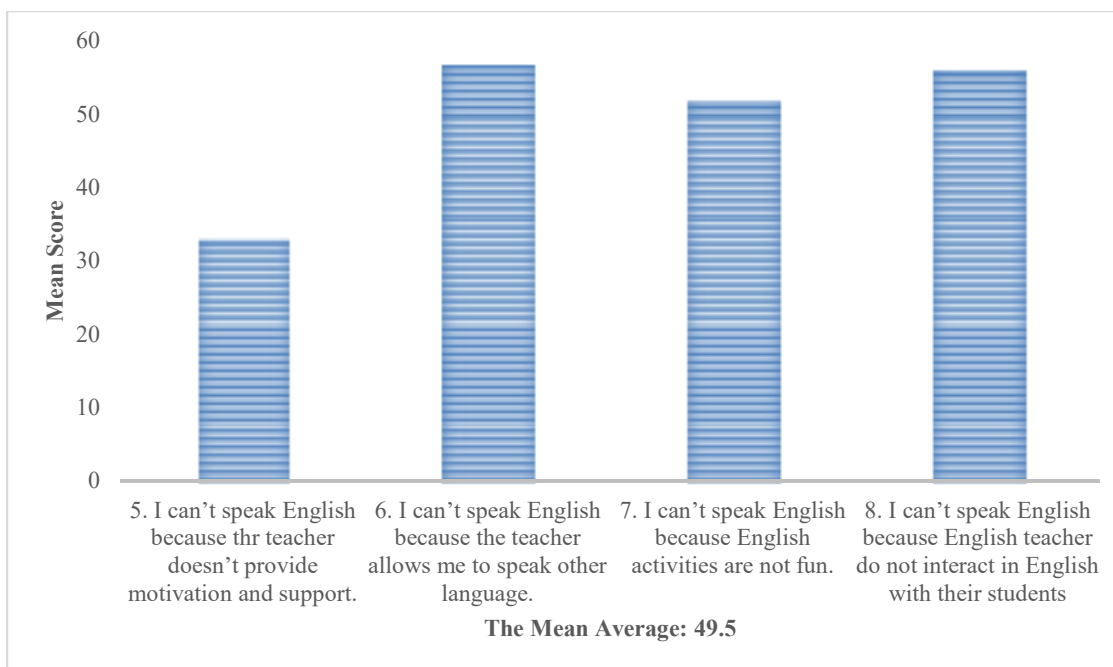


Figure 4. The Teacher Factor



The last contributing factor that is regarded as an obstacle to their English-speaking learning by the students is the teacher. Students see their boarding school teacher as too permissive. This is proven by a high agreement expressed by the respondents in item number 6; teachers allow them to speak in a different language. Something that contradicts the school regulation. Perhaps the teacher relates to what their students feel, that it is so difficult to function every day if access to their native language is blocked. The teachers themselves are also witnessed talking in languages other than English, including to their students (Item 8). The respondents also believe that English activities taught by the teachers are not fun enough and the teachers do not give enough support and motivation. This particular finding provides a dimension missed by related previous studies (Holyandah et al., 2022; Amelia & Komariah, 2017; Lestari, 2019; Aulia et al., 2021), that teacher plays a significant role in supporting the English language regulation in boarding schools.

4. CONCLUSION

The students of grades 7,8 and 9 at MIA Boarding School believe that despite the school's English language regulation that requires them to speak English daily, their English-speaking skills are not improved due to four important reasons; the facility, the peer, their personality and the teacher. Overall, the students feel their English competence is not sufficient to be used in social settings, and think that the school should have supported them with a less authentic learning experience, such as those from the digital resources, and fun role-play-based classroom activities. They also believe that the teacher should have been a role model for them and at the same time the language resource to whom they can safely practice their English.

REFERENCES

- Afifah, N. (2017). Problematika pendidikan di Indonesia. *Elementary: Jurnal Ilmiah Pendidikan Dasar*, 1(1), 41-47.
- Alwasilah, A. C. (2013). *Islam, culture, and education: Essays on contemporary Indonesia*. Rosda.
- Amelia, M., & Komariah, E. (2017). Investigating English speaking skill problems encountered by students at Islamic modern boarding schools. *Research in English and Education Journal*, 2(2), 119-126.
- Aulia, A. N., Hadi, M. S., & Izzah, L. (2021). English daily conversation at Islamic boarding school in improving speaking skill of EFL student. *Ethical Lingua: Journal of Language Teaching and Literature*, 8(1), 80-85.
- Holandyah, M., Marzulina, L., Erlina, D., Harto, K., Amalia, F., Fridiyanto, F., & Mukminin, A. (2022). Speaking challenges in a life skill program for Islamic Boarding school students: A case study. *Journal of Language Teaching and Research*, 13(3), 670-677.
- Irnanda, S., & Sarair, S. (2022). Learning L3 English early: A danger to L1 Indonesian language acquisition?. *Jurnal Dedikasi Pendidikan*, 6(2), 435-444.
- Irnanda, S. (2021). Preparing and motivating seventh graders of Indonesian junior high school to learn English through a Pre-Vocabulary Instruction Program. *Jurnal Dedikasi Pendidikan*, 5(1), 25-36.
- Jauhari, J. (2017). The Implementation of language program towards students' foreign language acquisition at bilingual islamic boarding school of Darul Amien Nagara Academic Year 2016/2017.
- Lamb, M. V. (2007a). *The motivation of junior high school pupils to learn English in provincial Indonesia* (Doctoral dissertation, University of Leeds).



- Lamb, M. (2007b). The impact of school on EFL learning motivation: An Indonesian case study. *Tesol Quarterly*, 41(4), 757-780.
- Lestari, H. (2019). *Problems in speaking English encountered by the students of Islamic boarding school of Darul Aman Gombara Makassar* (Doctoral dissertation, Pascasarjana).
- Muhammad, F. R., & Ashadi, M. (2019). Behaviorism or Mentalism? the case of foreign language learning process in Modern Islamic Boarding Schools. *IJIET (International Journal of Indonesian Education and Teaching)*, 3(1), 58-66.
- Philp, J., Adams, R., & Iwashita, N. (2013). *Peer interaction and second language learning*. Routledge.
- Rahayu, N. (2015). *An Analysis of Students' problems in Speaking English daily language program at Husnul Khotimah Islamic Boarding School* (Doctoral dissertation, IAIN Syekh Nurjati Cirebon).
- Ritonga, M., & Nurdianto, T. (2022). Strategies for improving Arabic language ability through language Environment: Phenomenology studies in Islamic boarding schools. *Journal of Language and Linguistic Studies*, 18(1), 496-510.
- Yousaf, I., Akram, M., Yousaf, S., & Ullah, N. (2021). Impact of facilities as a motivational factor on students' achievement in English as foreign language: teachers 'perspective. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 18(7), 383-392.



TECHNOLOGY EDUCATION AND INNOVATION OF CHAT GPT AND AI AT SMPS RK DELI MURNI BANDAR BARU MIDDLE SCHOOL STUDENTS

Benediktus Sipandi Ginggar^{1*}, Yohanes Kefi²

¹²Universitas Negeri Medan, Indonesia

*sipandinedos@gmail.com

ABSTRACT

Education in the Industrial Revolution 4.0 era demands innovation in the application of technology to improve the quality of learning. One increasingly popular innovation is the use of Chat GTP (Generative Pre-trained Transformer) and artificial intelligence (AI) in the educational context. This research aims to investigate the impact of implementing Chat GTP and AI in learning for students at SMPS RK Deli Murni Bandar Baru, North Sumatra in the era of the Industrial Revolution 4.0. The research method used is a case study involving junior high school students as research subjects. Data was collected through observation, interviews and questionnaires to evaluate students' perceptions and performance in using Chat GTP and AI in the learning process. Apart from that, data is also analyzed to identify the benefits, challenges and opportunities of implementing this technology. The research results show that the application of Chat GTP and AI in learning can increase learning interest, student involvement, and understanding of technology concepts. Students also show a positive response to the use of this technology in the learning process. However, some challenges such as technology accessibility and anxiety regarding changing teacher roles still need to be addressed. These findings provide an important contribution in developing learning strategies that are more innovative and responsive to the demands of the Industrial Revolution 4.0 era. The practical implication of this research is the need for a holistic approach to integrating technology into the curriculum, as well as adequate training for educators to utilize the potential of Chat GTP and AI technology effectively in the learning process.

Keywords: *Technology Education, Innovation, GTP Chat, Artificial Intelligence, Middle School Students, Industrial Revolution 4.0*

1. INTRODUCTION

In the 21st century, the world has moved towards Era 4.0, where the digital revolution and technological innovation greatly influence all aspects of life. In the midst of these changes, education must also plan strategies to implement new technologies such as Chat GTP and AI so that students can develop competencies that are relevant and competitive in the global job market. Chat GTP is one of the popular AI solutions today, which allows natural interaction between humans and AI systems through dialogue. Meanwhile, AI itself has great potential to drive transformation in the education sector, including optimizing the learning process, providing educational content, and evaluating learning outcomes.

In the era 4.0, where the digital revolution and technological innovation are becoming a hallmark, education plays a very important role in preparing future generations to face the challenges and opportunities offered by an increasingly connected world. In this context, the application of new technologies such as Chat GTP and artificial intelligence (AI) is an important strategy to improve the quality of education and develop relevant competencies for students so they can compete in an increasingly competitive global job market. (Sudiby, 2011)

GTP Chat as an AI Solution: GTP Chat is one example of an artificial intelligence solution that is popular today. This technology enables natural interactions between humans and AI systems through dialogue. With its ability to produce almost human-like responses, Chat GTP can be used in various contexts, including learning. For example, GTP Chat can be used as a virtual assistant to answer student questions, provide personalized learning assistance, and stimulate creative thinking through interactive dialogue.



AI's Potential in Educational Transformation: Apart from Chat GTP, artificial intelligence as a whole has great potential to drive transformation in the field of education. (Destiana., 2019) Here are some areas where AI can make a significant contribution: **Learning Process Optimization:** AI can be used to create learning programs tailored to individual students' needs and learning styles. Adaptive learning systems that use AI can identify students' weaknesses and strengths, and provide learning materials appropriate to their level of understanding.

Providing Educational Content: AI can be used to create interesting and interactive educational content, such as learning videos, simulations and customized learning materials. By utilizing technology such as big data analysis, AI can help teachers and educational institutions in compiling relevant and effective learning materials. **Evaluation of Learning Outcomes:** AI can be used to automatically evaluate student learning outcomes, both through online exams and other formative assessments. (Sutopo, 2012) By utilizing natural language processing techniques and data analysis, AI can provide accurate feedback quickly and accurately regarding student learning progress, as well as helping teachers in designing more effective learning strategies. **In-depth on Topic:** To understand more deeply about the application of Chat GTP and AI in education, further research and exploration needs to be carried out on: **Integration Methods:** How can Chat GTP and AI technology be integrated into existing curriculum and learning strategies? **Ethics and Privacy:** How can education ensure the ethical use of AI technology and respect for student privacy? **Teacher Training and Development:** How can teachers be empowered and trained to use AI technology effectively in the learning process?

Impact Measurement: How can the effectiveness of using AI technology in improving student learning outcomes be measured and evaluated objectively? By exploring these aspects, education can harness the full potential of GTP Chat technology and AI to create more innovative, adaptive and relevant learning experiences for students in the 4.0 era.

2. METHODS

The method used in the research is a descriptive qualitative method with the subject sources being students and teachers at SMPS RK Deli Murni. This research will continue and wants to see further how technological developments in the AI and Chat GTP framework have an influence on the student learning process. This of course also sees how the teachers, namely the teachers at SMPS Rk Deli Murni, accept this development as part of the way they teach and educate students at SMPS RK Deli Murni.

3. RESULTS & DISCUSSION

Integration of ChatGPT and AI at SMK RK Deli Murni Bandar Baru

The implementation of ChatGPT and AI at RK Deli Murni Bandar Baru Vocational School is carried out through several methods, starting from AI applications to create dynamic learning materials to ChatGPT as a means of assistance in carrying out students' final assignments. As a result, students can develop broader competencies and can integrate science with advanced technology.

Furthermore, Chat GTP has integrity. The integration of ChatGPT and AI at the RK Deli Murni Bandar Baru Vocational High School (SMK) is an initiative to encourage interactive, dynamic learning and create the possibility for students to develop broader competencies and be able to integrate science with technology. sophisticated. (Jamun, 2016) The following are some of these implementation methods:

1. AI Application to Create Dynamic Learning Materials. Use of machine learning algorithms to improve learning content and materials according to individual student needs.
2. ChatGPT as a means of assistance in carrying out students' final assignments This system provides practical solutions to problems students experience when completing final assignments, including ideas, concepts, and project structure.

The results of this integration include (Yuberti, 2015):



- More modern and effective education policies.
- Significant development of student competence.
- Increased student motivation and interest in learning.
- Adaptation of learning to suit individual student needs.
- Application of advanced technology in the education system.

This implementation also has positive impacts for teachers, such as:

- Facilitate teacher creativity in creating AI-based learning materials.
- Stimulate teachers to continue to master new knowledge and advanced technology.
- Make it easier for teachers to identify individual student needs.

With the integration of ChatGPT and AI at SMK RK Deli Murni Bandar Baru, students and teachers can develop broader competencies and be able to integrate science with advanced technology, which is very important in this digital era.

Positive impact

The integration of ChatGPT and AI at RK Deli Murni Bandar Baru Vocational School has several main benefits, (Munir, 2008) including:

1. Speed up the learning and studying process.
2. Make it easier for students to understand difficult material.
3. Increase student motivation in learning.
4. Facilitate a more efficient learning process.

Negative Impact

However not all aspects of the integration of ChatGPT and AI at SMK RK Deli Murni Bandar Baru have a positive impact. Some negative impacts include:

1. Dependent on AI technology.
2. Potential extreme dependency on ChatGPT and AI.
3. Risk of basic science concerns.

Solutions for Negative Impacts

To overcome these negative impacts, pedagogy and stakeholders must understand the risks and how to overcome them, including:

1. Train students to understand the limits and limitations of AI technology.
2. Design a curriculum that integrates AI technology with basic science.
3. Support students in understanding ethical and moral principles in using AI technology.

4. CONCLUSION

Technology Education and Innovation Chat GTP and AI among RK Deli Murni Bandar Baru Middle School Students in the 4.0 era illustrates the use of advanced technology in the context of education in a junior high school. The solution offered by the author is as follows: Teacher Training: Provide adequate training to teachers to understand and use Chat GTP and AI technology effectively in the learning process. Supervision and



Mentoring: Teachers need to provide adequate supervision and guidance to students in using this technology. This is important to ensure responsible and effective use of technology. Relevant Curriculum: Integrate the use of Chat GTP and AI in the curriculum so that it supports learning objectives and the development of student competencies in accordance with the needs of the 4.0 era. Evaluation of Impact: Conduct regular evaluations of the impact of the use of technology on the teaching and learning process and student academic achievement. Cultivating Soft Skills: Apart from focusing on academic aspects, it is also important to cultivate soft skills such as critical thinking, collaboration and communication skills in using this technology. Adjustment to Individual Needs: Ensure that the use of this technology can be adapted to individual student needs and ability levels so that all students can benefit from the use of this technology. By implementing the solutions above, SMPS RK Deli Murni Bandar Baru can make optimal use of Chat GTP and AI technology in education, while ensuring that the learning process remains relevant, effective and competitive in the 4.0 era.

5. ACKNOWLEDGMENTS

The author would like to thank the Foundation and the Principal of SMPS RK Deli Murni for the opportunity given so that the author could complete this research. Hopefully, this short article will inspire other writers to continue to innovate in the world of education and technology.

REFERENCES

- Destiana. (2019). Pengaruh teknologi informasi berbasis android (smartphone) dalam pendidikan industri. *Prosiding Seminar Nasional Pendidikan Program PAasca Sarjana Universitas PGRI Palembang*, 190.
- Jamun, Y. M. (2016). Desain aplikasi pembelajaran peta ntt berbasis multimedia. *Jurnal Pendidikan Dan Kebudayaan Missio*, 8(7), 144–150.
- Munir. (2008). *Teknologi Informasi dan Komunikasi (TIK)*. CV. Alfabeta.
- Sudibyo, L. (2011). Peranan dan dampak teknologi informasi dalam dunia pendidikan di indonesia. *Jurnal WIDYATAMA Universitas Veteran Bangun Nusantara Sukoharjo.*, 5(7), 123–125.
- Sutopo, A. H. (2012). *Teknologi informasi dan komunikasi dalam Pendidikan*. Graha Ilmu.
- Yuberti. (2015). “Peran teknologi pendidikan dalam perspektif islam. *Jurnal Pemikiran Islam STAIN Jurai Siwo Metro Lampung*, 1(23), 245.



NEED ANALYSIS OF MOBILE LEARNING AT JUNIOR HIGH SCHOOL IN INDONESIA: A BLIOMETRIC STUDY

Bekti Aprilia^{1*}, Muhammad Japar², Maria Paristiwati³

¹²³Universitas Negeri Jakarta, Indonesia

*bektiaprilialia_9902921013@mhs.unj.ac.id

ABSTRACT

This research examines the need for mobile learning at Indonesia's junior high school. Mobile learning is a learning approach that uses mobile devices and digital technology to support the learning process. This research aims to understand research trends related to mobile learning and the need for mobile learning in Indonesian junior high schools. This research uses bibliometric analysis to evaluate mobile learning research trends in Indonesian junior high schools. Bibliometric analysis involves collecting and analyzing relevant bibliographic data or scientific publications. The research uses four application tools. First, Publish or Perish was used to search for scientific articles by keyword, resulting in 752 articles. Then, through Mendeley, filtering was carried out based on specific criteria, resulting in 561 articles. Next, Covidence filtered articles in detail, resulting in 158 relevant articles. Finally, VOS viewer is used for data visualization with co-occurrences. The results of the bibliometric analysis show that research on mobile learning in Indonesian junior high schools has increased significantly since 2020. Various disciplines are involved in mobile learning research, primarily focusing on mathematics, science, and language education. Apart from that, the field of information technology also has a vital role in developing mobile learning applications and infrastructure. This research provides an objective view of research trends and mobile learning needs in Indonesian middle schools, provides direction for further research, and supports the development of more innovative and inclusive education in the future.

Keywords: *mobile Learning, indonesian junior high school, bibliometric analysis, educational development*

1. INTRODUCTION

Technological developments have a significant impact on education in schools. Technology has expanded access to education, reaching broader demographics, breaking down geographic barriers, and enabling diverse students to benefit from educational resources. Mobile learning is increasingly popular in various contexts, especially in education, due to the increased ownership of mobile devices and advances in mobile applications that provide practicality, comfort, and flexibility in the learning process (Little., 2011).

Apart from that, the COVID-19 pandemic has also accelerated the implementation of mobile learning, opening our minds to the need to highlight the importance of technology in education. The COVID-19 pandemic has changed how human activities are carried out in various sectors, including education, encouraging the development of distance learning through information and communication technology (ICT). In Indonesia, the use of ICT in education has increased rapidly over the last three years, mainly due to the pandemic. The government and educational institutions focus on technology to overcome educational problems during the pandemic, avoiding the risks of traditional face-to-face methods (Kamaludin et al., 2022; Zakiyya. H., 2022). Technological developments have provided a significant impetus for developing and implementing mobile learning systems in schools. These advances create new opportunities in education, increasing the accessibility and flexibility of learning.

Mobile learning relies on mobile devices and digital technology, such as smartphones and tablet computers, to support and enhance the learning process (Ferreira et al., 2013). According to Newby et al., (2006), mobile learning is defined as learning in various places, contexts, through social interaction and content using



mobile electronic devices (Newby et al., 2006). Mobile learning is mobile learning that utilizes mobile technology so that students can learn anywhere without time and place limitations. Mobile learning is a learning model that utilizes information and communication technology. Mobile learning can be defined as the use of mobile devices, such as mobile phones, tablets and laptops for teaching and learning purposes. With features such as portability, social connectivity, context sensitivity, and individuality mobile devices have made computer-based education more accessible and integrated with learning and teaching scenarios (Han, 2022). Mobile learning is an essential new learning paradigm in a knowledge-based society, with independence in learning time and place. Mobile learning also encourages visualization, interactivity, and efficiency, even in teaching children with disabilities (Izhdeneva, 2021). With mobile platforms, students can access content anywhere and at any time, creating a flexible learning approach that is responsive to individual needs (Ferreira et al., 2013).. Mobile learning can support nursing student engagement and learning in pre-simulation preparation, and in the pre-briefing and debriefing phases of clinical simulations (Costa et al., 2022).

In the context of the potential for mobile learning in Indonesia, research results and findings illustrate how mobile devices, such as cell phones, can play an essential role in supporting education and learning in this country. Research shows that students in Indonesia are very accustomed to using mobile devices and applications and have a favorable view of mobile learning (Suana, 2018). In addition, other findings reveal that mobile phones have the potential to help provide equitable access to education, especially in rural and remote areas in Indonesia (Suherman et al., 2020). Thus, mobile phones can be considered a tool with great potential in the context of mobile learning in Indonesia, given their role in supporting education and learning in this country (Garg et al., 2022).

Mobile learning provides students with learning flexibility. They can access materials, multimedia interactions, and independent learning, increasing their understanding of various subjects. With content adaptation and progress monitoring, mobile learning supports personalized learning. It is also inclusive for students with special needs and allows for collaboration.

Mobile learning has been proven to be a valid, practical, and effective method for teaching procedural and conceptual knowledge of fractions to elementary school students (Andriah & Amir, 2021; Yani et al., 2022). Its validity lies in aligning content and methods with educational standards, ensuring that the approach covers important fraction concepts. From a practical perspective, mobile learning is feasible and convenient for teachers and students, considering factors such as accessibility and integration into the curriculum.

Additionally, mobile learning has demonstrated its effectiveness by improving students' understanding of fractions, as evidenced by increased assessment scores, higher retention rates, and better overall performance in fraction-related assignments. This approach leverages the capabilities of mobile devices and applications to create engaging and meaningful learning experiences for young learners.

Mobile learning has been proven to be an effective strategy for improving learning practices and improving communication, engagement, and outcomes of student learning experiences (Andriah & Amir, 2021; Jan et al., 2016; Salhab & Daher, 2023).

Critical factors influencing learner engagement in mobile learning applications include usability, availability of learning experiences, features to facilitate learning, interaction between individuals, and incentives to complete learning (Liu & Correia, 2021). Mobile learning has transformed traditional education into a more accessible, interactive, and engaging experience. By providing flexibility, encouraging collaboration, offering multimedia resources, and improving communication, it has become a valuable tool for universities looking to improve learning practices and enrich the educational journey for their students.

Mobile learning systems can also provide teachers with new ways to engage students through interactive quizzes, games, and other multimedia content (Coello-Vásquez, 2019). Mobile learning provides teachers with various ways to make learning more exciting and compelling. By utilizing mobile technology, teachers can create a more interactive and dynamic learning experience, which can help students achieve a better understanding of the subject matter.

Teachers can easily create quizzes relevant to the lesson material, and students can answer them via mobile devices, which makes learning more exciting and helps teachers measure students' understanding of the



subject matter. In addition to interactive quizzes, mobile learning systems can also offer educational games. This game is designed to teach lesson concepts in an interactive and fun way. Students can learn while playing, which can increase their motivation to learn.

Finally, mobile learning presents some significant economic advantages compared to traditional teaching methods. One of the main benefits is reduced reliance on physical textbooks and other printed materials. In traditional teaching methods, educational institutions and students often have to spend large amounts of money to purchase textbooks, journals, and other printed materials needed for learning (Somasundaram et al., 2021).

Thus, mobile learning systems enable more affordable education and are more sustainable from an ecological perspective, making education more inclusive and helping reduce the financial burden on students and educational institutions.

In conclusion, mobile learning in education offers many significant advantages, such as accessibility, flexibility, increased student understanding, practicality, efficiency of use, interactivity, and reduced costs, making mobile learning a valuable tool in changing the way learning and teaching are done, increasing inclusivity, and enriching the educational experience for various types of learners.

Previous research on the use of mobile learning for Indonesian students at the junior high school level was reviewed by (Somasundaram et al., 2021). This research examines the use of mobile augmented reality in physics learning for junior high school students in West Java Province, Indonesia. The research results show that when students use mobile augmented reality, they achieve better learning achievements than textbooks. Qualitative data collected through interviews with students after they used mobile augmented reality indicated that augmented reality technology provides an effective learning environment that helps students understand physics concepts better, improves their achievement, and makes abstract concepts more real through visual simulations. 3D.

Another study (Winzky & Aswir, 2022) evaluated how first-year students at an Islamic junior high school in Indonesia responded to using mobile applications to improve their English pronunciation. The results revealed that students gave a positive view towards the use of mobile applications in learning English pronunciation, which could contribute to improving their English pronunciation skills.

Other research examines the impact of mobile augmented reality on physics learning outcomes and students' perceptions of using this technology. There were 64 participants in this research, who were students from grade 7 at a junior high school in West Java Province, Indonesia. This research reveals that students who use mobile augmented reality show higher levels of learning achievement compared to students who rely on textbooks as their learning resource (Rahmat et al., 2023)

A study conducted in East Nusa Tenggara, Indonesia, aimed to see high school students' responses after they participated in mobile learning. For two weeks, students were involved in mobile learning focusing on physics subject matter. The results of this research conclude that students in this area receive mobile learning well (Winzky & Aswir, 2022).

Finally, a study that compiled interactive teaching materials used the Edmodo platform as an alternative natural science (science) learning media to improve junior high school students' critical thinking skills. The results of this research conclude that Edmodo-based interactive teaching materials can function as an alternative science learning media that meets the criteria for validity, ease of use, and effectiveness.

Even though the advantages of mobile learning have been proven to bring benefits, several challenges and obstacles are visible for schools in Indonesia in implementing mobile learning. One of the main challenges is the need for more infrastructure and connectivity in some regions, which hinders access to mobile learning resources, especially for students living in remote areas. These obstacles can limit the potential of mobile learning to reach all students.

Another significant obstacle is teacher training in implementing mobile learning technology effectively. Many teachers still need to gain sufficient skills or knowledge to integrate mobile learning into their teaching methods, which can influence the effectiveness of mobile learning in achieving educational goals. Other challenges include developing high-quality mobile learning content, especially for subjects requiring interactive and multimedia resources. An adequate content development process requires a sufficient investment of time and



resources. Finally, pedagogical challenges must be addressed, such as ensuring that mobile learning activities align with learning objectives and can produce engaging and compelling learning experiences for students.

Implementing mobile learning in Indonesian schools requires significant investments in infrastructure, teacher training, and content development. However, if these challenges can be addressed effectively, mobile learning can improve student engagement and academic performance, bringing positive benefits to the world of education.

This study uses bibliometric analysis to assess the need for mobile learning in Indonesia's junior high school education context. *Bibliometric analysis* is a research approach that collects and analyzes scientific publication data relevant to this topic. The main objective of this research is to understand research trends, existing weaknesses, and the potential for developing mobile learning in junior high school education in Indonesia. Through this method, research can provide a more objective view of how mobile learning can effectively overcome educational challenges in Indonesia.

Bibliometrics can be applied in various fields, including education, mathematics, information architecture, and program coordination. *Bibliometrics* is a quantitative method used to measure, track, and analyzing scientific literature that involves analyzing patterns of publications, citations, and collaboration between researchers in a particular field (Bornmann & Hug, 2020). Bibliometric analysis can be used to identify trends, patterns, and gaps in research and to disseminate research impact (Burma Oglu et al., 2019). Bibliometric analysis can provide valuable insight into research developments in a particular field, which can help researchers and policymakers identify gaps and opportunities for future research. In addition, bibliometric analysis can also be used to form a conceptual framework for further research and develop theory in a field.

Therefore, this research uses bibliometric analysis to describe and map scientific articles related to the need for mobile learning at junior high school level in Indonesia. Through this analysis, trends in the number of research that have been published, research trends from various scientific disciplines, and keywords that often appear together in publications will be seen. Apart from that, this research also conducted a content analysis of all articles to understand the efforts to address the need for mobile learning at the junior high school level. Apart from that, this research also tries to identify regions in Indonesia that are the main focus of research related to mobile learning in the context of junior high school-level learning.

2. METHODS

The research used bibliometric analysis, which is a quantitative method for analyzing bibliographic data in articles and journals. The application tools used are: Publish or Perish, Covidence, Mendeley, and VosViewer. These are the complete descriptions:

2.1 Publish or Perish

The data collection method used in this research begins with using the Publish or Perish application, which allows researchers to quickly and efficiently identify and access scientific articles that are relevant to their research. This approach helps support research methodology and knowledge development in Indonesia's mobile learning context.

The first step is setting search keywords that match the research focus. Keywords used include "mobile learning for Indonesian junior high schools" and "mobile learning for junior high schools." By setting these keywords, the search becomes more focused, making it possible to find articles relevant to the research topic. The combination of the three keywords above produces 752 articles that are relevant to the research topic. After getting the search results, each keyword's data is exported to RIS format for further processing using Mendeley.

2.2 Mendeley

Next, search results from the Publish or Perish application are filtered according to predetermined criteria. These criteria include, namely, that the article is scientific research, published in a scientific journal, indexed in Google Scholar, and published between 2013 and 2023. This filtering was carried out through Mendeley; this



produced 561 articles. Besides filtering through Mendeley, we also complete author keywords to simplify the subsequent analysis process.

Covidence

The data is then processed through the Covidence application. This application will filter article data in detail in two stages :filtering based on title and abstract and filtering based on full text. One by one, the articles will go through these two stages to avoid duplication and get increasingly relevant. The results of the screening on Covidence were 158 relevant articles. Covidence is a platform that combines technology and methodology to help researchers run systematic reviews more efficiently, save time, and ensure that the correct methodology is used in their investigations.

2.3 VOSviewer

A total of 158 articles were then visualized via bibliometric software, which introduced literature data samples and drew a knowledge map. Vosviewer presents the overall external characteristics of a subject area, and this software has unique advantages, especially in clustering analysis (Huang et al., 2022).

The search and filtering of articles carried out can be seen in the data collection and analysis flow in Figure 1 below.

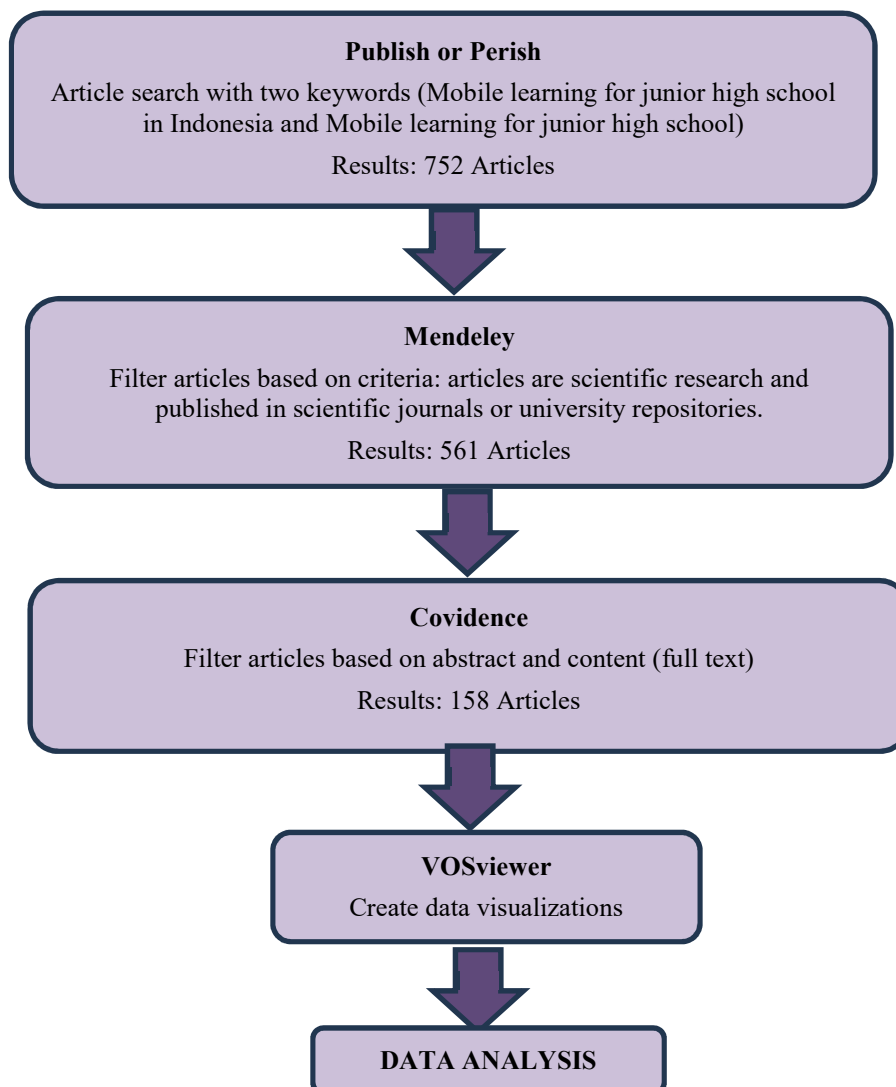




Figure 1. Article Search and Filtering Process

3. RESULTS & DISCUSSION

3.1 Trends in Mobile Learning Research Publications at the Indonesian Junior High School

Judging from the Research Publication Trends, after conducting a search using the keywords "mobile learning for junior high school Indonesia" and "mobile learning for junior high schools," which were accessed on September 17, 2023, as well as going through the filtering stages via Mendeley and Confidence, from 2011 to 2023, research related to mobile learning at junior high schools in Indonesia has experienced a significant increase since 2020, coinciding with the COVID -19 pandemic.

The following is a graph of research trends from 2011 to 2023, processed by researchers:

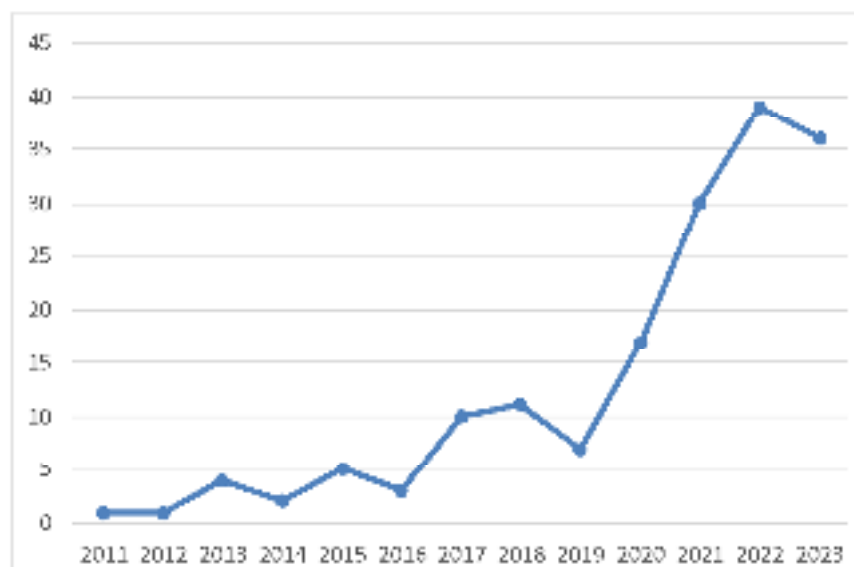


Figure 2. Research Trend Graph

Based on search results, research on mobile learning has increased significantly since the COVID-19 pandemic hit, and the pandemic has changed the educational landscape, forcing many educational institutions to switch to distance learning. Mobile learning, which uses technology and mobile applications to support the learning process, is becoming increasingly important as researchers realized that it can effectively bridge learning gaps when face-to-face learning is limited. The increasing use of mobile devices and broader internet access also make mobile learning research increasingly relevant, opening up new opportunities for educational innovation and developing better educational technology. Therefore, COVID-19 has triggered increased interest and research in the mobile learning domain, creating new opportunities and challenges that must be overcome in an increasingly digital educational era.



3.2 Writing Trends on the Use of Mobile Learning at Indonesian Junior High School Based on Scientific Disciplines

From the scientific area, it can be seen that the writing of articles on the use of mobile learning comes from various scientific disciplines, as seen in Figure 3 below.

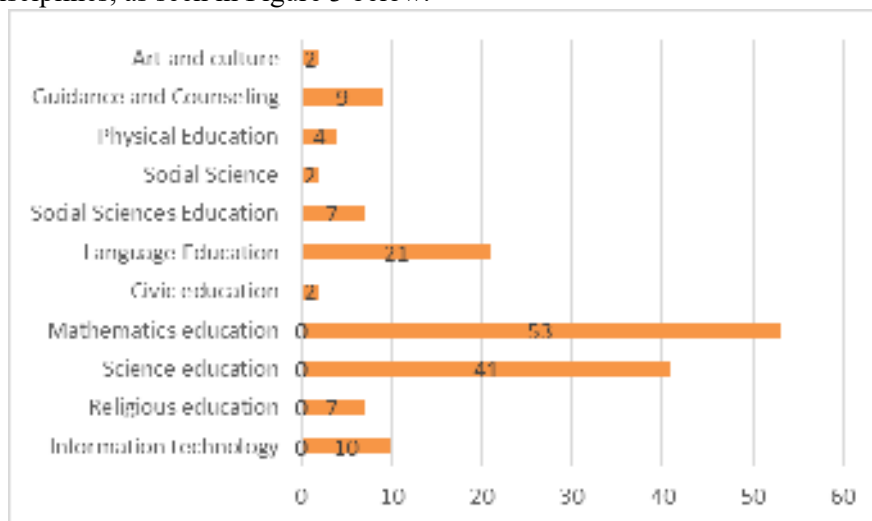


Figure 3. Research Trends Based on Scientific Fields

This table provides an overview of research trends in various scientific fields related to mobile learning using mobile technology. In this table, mathematics education and science education are the two fields that attract the most attention in the context of mobile learning. Much research has focused on using mobile technology to improve learning and teaching methods in these two fields. Language education has also received significant attention for developing language skills through mobile applications and text-based learning. Information technology, which is naturally related to developing mobile applications and technological infrastructure that supports mobile learning, is also highlighted in this table. Guidance counseling is another area that may involve using mobile technology to provide counseling services and educational guidance to students.

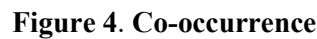
In addition, the fields of religious education, social sciences education, physical, artistic and culture are also involved in mobile learning in more specific ways. Although the number of studies in these areas is lower in the table, the relevance of using mobile technologies in an educational context remains.

Thus, this table illustrates the extent to which various scientific fields have explored and applied mobile learning in their teaching and research methods, reflecting the diversification of the use of mobile technology in various aspects of learning and teaching in various scientific fields.

With the various disciplines involved in mobile learning, students in Indonesia can expand their knowledge and develop relevant skills, which will ultimately help them face the challenges of education and an increasingly technology-based future. Mobile learning is a trend and an effective tool for advancing education in Indonesia.

3.3 Co-occurrence

Apart from the number, year of publication, and scientific disciplines studied, the need for mobile learning at the junior high school level in Indonesia is studied. The author also tries to illustrate the relevance of this topic by looking at the terminology used when searching using different terminology using the VOSviewer application (see Figure 4).



From the network visualization, it can also be seen that the item with the highest occurrence is "mobile learning," with 48 occurrences. These occurrences indicate how many articles appear when this keyword is used and provide essential information on topics and discussion material in the related journal, followed by the keywords Android, learning media, and development.



3.4 Need Analysis of Mobile Learning for Junior High School in Indonesia

Mobile learning is an educational innovation that is increasingly receiving attention in various countries, including Indonesia. At the junior high school (SMP) level, it is vital for students to be familiar with mobile learning because technology in education provides various benefits and essential preparation for their future. Several studies show that mobile devices and digital tools can facilitate learning and increase motivation among middle school students. For example, making mobile learning more interesting in the classroom can help students understand lessons and increase their learning motivation (Albantani & Rahmadi, 2020; Honório et al., 2018).

The need for mobile learning is also strengthened by data showing that the education gap in Indonesia is very high. Many students still need access to high-quality education, especially in remote and isolated areas. According to data from the Central Statistics Agency (BPS), school participation in Indonesia is still low, especially at the secondary education level. In 2019, the participation rate for junior high schools (SMP) in Indonesia was only 88.67%. In addition, many schools in Indonesia must have adequate educational facilities and resources. According to data from the Ministry of Education and Culture, in 2019, only around 60% of schools in Indonesia had internet access. Based on that data, mobile devices such as smartphones and tablets can solve education gaps in Indonesia. Using mobile devices, students in remote and isolated areas can access high-quality educational resources that may not be available at their schools. This can help increase school participation and improve the quality of education in Indonesia.

Understanding mobile learning from a junior high school age also significantly impacts their development when they become professionals in the future. One is the ability to continuously access up-to-date information that is only sometimes available in traditional textbooks. This helps students build lifelong learning habits that will be beneficial when they become professionals in various fields. So, understanding mobile learning at an early age will positively impact their readiness to continue learning and developing in the future.

For example, a Canadian study involving health and social services professionals found that mobile learning immensely helped professionals gain better access to the latest information in their field, allowing them to stay informed about current developments (Curran et al., 2019). Another example of research on continuous professional development for teachers in Indonesia shows that mobile learning can effectively provide the latest information and expand teachers' knowledge and skills beyond what they learned during initial training (Effendi & Hendriyani, 2018).

Furthermore, research in Zambia examining the use of mobile technology in mathematics education shows that mobile devices can provide students with access to the latest information and support the development of critical problem-solving skills (Nkhata & Mwanza, 2018). Thus, mobile learning is the key to overcoming educational challenges and giving middle school students in Indonesia access to the latest knowledge to help them grow and develop. This is essential to promoting equality in education and preparing young people for an increasingly digital world.

4. CONCLUSION

Technological developments, especially mobile learning, have significantly impacted education at the junior high school level in Indonesia. The application of mobile learning has increased along with the development of mobile device ownership and mobile applications that enable more flexible and practical learning. The COVID-19 pandemic has also accelerated the use of mobile learning, highlighting the critical role of technology in education. The research results show that students in Indonesia are very accustomed to using mobile devices and have a favorable view of mobile learning. Mobile phones have great potential to support equitable education, especially in rural and remote areas in Indonesia.

Mobile learning provides students flexibility, allowing them to access material anytime and anywhere, and support personalized learning. Research also shows that mobile learning effectively improves student understanding, grades, and overall performance in certain subjects, such as math and science.

Although mobile learning has many advantages, several challenges must be overcome, including infrastructure and connectivity problems in remote areas, a lack of teacher training in integrating technology and developing high-quality learning content. However, if these challenges can be addressed effectively, mobile



learning has great potential to improve student engagement, academic performance, and inclusivity in education in Indonesia.

Bibliometric research also provides insight into research trends, comparisons of contributing disciplines, and keywords frequently appearing in articles. The results of this bibliometric analysis help understand the development of mobile learning research at the junior high school level in Indonesia, which is increasingly relevant in modern education.

To face educational challenges and realize more inclusive and sustainable education, implementing mobile learning in schools in Indonesia requires significant investment in infrastructure, teacher training, and content development. However, the potential for mobile learning to advance education in Indonesia is accurate, and this is the right step towards a more technology-based educational future.

Bibliometric studies highlight the diversity of disciplines that have explored and applied mobile learning in their teaching and research methods, reflecting the diversification of the use of mobile technologies in various aspects of learning and teaching across various disciplines.

Mobile learning research publication trends have significantly increased since 2020, especially in response to the COVID-19 pandemic. This indicates that mobile learning has become an effective solution for bridging educational gaps during limited face-to-face learning.

All the results of this research emphasizes the vital role of mobile learning in changing education and learning in Indonesia and offer an excellent opportunity to make more use of it to improve education at the junior high school level. Mobile learning is the right solution to provide quality and equitable education, especially in remote and isolated areas, while also providing flexibility and interactivity in learning.

5. REFERENCES

- Albantani, A. M., & Rahmadi, I. F. (2020). Mobile devices for arabic learning in junior high schools: the teachers' perspective.
- Andriah, A., & Amir, M. F. (2021). Mobile learning based on procedural and conceptual knowledge on fractional for elementary school. *Jurnal Ilmiah Sekolah Dasar*, 5(4), 567. <https://doi.org/10.23887/jisd.v5i4.40819>
- Bornmann, L., & Hug, S. (2020). Bibliometrics-based heuristics: what is their definition and how can they be studied?-research note. *Profesional de La Informacion*, 29(4), 1–9. <https://doi.org/10.3145/epi.2020.jul.20>
- Burmaoglu, S., Sartenaer, O., Porter, A., & Li, M. (2019). Analysing the theoretical roots of technology emergence: an evolutionary perspective. *scientometrics*, 119(1), 97–118. <https://doi.org/10.1007/s11192-019-03033-y>
- Coello-Vásquez, V. J. (2019). Effects of mobile learning in the efl classroom. *management, benefits and limitations. polo del conocimiento*.
- Costa, I. G., Goldie, C., Pulling, C., & Luctkar-Flude, M. (2022). Usability, engagement, learning outcomes, benefits and challenges of using a mobile classroom response system during clinical simulations for undergraduate nursing students. *clinical simulation in nursing*, 70, 1–13. <https://doi.org/10.1016/j.ecns.2022.05.001>
- Curran, V., Fleet, L., Simmons, K., Lannon, H., Gustafson, D. L., Wang, C., Garmsiri, M., & Wetsch, L. (2019). Adoption and use of mobile learning in continuing professional development by health and human services professionals. *Journal of continuing education in the health professions*, 39(2), 76–85. <https://doi.org/10.1097/CEH.0000000000000243>
- Effendi, H., & Hendriyani, Y. (2018). Mobile learning sebagai alternatif pengembangan keprofesian berkelanjutan



guru profesional.

- Ferreira, J. B., Klein, A. Z., de Freitas, A. S., & Schlemmer, E. (2013). Mobile learning: definition, uses and challenges.
- Garg, S., Prasad, Y., & Kumar, V. (2022). Mobile-based active learning can enhance engagement in classroom. *Proceedings of the 14th International Conference on Education Technology and Computers*.
- Han, S. (2022). Impact of smartphones on students: How age at first use and duration of usage affect learning and academic progress. *Technology in Society*, 70. <https://doi.org/10.1016/j.techsoc.2022.102002>
- Honório, J., Moura, J. A. B., Brito, P., Menezes, T., & de Barros, M. A. (2018). Gamification in location-based m-learning: students' perceptions of game elements. *International Conference on Computer Supported Education*.
- Huang, Y. J., Cheng, S., Yang, F. Q., & Chen, C. (2022). Analysis and visualization of research on resilient cities and communities based on vosviewer. *International Journal of Environmental Research and Public Health*, 19(12). <https://doi.org/10.3390/ijerph19127068>
- Izhdeneva, I. V. (2021). Characteristic of basic tools of mobile learning in informatics.
- Jan, S. R., Ullah, F., Ali, H., & Khan, F. (2016). Enhanced and effective learning through mobile learning an insight into students perception of mobile learning at university level. *International journal of scientific research in science, engineering and technology*, 2, 674–681.
- Kamaludin, N., Juanda, E. A., & Abdullah, A. G. (2022). Utilization of cloud computing for learning in the pandemic era of covid 19. *Proceedings of the 4th international conference on innovation in engineering and vocational education (ICIEVE 2021)*.
- Little, B. (2011). The Rising popularity of mobile learning southern europe. *ELearn Mag.*, 2011, 7.
- Liu, C., & Correia, A. P. (2021). A case study of learners' engagement in mobile learning applications. *Online Learning Journal*, 25(4), 25–48. <https://doi.org/10.24059/olj.v25i4.2827>
- Newby, T. J., Stepich, D. A., Lehman, J. D., & Russell, J. D. (2006). Educational technology for teaching and learning. In Teaching Forum. http://www.uwosh.edu/programs/teachingforum/public_html/?module=displaystory&story_id=648
- Nkhata, B., & Mwanza, B. J. (2018). Using mobile technologies in mathematics education: perspectives from student teachers and teacher educators in chipata district, Zambia.
- Rahmat, A. D., Kuswanto, H., Wilujeng, I., & Perdana, R. (2023). Implementation of mobile augmented reality on physics learning in junior high school students. *Journal of Education and E-Learning Research*, 10(2), 132–140. <https://doi.org/10.20448/jeelr.v10i2.4474>
- Salhab, R., & Daher, W. (2023). University students' engagement in mobile learning. *European Journal of Investigation in Health, Psychology and Education*, 13(1), 202–216. <https://doi.org/10.3390/ejihpe13010016>
- Suana, W. (2018). Students' internet access, internet self-efficacy, and internet for learning physics: gender and



grade differences. *Journal of Technology and Science Education*.

Suherman, Fauzan, A., & Yerizon. (2020). Development of actuarial e-learning based on android applications. *Proceedings of the 2nd International Conference Innovation in Education (ICoIE 2020)*.

Sunasundram, S., Zaidi, S. M. J., & Roslin, N. A. (2021). Impact of on-line learning system on higher education. *Psychology And Educatio*, 58(2), 6535–6543.

van Eck, N. J., & Waltman, L. (2023). VOSviewer manual version 1-6-19. Leiden: Univeristeit Leiden, January, 54. http://www.vosviewer.com/documentation/Manual_VOSviewer_1.6.1.pdf

Winzky, T. A., & Aswir, A. (2022). Junior high school students' perception of using mobile application to learn english pronunciation. *Jurnal Studi Guru Dan Pembelajaran*, 5(3), 233–238. <https://doi.org/10.30605/jsqp.5.3.2022.1514>

Yani, A., Pramita, A., Hartono, H., & Hodiyanto, H. (2022). Android-based mobile learning media with character. AKSIOMA: *Jurnal Program Studi Pendidikan Matematika*, 11(2), 839. <https://doi.org/10.24127/ajpm.v11i2.4790>

Zakiyya. H., N. N. (2022). Pengembangan media simach land berbasis android di sekolah dasar. *Jurnal Basicedu*, 5(4), 2541–2549.



APPLICATION OF ROLE-PLAYING METHOD TO OVERCOME STUDENTS' LEARNING DIFFICULTIES IN LEARNING MATH STORY PROBLEMS IN SANGUWATANG 1 STATE ELEMENTARY SCHOOL KARANGJAMBU SUBDISTRICT

Murwanto*

Universitas Muhammadiyah Purwokerto, Indonesia

*moreonetoo@gmail.com

ABSTRACT

The background is the evaluation results of Class V students at SD Negeri 1 Sanguwatang where, from the composition of the questions tested, in general the students were not capable and still found it difficult to complete story questions. From the results of observations of students' answer sheets, it appears that there are several reasons why students have difficulty solving mathematics story problems, such as: the ability to interpret the language of the questions is still lacking, students cannot determine what is known and what is being asked and students' ability to determine the mathematical model to be used. in solving problems. Therefore, the role-playing method is applied in the learning process. This research aims to determine the effectiveness of applying the role-playing method in improving student learning outcomes, especially in mathematics story problems. With role-playing, it is hoped that students will be able to realistically describe abstract things in the story. The research procedure was carried out in three cycles: planning, implementation, observation and reflection stages. Data collection techniques use qualitative (attitudes) and quantitative (values) data. Data analysis was carried out using comparative descriptive analysis, namely comparing the values of students' initial conditions, first cycle, second cycle and third cycle. Based on the actions taken, it can be concluded that the role-playing method can improve mathematics learning outcomes in story problems at SD Negeri 1 Sanguwatang. The results of observations on student activities turned out to have good relevance to support improved learning outcomes. The average test results for learning mathematics story problems through role - playing were 60.16 in the initial condition, 64.36 in the first cycle, 68.6 in the second cycle and 79.56 in the third cycle. For the level of learning completeness with a completeness limit of 65, the initial condition is 40%, the first cycle is 56%, the second cycle is 76%, and the third cycle is 92%.

Keywords: Mathematics Story Problems, Role Playing

1. INTRODUCTION

Mathematics is a phenomenal subject in the world of education from college to the elementary school level. Mathematics is always considered by students as a frightening specter like a monster. Students felt dizzy and scared before following him. Mathematics is known as a complicated subject and requires extraordinary reasoning and thinking to solve it because what is found in mathematics is abstract numbers, so it is often difficult for students' reasoning, especially elementary school students, whose reasoning is still concrete. Moreover, if what is encountered is a math problem in the form of a story problem, students will think twice about solving it. On the other hand, students must interpret the meaning of the story, and students must also solve it correctly.

Compared to straight questions, story questions are considered more complicated. This is proven by the results of student evaluations, 75% of students got a score above 65. However, judging from the composition of the questions on the test, 64% of students were not able to solve the story questions. Students still have difficulty solving math problems in the form of stories. From the results of observations of students' answer sheets, it can be seen that there are several reasons why students have difficulty solving story-shaped math problems, such as: the ability to interpret the language of the questions is still lacking, students cannot determine what is known and what is being asked and students' ability to determine the correct mathematical model used in solving problems. Apart from that, teachers are still less able to pay attention to aspects of story questions as a form of practice questions at home. The teacher is still focused on the questions at hand. This provides less space for students to develop their ideas by practicing their ability to solve problems in mathematics.



On the other hand, playing is something that students really like. Almost all students when asked "Do you like playing? Surely the answer for all students is "Like". By playing they are able to express and actualize themselves with freshness and fun. *Smith (2013)* suggests that role playing can increase student motivation and involvement in learning. Apart from that, this method also helps students understand complex and abstract concepts. Students will feel challenged to perform and be able to understand their role in the game. Role Playing is able to express students' emotions, thoughts and abilities in a fun and happy manner. *Sukardi (2020)* states that the role playing method is a form of learning where students learn by acting as characters or individuals in a particular situation or scenario to improve their understanding and skills.

According to *Saracho and Spodek (2017)*, role playing can be an effective tool for improving learning in various fields, such as literacy, mathematics and science. Meanwhile, according to *Komalasari (2014)*, role playing is a model of mastering learning material through developing students' imagination and appreciation. Students act out living characters or inanimate objects to develop their imagination and appreciation. *(Huda et al., 2018)* describe the role playing method as a learning technique in which participants participate in certain roles to explore knowledge, skills and attitudes in the context of certain situations.

Based on the opinion above, it can be concluded that the role playing method is a learning method in which visible camouflage of student behavior or imitation of the situations of the characters in the story is shown in such a way.

2. METHODS

The research was carried out at SD Negeri 1 Sanguwatang, Karangjambu District, Purbalingga Regency. The implementation was carried out in the odd semester of the 2022/2023 academic year from May to October 2022. The research subjects were 25 class V students at SD Negeri 1 Sanguwatang, consisting of 10 male students and 15 female students. Nearly 64% of students' abilities are above average. The majority of class V students at SD Negeri 1 Sanguwatang come from lower middle class families where almost all of their parents' livelihoods are farm laborers and entrepreneurs. The data source comes from research conducted by students and teachers. Meanwhile, the types of data used are quantitative data obtained from learning results tests and qualitative data obtained through observation sheets, questionnaires and journals. The data collection techniques used are: data on the situation of implementing the role playing method which is taken using an observation sheet, data on student responses to the implementation of the role playing method which is taken using a questionnaire, self-reflection data, as well as changes that occur in the class are taken using a journal, and data about students' mathematics learning outcomes were taken using learning outcomes tests.

Elliott, J. (2016), views classroom action research as a cyclical process that is oriented towards improving classroom learning practices, is collaborative, and has the potential to contribute to the development of educational knowledge. Despite its limitations, this research remains a valuable approach for teachers to continue learning and improve the quality of learning

In collecting the data needed for research, researchers are assisted by colleagues through observation. Observations carried out by colleagues are observing the activities of researchers and students during teaching and learning activities. The data that will be taken is supported by real data according to what happens in the field. In collecting data, researchers must be objective. This aims to maintain the validity of the data obtained. The data analysis techniques used in this research are data collection, data sorting, data classification, data interpretation and inference.

This classroom action research is planned to be carried out in three action cycles. However, if in the evaluation results of a cycle at least 80% of students have obtained a score of at least 65, then the next cycle will not be implemented because the indicator of success has been achieved. The steps for Classroom Action Research according to *Kemmis, S., and McTaggart, R. (2014)*, are carried out through a cyclical assessment process that consists of four stages, namely planning, implementation, observation and reflection.

Planning is an activity that determines the success or failure of an activity. Planning is made so that the actions to be implemented are directed and clear. Implementation is more stable with a clear and programmed plan. Activities carried out in this planning stage include: (1) creating action implementation scenarios; (2)



making an observation sheet to see how the teaching and learning atmosphere is in the class when the role-playing method is implemented; (3) creating a questionnaire to collect data about student responses regarding the implementation of role-playing methods in learning; (4) creating the necessary teaching aids to help students understand mathematical concepts well; and (4) designing evaluation tools to see whether students have mastered the mathematics material. The implementation of Class Actions must be appropriate so that maximum results can be obtained. The actions that had been designed were implemented by the fifth-grade teacher at SD Negeri 1 Sanguwatang. Learning that applies the Role-Playing method must be in accordance with the learning scenario that has been created.

Observations were carried out using the observation sheet that had been made. The observation process is carried out to observe teachers in the classroom during the learning process using the role-playing method. Observations were also made on student behavior and activities during the learning process and the impact of teacher behavior on students during the learning process. Observations are carried out to determine the advantages and disadvantages. Strengths and weaknesses will foster new ideas to improve learning.

Before reflecting, first carry out an evaluation at the end of each action implementation cycle. This evaluation is aimed at finding out whether there is an improvement in students' mathematics learning outcomes in the material being taught. The evaluation tool used is a learning outcomes test prepared by researchers. If classically at least 80% of students have achieved a score of at least 65, then the action is considered to have been successfully implemented. The results obtained at the observation and evaluation stages were analyzed. Weaknesses or shortcomings that occur in each cycle will be corrected in the next cycle.

3. RESULTS & DISCUSSION

Before carrying out learning improvements, the researcher prepared a Learning Improvement implementation plan by implementing role playing. To support the research, researchers prepared observation sheets and were prepared to observe. The results obtained from learning improvement actions in Cycle I are qualitative and quantitative. Qualitative results in the form of increased student activity in learning activities when compared to learning before improvement, student motivation also increased as well as students' creative power and courage to explore and improve their abilities, although not so significantly. This is proven by the students' enthusiasm for role playing. Even though students still feel embarrassed about doing it, they look more fun and happier while learning, as if they were not studying. This is the strength of the learning improvement activities in this cycle. However, the actions in this cycle also have weaknesses, namely that the teacher still helps students too much so that students have less independence and are too dependent on researchers. Students' reasoning power in understanding story problems is still not well formed considering the absence of supporting properties or media.

Quantitative results can be seen from the results of student formative tests. The results of the students' formative tests showed that the students' average score was 64.36, with the lowest score being 30 and the highest score being 75. The level of completeness reached 56% or only 14 students out of 25 students reached the specified completion limit, while 11 students or 44 have not reached the completeness limit because the value is below the specified completeness, namely 65. Detailed formative test results are attached while the global recapitulation can be seen in the table below.

Table 1. Recapitulation of Cycle I Student Formative Tests

No	Value Interval	Many Students	Percentage (%)	Completeness Limit	Information	
					Complete	Not Completed
1	... < 54	5	20 %	65	-	√
2	55 – 64	6	24 %		-	√
3	65 – 74	8	32 %		√	-
4	76 – 84	6	24 %		√	-
5	85 - 100	-	-		-	-
Amount		25	100%	<i>Source:</i> <i>Cycle I Student Formative Test Scores</i>		
Students complete		14	56 %			



Students Incomplete	11	44 %
The highest score	75	
Lowest Value	30	
Number of Values	1609	
Average	64.36	

The results of observations from colleagues as observers are (1) learning becomes more fun and interactive. This can be seen from the expressions of students who look cheerful, happy and enjoying role playing; (2) student activity is good, seen from the enthusiasm of students in role playing and responding to questions from researchers; (3) there are no role playing properties so that the role-playing activities are less than optimal and often experience problems; and (4) the time required for role playing is long so this needs attention. Researchers held discussions with colleagues as observers regarding things that needed to be done again in the next cycle (Cycle II) so that the results obtained improved. The result of the discussion between researchers and observers was that role playing was equipped with props and other supporting media.

In this cycle, before carrying out learning improvements, the researcher prepared a Learning Improvement Implementation Plan as well as role playing properties and supporting media according to the results of the researcher's agreement during reflection in Cycle I. The strength of action in this cycle occurred after the researcher used role playing properties. Student activity and motivation have increased and role playing can run well. Students are able to understand things that were initially abstract to become real. Students also look fun and happy, as if they are playing without realizing they are learning. The weakness that is very visible in the actions that have been carried out in this cycle is that the role of researchers in assisting the implementation of role playing is still influential, This causes student dependence on researchers so that there is less embedded student independence in determining and carrying out role playing.

The results of the students' formative tests showed that the students' average score was 68.6 with the lowest score being 45 and the highest score being 90. The level of completeness reached 76% or 19 students out of 25 who had reached the specified completion limit, while 6 students or 34% had not. reached the limit of completion because the score was 65. The results of the formative tests in cycle II can be described globally through the following table.

Table 2. Recapitulation of Cycle II Student Formative Tests

No	Value Interval	Many Students	Percentage (%)	Completeness Limit	Information	
					Complete	Not Completed
1	... < 54	2	8 %	65	-	√
2	55 – 64	4	16 %		-	√
3	65 – 74	9	36 %		√	-
4	76 – 84	3	12 %		√	-
5	85 - 100	1	4 %		√	-
Amount		25	100%	<i>Source:</i> <i>Student Formative Test Scores in Cycle II</i>		
Students complete		19	76 %			
Students Incomplete		6	34 %			
The highest score		90				
Lowest Value		45				
Number of Values		1715				
Average		68.6				

The results of observations obtained by colleagues as observers were (1) learning became more fun and interactive. This can be seen from the expressions of students who look cheerful, happy and enjoying role playing; (2) student activity is good, seen from the enthusiasm of students in role playing and responding to questions from researchers; (3) the use of role-playing properties is able to overcome problems in doing role playing and is able



to make students understand things that are still abstract; (4) the time required for role playing is long so this needs attention. The activity carried out in reflection is that the researcher carries out discussions with colleagues as observers regarding things that need to be done and improved in the next cycle (Cycle III) so that the results obtained are as expected, considering that Cycle III is the final cycle of this learning improvement activity. The result of the discussion between researchers and observers was the formation of a student working group to reduce dependence on researchers and save time. This is also combined with role-playing properties and supporting media.

This is the final cycle so preparation and planning are carried out carefully and more maturely so that the results obtained are in line with expectations. The planning carried out includes a Learning Improvement Implementation Plan which has been studied in detail at each point, visual aids in the form of charts, a list of student work groups as well as role playing properties and supporting media. This is in accordance with the results of the agreement during reflection in cycle II. The most obvious action in this cycle is the formation of student work groups so that they are able to explore all their abilities actively, creatively and innovatively. Apart from group work, props are also prepared to support role-playing. This is what makes the strength of the actions carried out in this cycle. By implementing the above, it is clear that students' activeness, creativity and innovativeness increase as well as their cohesive teamwork abilities. Weaknesses only appear when students create story scenarios because the time required increases and in terms of diction it is also not very communicative. However, this weakness is not something that is very urgent to fix.

The results of the students' formative tests showed that the students' average score was 79.56, with the lowest score being 50 and the highest score being 100. The level of completeness reached 92% or 23 students out of 25 students who reached the specified completion limit, while 2 students or 8% have not reached the completion limit because their score is below the specified completion limit, namely 65. The detailed formative test results in cycle III are attached, while the global recapitulation can be seen in the table below.

Table 3. Recapitulation of Cycle III Student Formative Tests

Table 3: Recapitulation of Cycle III Student Formative Tests						
No	Value Interval	Many Students	Percentage (%)	Completeness Limit	Information	
					Complete	Not Completed
1	... < 54	1	4 %	65	-	√
2	55 – 64	1	4 %		-	√
3	65 – 74	4	16 %		√	-
4	76 – 84	10	40 %		√	-
5	85 – 100	9	36 %		√	-
Amount		25	100%	<i>Source:</i> <i>Cycle III Student Formative Test Scores</i>		
Students complete		23	92 %			
Students Incomplete		2	8 %			
The highest score		100				
Lowest Value		50				
Number of Values		1989				
Average		79.56				

The results obtained by colleagues as observers showed a significant improvement in every aspect that the observer had researched, although there were several weaknesses, they were not that important because they did not really support this achievement. As a final reflection, the researcher and observer held a discussion by comparing the data obtained from Cycle I to Cycle III to be analyzed, interpreted and concluded.

Table 4. Range of Values for Inter-Cycle Learning Formative Test Analysis

No	Value	Pre-Remedial	Learning Improvement
----	-------	--------------	----------------------



	Interval	Learning		Cycle I		Cycle II		Cycle III	
		Number of Students	%	Qty Student	%	Qty Student	%	Qty Student	%
1	... < 54	7	28%	5	20%	2	8%	1	4%
2	55 – 64	8	32%	6	24%	4	16%	1	4%
3	65 – 74	6	24%	8	32%	9	36%	4	16%
4	75 – 84	4	16%	6	24%	3	12%	10	40%
5	85 - 100	-	-	-	-	1	4%	9	36%
Amount		25	100%	25	100%	25	100%	25	100%
Completeness		40%		56%		76%		92%	
The highest score		70		75		90		100	
Lowest Value		20		30		45		50	
Number of Values		1504		1609		1715		1989	
Average		60.16		64.36		68.6		79.56	
Action		Learning is conventional without paying attention to student needs		The use of role-playing in learning without simple role-playing properties		The use of role-playing in learning with role playing properties		The use of role-playing in learning with role playing properties and student work groups	
Learning Process		Passive Students Students are less involved in learning, Students' creativity and motivation are lacking		Students are starting to be active, are involved in learning, students' creativity and motivation are starting to grow, abstract things in story problems are starting to be captured by students.		Students are active, involved in learning, students' creativity and motivation have grown, abstract things in story problems can be captured by students		Students are active, involved in learning, students' creativity and motivation increases and there is unified team working, abstract things in story problems can be captured by students.	

Source: Recapitulation of Student Formative Test Scores per Cycle

Based on the data above, it is clear that the average score for mastery of the material always increases. The average formative test score in the pre-cycle was 60.16, then increased in cycle I to 64.36, increased again in cycle II to 68.6 and increased in cycle III to 79.56. The level of completion has also increased. This can be seen from the pre-cycle completeness which was only 40%, which increased in cycle I to 56%, then increased again in cycle II to 76% and increased again in cycle III to 92%. On the other hand, the highest and lowest scores also increased, where in the pre-cycle the lowest score was 20 and the highest was 70, in cycle I it increased to the lowest score of 30 and the highest score of 75. The most visible and significant increase was in cycle II to the lowest score of 45 and the highest score of 90, then increased again in cycle III to the lowest value of 50 and the highest value of 100.

Meanwhile, student activity in learning has also increased. This increase starts with motivation, attention to the researcher's explanation, activeness, expressing oneself, expressing opinions, responding to the results of other friends' work, answering researchers' questions, being active in groups, expressing ideas and ideas and helping friends who are having difficulties. This can be seen in the table below.

Table 5. Observation Results of Student Activities Between Cycles



No	Description of Student Activities	Pre-Cycle	Cycle Learning Improvement		
			I	II	III
1	Motivation to learn	40 %	62 %	78 %	85 %
2	Pay attention to the researcher's explanation	45 %	64 %	83 %	90 %
3	Active in role playing activities	43 %	60 %	85 %	88 %
4	Able to express his abilities	40 %	65 %	78 %	86 %
5	Dare to express your opinion	57 %	63 %	79 %	85 %
6	Dare to respond to the results of your friends' work	45 %	70 %	82 %	87 %
7	Able to answer questions from researchers	54 %	72 %	84 %	90 %
8	Work actively in groups	47 %	58 %	78 %	84 %
9	Able to express thoughts and ideas	42 %	68 %	76 %	85 %
10	Help a friend who is in trouble	53 %	66 %	79 %	87 %

Source: Observation results from observers for each cycle

Thus it can be said that increased activity is followed by increased student achievement. There is a real relevance between activities and student achievement.

4. CONCLUSION

Using the Role-Playing Method in learning mathematics story problems can improve student learning outcomes. Apart from that, it can also train students to think critically in solving problems, increase activity and motivate students to participate in learning, increase self-confidence and courage to put forward and express their ideas, ease the teacher's task in delivering material, make it easier for students to accept the concept of mathematical story problems. The use of properties in learning can increase students' understanding of something abstract becoming real and students can work together to build knowledge through their groups.

5. ACKNOWLEDGMENTS

Thank you to the rector and supervisors of Muhammadiyah Purwokerto University, the Head and the teachers of Sanguwatang 1 State Elementary School for the support given so that this research can be carried out without any obstacles. Hopefully the results of this class action research can bring benefits to the world of education.

REFERENCES

- Elliott, J. (2016). The concept of action research. *International Journal of Educational Research*, 76, 22-30.
- Huda, M. (2018). "Metode role playing: sebuah pendekatan inovatif dalam pembelajaran." *Jurnal Pendidikan dan Pembelajaran*, 22(2), 125-132.
- Kemmis, S., & McTaggart, R. (2014). *The action research planner: Doing critical participatory action research*. Springer.
- Komalasari, D. (2014). *Strategi pembelajaran aktif*. Bandung: Pustaka Setia.
- Saracho, ON, & Spodek, B. (2017). *Peran bermain dalam pendidikan anak usia dini*. New York: Routledge.
- Smith, MK (2013). *Bermain peran di kelas: Panduan bagi guru*. New York: Routledge.
- Sukardi, D. (2020). "Metode role playing: strategi pembelajaran efektif untuk meningkatkan motivasi dan keterlibatan siswa." *Jurnal Pendidikan dan Pembelajaran*, 10(2), 123-134.



ANALYZING THE UTILIZATION OF LEARNING MANAGEMENT SYSTEMS TO SUPPORT STUDENT LEARNING IN AN ONLINE LEARNING ENVIRONMENT

Dina Zhafira^{1*}, Ita Pratiwi Simangunsong², Shahnaz Shafitri Harahap³

¹²³State University of Medan, Indonesia

*dzhafira63@gmail.com

ABSTRACT

As online learning continues to gain prominence in educational settings, the role of Learning Management Systems (LMS) becomes increasingly crucial in facilitating and enhancing student learning experiences. This research aims to investigate the utilization of learning management systems and their impact on supporting student learning in the context of online education. The study employs a study literature method by identifying related research on learning management systems and how they support student learning. The primary objectives are to identify patterns in LMS usage, assess the effectiveness of various features, and explore the challenges faced by students in adapting to online learning environments. Key areas of analysis include the impact of LMS access as a learning tool, the impact of LMS on students, the features of LMS that support student learning, and the challenge of using LMS itself. Additionally, the study delves into the perceptions of students regarding the use of the LMS interface, the adequacy of the instructional materials provided, and the overall impact on their learning outcomes. Through the integration of data analytics and qualitative feedback, this research aims to provide a comprehensive understanding of how Learning Management Systems contribute to student learning in online environments. The findings are expected to inform educators, administrators, and instructional designers about optimizing the design and implementation of online courses, ultimately enhancing the quality of education in the digital era.

Keywords: *Learning Management Systems, Online Learning Environment*

1. INTRODUCTION

In the ever-evolving landscape of education, the advent of online learning has brought forth a paradigm shift, transforming the traditional classroom experience into a digital realm. The COVID-19 pandemic also brought a challenging movement to our learning process. E-learning nowadays is not only a concept that we have known since 1999, but it has already become part of our daily lives. Due to the growth of developing technology, we need to adapt and also follow the trends in our learning environment. Research has shown that the deeper a student knows about technology, the better they can face the ever-changing job market and develop their creativity and innovation (Mulyana, 2023).

As educational institutions globally embrace the potential of online learning, the role of learning management systems (LMS) has become increasingly pivotal in shaping the future of student education. The Learning Management System (LMS) is an information technology system developed to manage and support the learning process, distribute lecture materials, and enable collaboration between lecturers and students (Fitriani, 2021). LMS helps students learn independently anytime and anywhere.

This article aims to delve into the multifaceted aspects of LMS utilization, unraveling its impact on student learning in an online learning environment. The contemporary educational landscape is marked by diverse pedagogical approaches, with a significant emphasis on leveraging technology to enhance the learning experience. In the traditional way, we usually used a blackboard and marker to learn; now, in the technological era, LMS provides us with many tools to use. Learning management systems, encompassing platforms such as Moodle, Blackboard, Canvas, and others, have emerged as linchpins in



the facilitation of online education. These systems act as virtual hubs, providing a centralized space for course content, collaboration, assessments, and communication to support student learning.

As we navigate the digital corridors of education, understanding how LMS is employed to support student learning is crucial for educators, administrators, and policymakers alike. Our comprehension of technology is really important to gain more benefit from technology itself. As we know, technology is also challenging to use in other hands. The utilization of LMS had a positive impact on learning. Bradley (2021) said that LMS reinforces the learning process through an online learning environment. But on the other hand, Fatmi et al., (2023) said that one of the LMS did not make a significant contribution to student learning outcomes.

The data above brings us to many questions that will be answered in this research. This analysis aims to explore the diverse functionalities of LMS and their impact on student engagement, achievement, and overall satisfaction in an online learning environment. The utilization of LMS is not merely confined to the administration of courses but extends to fostering a dynamic and interactive learning experience. Features such as discussion forums, multimedia content integration, real-time feedback, and personalized learning paths are integral components that contribute to the effectiveness of LMS in catering to the diverse needs of online learners. By exploring these dimensions, we aim to unravel the transformative potential of learning management systems for creating a more equitable and learner-centric online educational environment.

2. METHODS

Systematic Literature Review

The method used is a systematic literature review. Systematic literature review (Sangadji & Sopiah, 2010) is research conducted using literature, either in the form of books, notes, or research reports from previous studies. The research approach is survey-based qualitative because the resulting data is in the form of words or descriptions. The research was conducted on secondary data from primary research on the utilization of learning management systems to support student learning in an online learning environment. There are three stages, those are data collection, data analysis, and drawing conclusions. Sources of data in this research from primary studies that have been published are indexed journal articles. Data collection used indexed electronic databases such as Garuda Portal, Google Scholar, Research Gate, Doaj, direct journal URLs, theses, and dissertations. All articles were extracted to select relevant articles. All articles that have been extracted will enter the analysis stage.

Inclusion Criteria

The criteria for selection used in this research are inclusion criteria. Notoadmodjo (2018) said that inclusion criteria are criteria for research subjects to represent research samples that qualify as samples. The inclusion criteria that have been determined are as follows:

1. The article comes from research on education.
2. The research comes from the utilization of learning management systems
3. The sample used is research in the online learning environment.



Research Instrument

The research instrument was an observation sheet or matters related to the inclusion criteria. Criteria, namely based on the utilization of learning management systems to support student learning in an online learning environment.

Population Sample

The focus of this research is on the utilization of learning management systems to support student learning in an online learning environment. The number of article samples obtained was 36 relevant according to the inclusion criteria.

Data Collection Technique

Data collection techniques in this study used articles related to the utilization of learning management systems to support student learning in an online learning environment. The articles found using a search engine (Google) included as many as 50 articles using the keywords “learning management system,” “Online Learning Environment”, and “journals”. After that, the next step was to select 42 articles that matched the research questions about the utilization of learning management systems to support student learning in an online learning environment. In the final stage, 34 specific articles were found with research questions and inclusion criteria.

3. RESULTS & DISCUSSION

In this part, we will show the research results that have been processed by the data. It will be shown in tables and graphs to explain the results of the study. The previous study will be disclosed and explained by comparing or confirming it. The journals that published the selected articles are presented in **Table 1**.

Table 1. Journal Publishing or Sources Selected Articles

No	Journal	Frequency
1	Turkish Online Journal of Distance Education	1
2	Ar-Raniry State Islamic University, Thesis	1
3	International Journal of Technology in Education	1
4	Linnaeus University, Thesis	1
5	University of Northern Colorado, Dissertation	1
6	Islamic University of Riau, Thesis	1
7	Elsevier	2
8	International Journal of Advanced Science and Technology	1



9	International Journal of Research and Innovation in Social Science	1
10	Journal of English Language Teaching and Learning	1
11	Journal of Information System, Informatics and Computing	1
12	Proceeding International Conference of Social Research with Multidisciplinary Approach	1
13	Mantik Journal	1
14	Al-Ishlah: Journal of Education	1
15	New Language Dimensions	1
16	International Journal for Educational and Vocational Studies	1
17	Journal of English in Academic and Professional Communication	1
18	Edulingua	1
19	Journal of Mathematical Pedagogy	1
20	INTENSIF	1
21	Journal of Special Education Research and Development	1
22	Indonesian Journal of Multidisciplinary Research	1
23	International Journal of Language Education	1
24	Scientific Journal of Technical and Vocational Education	1
25	Southeast Asian Journal of Islamic Education Management	1
26	IEEE Global Engineering Education Conference (EDUCON)	1
27	International Young Scholars Journal of Language	1
28	Australasian Journal of Educational Technology	1
29	State Islamic University Prof. K.H. Saifuddin Zuhri Purwokerto, Thesis	1
30	Journal of Education Technology	1
31	Proceedings of the Tenth International Conference on Languages and Arts (ICLA 2021)	1
32	The University of Michigan- Dissertation	1
33	TEM Journal	1



The utilization of LMS based on level of study

Research on the utilization of LMS in learning has been done at each level of education. It has been shown that LMS has been used in each level of education nowadays in learning mathematics due to the e-learning process era since the pandemic of COVID 19. Research showed that of the 34 studies about the utilization of LMS in learning, 26 were conducted by students in elementary through senior high school, and 14 were conducted in higher education. There are a lot of types of LMS that can be used in learning, such as blackboard LMS, Google Classroom, Edmodo, Moodle, SEVIMA Edlink, LMS provided or developed by a university or government, Schoology, and Learnboost.

Wiratomo (2020) said that it's better to have an Android-based application if we want to apply LMS to learning and get a good learning outcome. The type of LMS that is used in every learning situation can be different based on needs. In Saudi Arabia, Aldiab et al., (2018) said that most of the universities used blackboard LMS to help students study. Meanwhile, in Indonesia, Utomo et al., (2021) mentioned that at college study levels, Moodle is the most frequently used LMS. It can be adapted based on the needs of each level of study and learning environment. The discussion above has shown us that LMS can be applied in many kinds of online environments, but we still need to adjust the learning process so that it can still support student learning.

The utilization of LMS to support student learning

The use of LMS to support student learning has been mentioned in 20 papers out of 34 that are analyzed in this research. Most of them mention the positive impact of using LMS for student learning. Students gave a positive attitude by using LMS in learning. LMS helped students retain their autonomy, enthusiasm, and motivation for learning. It made students learn independently anytime and anywhere. Some researchers also strengthen it by showing that students can raise their voice more by using LMS. They felt more interested and agreed to use the LMS for intensive learning. It all showed a good perception of learning using the LMS.

Other than that, LMS also helps students construct and build knowledge. Students get used to technology when using LMSs for learning. Through that process, students show a good improvement in their personal skills, such as speaking, reading, listening, and writing. The technology that is used in the LMS encourages students to have a good strategy for self-learning. That happened because the LMS itself facilitated student-centeredness and could be accessed anytime and anywhere. LMS not only helps students increase their learning activities but also inspires them to compare all tasks and quizzes. Students also have a chance to collaborate and interact with other students and teachers on this learning platform. So, there was no doubt if many papers that were analysed in this research said that by utilizing LMS to support student learning, we found that students could increase their learning outcomes effectively.

Feature in LMS that support student learning

The utilization of LMS in student learning is increasing because of the features inside LMS that make learning effective. LMS is easy to use and gives tasks and assignments. Other than that, it also helps teachers with scheduling and controlling the learning process. It can facilitate and model discussion, plan activities, set learning expectations, provide learners with options, download material, access quizzes, and assist in problem solving with a process for decision-making. Video conference, chat room for personal use, and discussion are also some good features that are recommended to exist in LMS to support student learning.

The impact of the utilization of LMS

In the following, a graph will be presented to show the impact of the utilization of LMS to support student learning. See **Graph 1**.

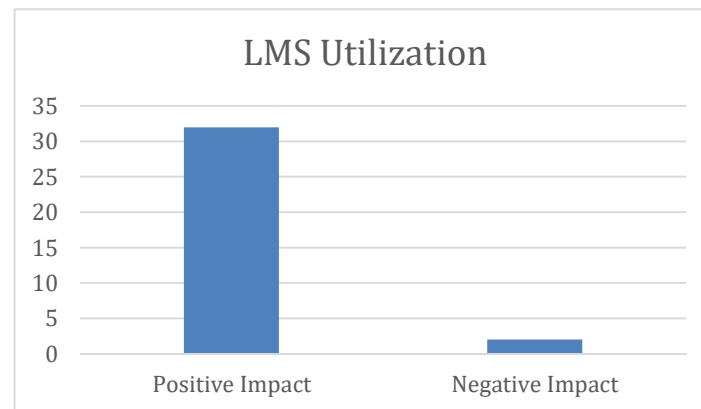


Figure 1. Impact of The Utilization of LMS

Graph 1 shows that most of the research on the utilization of LMS in learning has a positive impact. Especially during the COVID-19 pandemic (Ayudia, 2021). The negative impact happened for a reason. Research has shown that the utilization of LMS really depends on connection (Putri, 2020). This situation will lead us to find other problems, such as student understanding and lower learning outcomes. The limited technological capabilities experienced by teachers and students and inadequate facilities and infrastructure also become challenges in using LMS as a learning platform. Students and teachers need to have a certain strategy to solve the error situation and other technical problems.

How to use LMS properly to help student learning?

The utilization of LMS has pros and cons, but through this research, we know that the impact of the utilization is greater than we could have expected. Knowing how to use it properly is the key to leveling up student learning and supporting them properly. The following is a suggestion for several parties related to the learning process.

- Stakeholder
Stakeholders in the educational community must find scientific studies to support their contributions to LMS platforms and assist scholars in learning and developing the LMS.
- Teacher/Instructor

The teacher or instructor must use more multimedia, such as video conferencing and audio discussion, to enhance students' critical thinking and engagement in LMS activities, thus improving students' outcomes. The preparation of the LMS for teaching and learning activities is also important. It also includes the learning goals, planning for both face-to-face and online learning, the current Bloom Taxonomy, selecting online tools, and interpreting the evaluation to establish future classroom activities. Teachers and instructors need to play a greater role in motivating students to use the LMS via innovative and creative means.

- Designer LMS

Designers of LMS need to make sure that learning management is structured and implemented properly by all related parties. LMS should be simple in the application and use clear tutorials. Additionally, LMS designers and implementers are urged to consider previous literature on computer-supported collaborative learning environments in order to improve these systems.



Further research is needed to identify the best types of scaffolds and overall technological improvements in order to provide support for online collaboration and knowledge construction.

4. CONCLUSION

The results of the review of 34 articles that became the main study in this study have found that the utilization of learning management to support student learning in an online learning environment has proven to have an impact. There are so many benefits we can get from LMS itself to elaborate and develop our learning process in an online learning environment. Despite the benefits, we still need to face the challenging part of using LMS that the connection trouble and technological knowledge from teachers and students need to be developed more. From the results of this diversity, it can be concluded that the utilization of LMS has been done at many levels of education and has had a positive impact on improving learning. The findings are expected to inform educators, administrators, and instructional designers about optimizing the design and implementation of online courses, ultimately enhancing the quality of education in the digital era.

REFERENCES

- Agustina, S., Asep B., & Dani B. (2021). The effectiveness of distance learning using learning management system media and whatsapp groups at senior high school. *Indonesian Journal of Multidisciplinary Research*, 1(1).
- Akay, Emel & Eylem K. G. (2020). The impact of learning management systems on students' achievement in language exams. *Turkish Online Journal of Distance Education*, 21 (4).
- Aldiab, A., Harun C., Alex K., & Firoz A. (2018). Utilization of learning management systems (LMSs) in higher education systems: A case review for Saudi Arabia. *Elsevier*, 160.
- Almoslamani, Y. (2018). Dissertation: *Effectiveness of student engagement using learning management system in the blended learning environment at a saudi electronic university*. Northern Colorado: University of Northern Colorado.
- Ayudia, D. (2021). Thesis: *An analysis of students' perceptions in using the learning management system (LMS) for learning english*. Aceh: Ar-Raniry State Islamic University.
- Bradley, V. M. (2021). Learning management system (LMS) used with online instruction. *International Journal of Technology in Education*, 4(1).
- Elvyanti, S. (2022). The teachers' selection of the use of learning management systems in teaching and learning. *Scientific Journal of Technical and Vocational Education*, 1(1).
- Fatmi, N., Iryana M., Muliana M., & Sayni H. (2023). The utilization of moodle-based learning management system (LMS) in learning mathematics and physics to students' cognitive learning outcomes. *International Journal for Educational and Vocational Studies*, 3(2).
- Fitriani, Y. (2020). Analysis of the utilization of learning management system (LMS) as online learning media during the Covid-19 pandemic. *Journal of Information System, Informatics and Computing*, 4(2).



- Furqon, M., Parlindungan S., Liliyasi L., & Lala S. R. (2023). The impact of learning management system (LMS) usage on students. *TEM Journal*, 12(2).
- Ismailia, T. (2022). The practice of Learning Management System (LMS) in teaching speaking. *Journal of English in Academic and Professional Communication*, 8(2).
- Jamal, H. & Ameera. (2011). Thesis: *The role of learning management systems in educational environments: An Exploratory Case Study*. Swedia: Linnaeus University.
- Khaerani, W. (2022). Thesis: *Students' perceptions of using learning management systems at second grade students SMAN 1 Tualang*. Riau: Islamic University of Riau.
- Lestari, D. T. (2021). Thesis: *The implementation of learning management systems for online learning in English as foreign language (EFL) at SMAN 1 Jatilawang*. Purwokerto: State Islamic University Prof. K.H. Saifuddin Zuhri Purwokerto.
- Lonn, S D. (2009). Dissertation: *Student use of a learning management system for group projects: a case study investigating interaction, collaboration, and knowledge construction*. The University of Michigan.
- Mulyana, D. (2023). Educational management innovation: challenges and opportunities in the digital era. *Science Info Journal: Informatics and Science*, 13 (3).
- Nguyen, N. T. (2021). A study on satisfaction of users towards learning management systems at International University e Vietnam National University HCMC. *Elsevier*, 26.
- Notoatmodjo, S. (2018). *Health research methodology*. Third Printing. Jakarta: PT Rineka Cipta
- Omika, H. A. (2023). The performance of LMS use and its impact on English learning outcomes. *Edulingua*, 10(1).
- Putri, Emiliana & Fatimah M. S. (2020). Indonesian Efl students' perspectives towards learning management system software. *Journal of English Language Teaching and Learning*, 1(1).
- Ranata, Y. (2020). A study on online learning management system: implementation of edmodo-based blended english learning method. *Southeast Asian Journal of Islamic Education Management*, 1(1).
- Sakinah, Nur & Afidah M. A. (2016). Factors influencing the success of learning management system (LMS) on Students' Academic Performance. *International Young Scholars Journal of Language*, 1(1).
- Sangadji, Etta M. & Sopiah. (2010). *Research Methods: A Practical Approach to Research*. Yogyakarta: Andi.
- Sanoto, H., Dani K. & Mila C. P. (2023). The Effect of integrated learning management systems FLearn in improving learning outcomes at universities during online learning. *INTENSIF*, 7(1).



- Satriani, E., Muhammad Z., Ermanto. (2021). The utilization of the E-learning module for the learning process of intensive reading at college students in riau, Indonesia. *Proceedings of the Tenth International Conference on Languages and Arts*, 599.
- Sitompul, H. S. (2022). The effectiveness of using a learning management system (LMS) in a blended learning model in the learning system of 4.0 Era. *Mantik Journal*, 6(1).
- Sova, M, Maryadi T. S., Iskandar A., Christiyanti A., & Kristia K. (2022). Learning management and ICT on the learning effectiveness: A Literature Review from Diverse Lenses. *Al-Islah: Educational Journal*, 14(2).
- Sujianto, A. E., Zaini F., Nurul H., Lukman, & Rachmawati N. (2020). Learning management system using Google classroom for economics learning in higher education. *International Journal of Research and Innovation in Social Science*, 5 (2).
- Sumardi, D. (2021). Use of learning management systems (LMS) as a network learning media (online) during the covid-19 pandemic. *Proceeding International Conference of Social Research with Multidisciplinary Approach*.
- Sumardi, D. (2021). Website-based learning management system (LMS) as a tool for learning in the covid-19 pandemic period for junior high schools. *Journal of Education Technology*, 5(3).
- Suriaman, A., Konder M., Mukrim M., Aisah A., & Agussatriana. (2023). Effective or impractical? discussing students' perceptions toward learning management systems in English language learning. *International Journal of Language Education*, 7(2).
- Swart, A. J. (2016). The effective use of a learning management system still promotes student engagement! *Proceeding IEEE Global Engineering Education Conference (EDUCON)*.
- Tantri, Niki R. & Yudi E. (2020). Learning management system as a tool to achieve 21st century skills in teaching and learning process in indonesia school context. *New Language Dimensions*, 1(1).
- Utomo, Dewi E. K., & Misliyani. (2021). Utilization of E-Learning based on learning management system (LMS) for college students with special needs during covid-19 pandemic. *Journal of Extraordinary Education Research and Development*, 8(1).
- Weaver, D., Christine S., & Chenicheri S.N. (2008). Academic and student use of a learning management system: Implications for quality. *Australasian Journal of Educational Technology*, 24(1).
- Wiratomo, Yogi & Fauzi M. (2020). Use of learning management systems in mathematics learning during a pandemic. *Journal of Mathematical Pedagogy*, 1(2).



AUGMENTED REALITY IN EDUCATION: A BIBLIOMETRIC ANALYSIS

Besse Nirmala^{1*}, Etin Solihatin², Moch. Sukardjo³

^{1, 2, 3}Educational Technology, Universitas Negeri Jakarta, Indonesia

*BesseNirmala_9902921026@mhs.unj.ac.id

ABSTRACT

The application of augmented reality in education has become increasingly important in recent years. This research aims to reveal trends over the last twenty years with bibliometric analysis to examine the results of articles related to the use of augmented reality in education. This research collects data from the Scopus database from 2003 to 2023, uses the Scopus website analysis features, and visualizes the bibliometric network using Vosviewer. A total of 1,772 studies were accessed through various screening processes. This research distributes publications based on year, country, author, and most cited articles. Among the most published articles indexed by Scopus, papers published by researchers in the United States have the highest number of publications (302), followed by Spain (166) and China with 131 publications. Computer science provided the largest contribution by subject area (858 articles). The five most popular journals in AR are *Education and Information Technologies*, *Computers and Education*, *Education Sciences*, *Sustainability Switzerland*, and *the International Journal of Emerging Technologies in Learning*. It has been detected that Wu H.-K. et al. are the most popular authors, with a citation level reaching 3022 citations. The concepts that became clear in the co-occurrence analysis group were "augmented reality," "virtual reality," "education," "teaching," "students," and "e-learning."

Keywords: Augmented, Reality, Education, Bibliometric, Vosviewer

1. INTRODUCTION

Augmented Reality (AR) is a technology that can add virtual objects to the real world and can be seen through a camera (Ronald T. Azuma, 1997). AR is a technology where the real world and virtual objects interact simultaneously (in real-time) using electronic devices (Maas & Hughes, 2020). Augmented Reality (AR) has the potential to provide new opportunities for promoting learning, creating constructive learning environments and providing interactive visual experiences (Huang et al., 2016; Klopfer & Squire, 2008).

At the beginning of AR use, users faced many problems, such as technical problems, hardware shortages, and usage costs. This makes it possible that in 2004–2008, researchers had not studied the use of augmented reality in the educational sector in more depth based on Scopus data. However, as technology develops, utilizing AR technology is no longer as difficult as it used to be (Akçayır & Akçayır, 2017). AR applications have increased along with technological advances and ease of use (Talan, 2021). Expensive hardware and complex equipment are no longer required to utilize AR technology, which is one of the most significant factors contributing to the widespread adoption of AR technology (Masalimova et al., 2023). With more accessible AR, users have more opportunities to engage with academic material, thereby improving students' retention of the material (Kaur et al., 2020).

Many research results have tested the effectiveness of using AR in educational environments. The research results reveal that AR can increase students' motivation, learning experience and learning outcomes (Bacca et al., 2018; Di Serio et al., 2013; Georgiou & Kyza, 2018; Ibáñez et al., 2020), improve students' science reading performance from the perspective of cognitive load theory (Lai et al., 2019), and students with high anxiety also have higher self-confidence and satisfaction and lower anxiety when learning using AR (Y. Chen, 2019). Augmented reality technology can also improve storytelling skills, testing elementary school students' narrative skills and creativity (Yilmaz & Goktas, 2017). AR increases engagement, collaboration and participation



(C. Chen et al., 2020). Much research has been conducted on AR implemented in medical education (Baashar et al., 2022; Christopoulos et al., 2022; Gonzalez et al., 2020).

Most studies on AR in education are based on constructivist and situated learning theories (Koutromanos et al., 2015). Previous research on AR generally focuses on the development of the technology and its practical implications in various learning environments (Cheng & Tsai, 2014; Wei et al., 2015). Previous research has also highlighted the importance of using AR in education and its potential impact on learning. However, understanding of research trends related to the use of AR in education remains limited. Therefore, this research will fill this gap by identifying articles related to AR in education and analyzing research trends over the last two decades.

This research uses bibliometric methods to collect, analyze and evaluate articles related to the use of AR in education published over the last twenty years (2003–2023). The research strategy will include identifying relevant databases, developing an analytical framework, and conducting comprehensive bibliometric analysis to reveal significant research trends. Bibliometrics is a type of quantitative analysis that uses various publication patterns. There are evaluative and descriptive methods that can be used in bibliometric methodology. Evaluative methods, such as bibliographic maps, bibliographic networks, and bibliographic coupling, are used to evaluate and compare the impact of publications more complexly than descriptive methods (Karakus et al., 2019).

This research aims to reveal trends over the last twenty years with bibliometric analysis to examine the results of articles related to the use of augmented reality in education. Thus, this study aims to provide in-depth insight into the development, focus and contribution of research in this domain over the specified period. The research questions raised in this study, all related to entries in the Scopus online literature resource, are listed below.

RQ1. What is the distribution of relevant publications by year?

RQ2. What is the distribution of relevant publications by country?

RQ3. What is the citation ranking of related publications, journals, authors, and institutions?

RQ4. What kind of structure emerges in connection with co-occurrence?

2. METHODS

This research uses bibliometric analysis methods to examine the use of AR technology in the education sector. Bibliometric analysis is used in many scientific disciplines, where mathematical and statistical methods are used to measure and analyze scientific publications (Pritchard, 1969). The reason for using bibliometrics is that the tool is widely known and powerful for conducting bibliometric analysis (Aria & Cuccurullo, 2017). The research aims to describe existing phenomena, both currently occurring and those that have occurred in the past, as well as various AR-related topics. This bibliometric study is comprehensive in scope, investigating the existing state and trends regarding AR research from 2003 to 2023 according to the specifications established for the research process. This search was carried out in February 2024, and the Scopus database was used as the main source to obtain bibliographic information.

Data Collection

This research used the Scopus database to obtain bibliometric data to be examined. Scopus is considered the leading citation index in scientific circles and is recognized as the world's leading academic database. Below is the generated code regarding how content is scanned and filtering options in topic areas (article title, abstract, keywords) of the Scopus search engine:

```
TITLE-ABS-KEY ( augmented AND reality AND in AND education ) AND PUBYEAR > 2002  
AND PUBYEAR < 2024 AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND ( LIMIT-TO ( DOCTYPE ,  
"ar" ) ) AND ( LIMIT-TO ( EXACTKEYWORD , "Augmented Reality" ) )
```

The following exclusion and inclusion criteria were applied:

1. Studies published between 2003 and 2023.
2. Document types are limited to articles.



3. Studies must be published in English.
4. Studies are categorized into social sciences and education.

A total of 1,772 studies were found as a direct consequence of searches conducted using the given keywords. In RIS and CSV formats, the bibliometric data of the retrieved studies was downloaded and analyzed.

Data Analysis

Bibliometric and descriptive content analysis is used in data analysis in research. The Scopus database system was used for content analysis. VOSviewer version 1.6.19, a mapping and visualization software, was used for bibliometric analysis. VOSviewer is one of the most popular computer programs designed and developed to present several visualization techniques (Eck & Waltman, 2017). The distribution of studies by year and country was examined first among all the data obtained at the end of the data collection process. After that, the content analysis process included the most published research reference sources, authors, and number of research citations. Bibliometric analysis was carried out to determine trends in AR research that has been carried out in the field of education.

3. RESULTS & DISCUSSION

The research objectives have yielded the following findings: Research findings are presented in the form of tables and figures.

RQ1. What is the distribution of relevant publications by year?

In this study, the distribution of research published in Scopus by year was examined first. The findings obtained are presented in Figure 1.

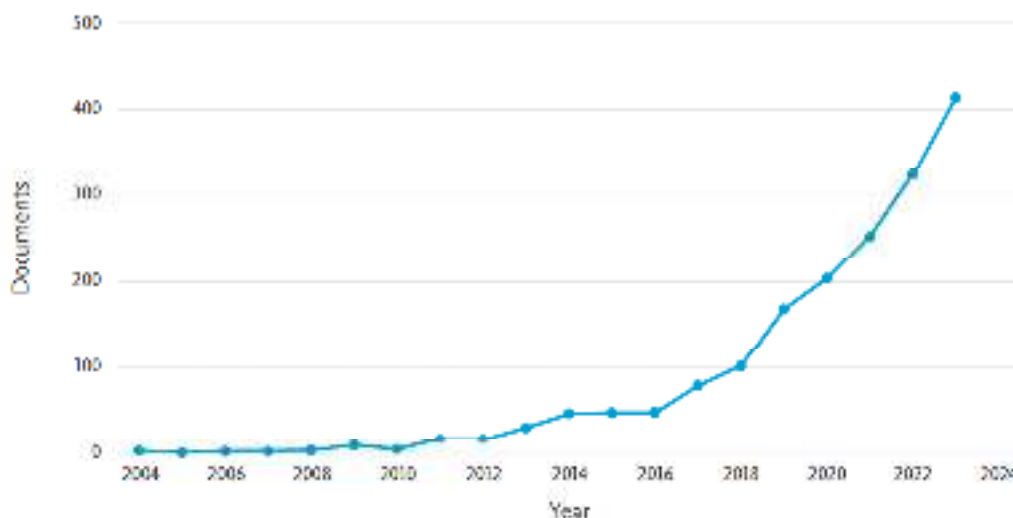


Figure 1. Distribution of Publications by Year

If you look at Figure 1, it can be seen that the first research related to augmented reality in the field of education was carried out in 2004 with two articles. There is a visible increase in the number of studies conducted in general. It was found that the number of publications was low from 2004 to 2010 but reached the highest number in the last three years (2021-2023). 2023 is the year with the most publications on this subject, with 413 research articles on AR in education. This is because the research results of (Bujak et al., 2013) stated that AR is just starting to surface in educational applications (Bujak et al., 2013). Therefore, (Bacca Acosta et al., 2014) recommended more research on AR in education (Bacca Acosta et al., 2014).

RQ2. What is the distribution of relevant publications by country?



When the distribution of studies conducted on this subject by country is examined, the graph below (Figure 2) shows the top 10 countries with the most publications.

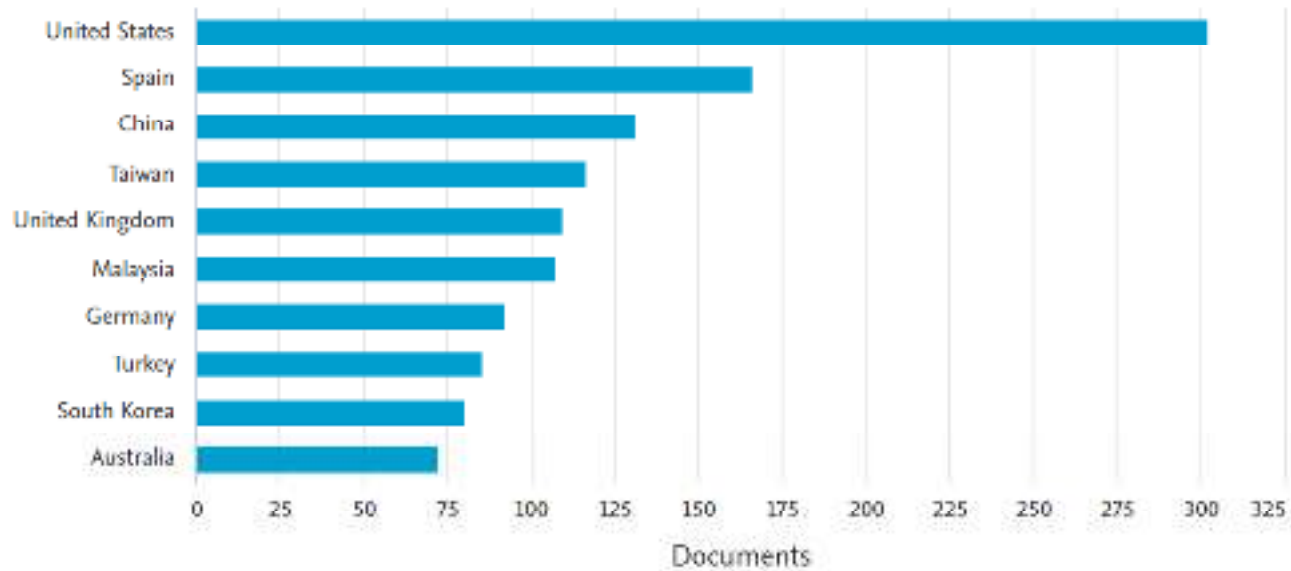


Figure 2. Distribution of Publications by Country

Based on this distribution, the United States ranks first with 302 papers, Spain ranks second with 166 papers, and China ranks third with 131 papers. Taiwan ($f = 116$) follows the list, followed by the followed by the United Kingdom ($f = 59$), Malaysia ($f = 107$), Germany ($f = 92$), Turkey ($f = 85$), South Korea ($f = 80$), Australia ($f = 72$), and other countries. The United States ranks first in terms of the total number of publications. This aligns with bibliometric research findings (Karakus et al., 2019; Masalimova et al., 2023) that the United States is at the top of the list based on total publications. Researchers researching AR are more open to collaborating and publishing joint works (Masalimova et al., 2023).

RQ3. What is the citation ranking of related publications, journals, authors, and institutions?

The distribution of papers according to the research areas in the Scopus data is checked first. Relevant data are presented in Figure 3.

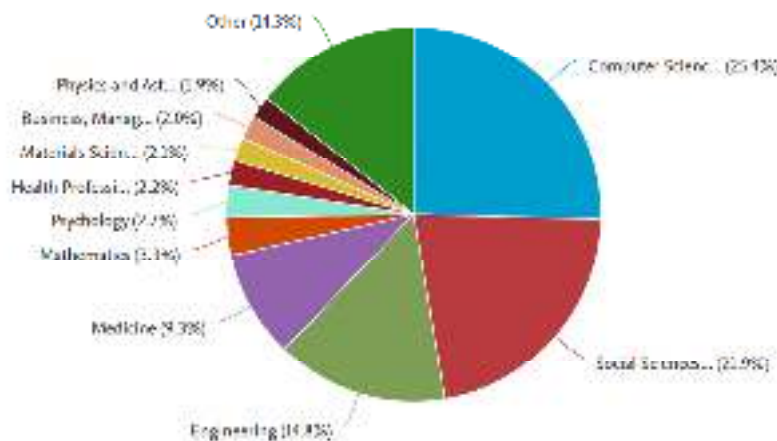




Figure 3. Relevant Data

Journals that publish AR papers are highly diversified. Based on Scopus data, it was found that the distribution of papers based on areas related to the use of AR is: computer science (858 articles), social sciences (740 articles), engineering (499 papers), medicine (315 papers), mathematics (111 papers), psychology (91 papers), health professions (73 papers), materials science (70 papers), business, management and accounting (69 papers), physics and astronomy (65 papers), arts and humanities (60 papers), and environmental science (58 papers). This analysis shows that AR is a technology that will be involved in many fields because it is useful for users (Arici et al., 2019). Furthermore, a comparison of the number of articles based on their sources can be seen in Figure 4.

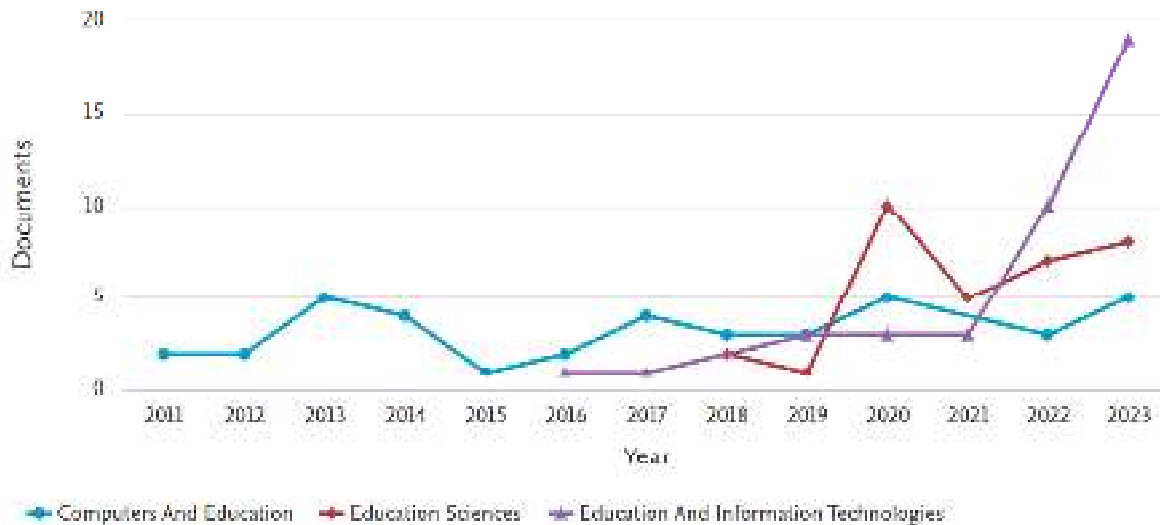


Figure 4. Documents per Year by Source

Computer and Education is in first place with a total of 40 documents. The second is Education Sciences, with a total of 39 documents. Third is Education and Information Technologies, with a total of 33 documents. Several bibliometric studies (Garzón, 2021; Karakus et al., 2019; Masalimova et al., 2023) stated that Computer and Education were the most cited sources. The author prefers Computer and Education because the AR subject covers technology intensively and is compatible with the scope of Computer and Education (Masalimova et al., 2023).

Next, analysis of articles with the highest number of citations based on Scopus data is presented in Table 1 below.

Table 1. Most Cited Articles

Cited by	Authors	Title	Year	Journal
3022	Wu H.-K.; Lee S.W.-Y.; Chang H.-Y.; Liang J.-C.	Current status, opportunities and challenges of augmented reality in education	2013	Computers and Education
2261	Akçayır M.; Akçayır G.	Advantages and challenges associated with augmented reality for education: A systematic review of the literature	2017	Educational Research Review
1685	Bacca J.; Baldiris S.; Fabregat R.; Graf S.; Kinshuk	Augmented reality trends in education: A systematic review of research and applications	2014	Educational Technology and Society



1560	Di Serio Á.; Ibáñez M.B.; Kloos C.D.	Impact of an augmented reality system on students' motivation for a visual art course	2013	Computers and Education
1369	Klopfer E.; Squire K.	Environmental detectives-the development of an augmented reality platform for environmental simulations	2008	Educational Technology Research and Development
1049	Radu I.	Augmented reality in education: A meta-review and cross-media analysis	2014	Personal and Ubiquitous Computing
933	Li X.; Yi W.; Chi H.-L.; Wang X.; Chan A.P.C.	A critical review of virtual and augmented reality (VR/AR) applications in construction safety	2018	Automation in Construction
886	Ibáñez M.-B.; Delgado-Kloos C.	Augmented reality for STEM learning: A systematic review	2018	Computers and Education
863	Moro C.; Štromberga Z.; Raikos A.; Stirling A.	The effectiveness of virtual and augmented reality in health sciences and medical anatomy	2017	Anatomical Sciences Education
779	Ibáñez M.B.; Di Serio Á.; Villarán D.; Delgado Kloos C.	Experimenting with electromagnetism using augmented reality: Impact on flow student experience and educational effectiveness	2014	Computers and Education

Based on Table 1 above, it was found that the most frequently cited article titles were Current Status, Opportunities, and Challenges of Augmented Reality in Education, written by (Wu H.-K. and Lee S.W.-Y.; Chang H.-Y.; and Liang J.-C.2013) in the Computer and Education journal with 3,022 citations. This study recommends that future research consider how Augmented Reality (AR) environments support learning so that they can help transform important concepts in education, such as contextualization, authenticity, and engagement. Additionally, learning approaches that emphasize students' roles in AR environments can increase students' sense of presence and engagement. Likewise, location-based learning approaches can link formal and informal learning, which can change the concept of contextualization. AR can also enhance learning tasks by allowing students to view content from different points of view. However, further research is needed to understand the learning effects of AR in more depth, including the development of substantial educational content and the integration of AR into school curricula (Wu et al., 2013).

Table 2. Top 5 Documents by Author

Authors	Number of Study	Example Paper
Mantri, A.	14	(Tuli, Mantri, et al., 2022); (Pathania et al., 2023); (Tuli, Singh, et al., 2022); (Kumar et al., 2021); (Singh et al., 2019)
Yilmaz, R.M.	9	(Salar et al., 2020); (Sahin & Yilmaz, 2020); (Yilmaz & Goktas, 2017); (Yilmaz, 2016); (Küçük et al., 2014); (Topu et al., 2023)
Navab, N.	8	(Ma et al., 2016); (Barmaki et al., 2019); (Martin-Gomez et al., 2021); (Bork et al., 2021)



RQ4. What kind of structure emerges in connection with co-occurrence?

VOSviewer software analyzed 1,772 articles to extract the most researched AR-related topics in education. The keywords most frequently used are AR, VR, education, human, AI, student, teaching and learning. All keywords were categorized into four logical groups (Figure 5). The node's size indicates the keyword's frequency: the larger the node, the more often the keyword is researched. The close relationship between the two phrases affects the thickness of the line. The study found 1,858 links for 55 items, giving an average link strength for co-occurrence of 33.8 (across all keywords).



The network structure of relationships between keywords is shown in Figure 5. Larger circle sizes indicate more frequently discussed subjects, while yellow areas indicate recent subjects. As can be seen in Figure 5, the words “augmented reality,” “virtual reality,” “education,” “teaching,” “student,” and “e-learning” are located in the center of the map. These words are concepts that have been studied together with other clusters and have been identified as the most frequently used keywords.

The co-occurrence of author keywords is presented with a network visualization. The number of occurrences and the total strength of their links with other keywords are calculated for all keywords. The



keywords with the greatest total link strength are selected. Augmented reality was the most frequently found keyword, with 1,772 occurrences and a total link strength of 11,579. For others, the first number represents the occurrence, and the second is the total link strength. Virtual reality is in second place (498; 4,526), and education is in third place (438; 4,473). Other terms are human (373; 5,739), students (276; 2,428), engineering education (188; 1,475), teaching (185; 2,055), e-learning (176; 1,619), and learning (173; 2,104).

Figure 5 shows that the largest cluster comprises AR, student, teaching, and engineering education. The second cluster comprises humans, articles, procedures, females, and 3D imaging. The third cluster comprises education, learning, student, COVID-19, curriculum, anatomy, student medical, and major clinical study. The fourth cluster comprises human experiments, knowledge, pilot studies, and nursing education. Most augmented reality literature studies have been conducted at all levels and in all in all scientific disciplines.

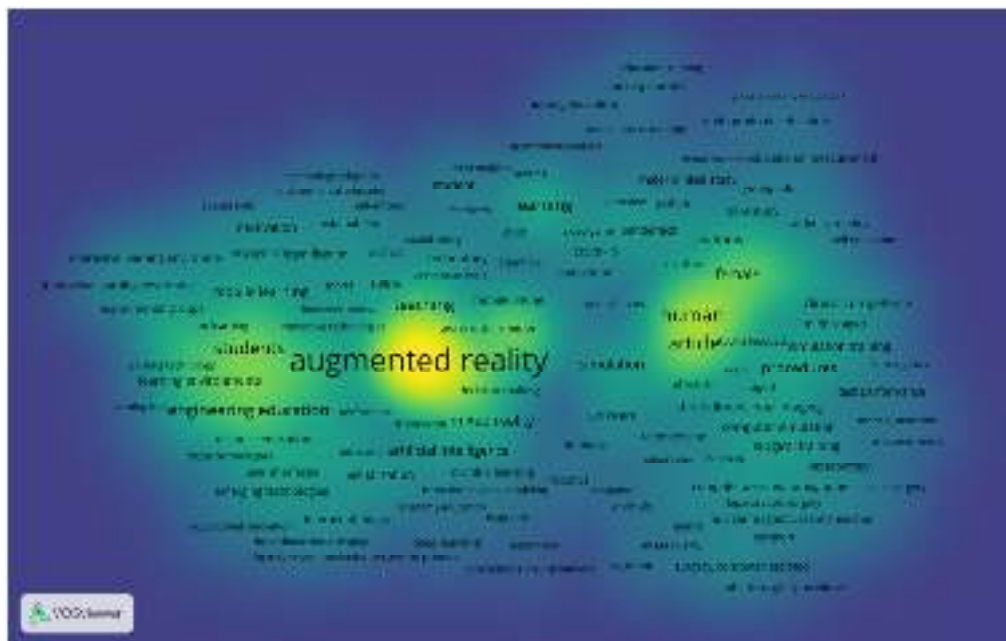


Figure 6. VosViewer Cluster Analysis

Table 3. Cluster Keywords and Cluster Topics

Cluster	Cluster keywords	Cluster topic / Example papers
1	AR, student, teaching, engineering education, artificial intelligence, interactive learning, motivation, mixed reality, mobile learning, gamification, emerging technologies, iot, etc.	AR, motivation: (Santos et al., 2013); (Huang et al., 2016); (Ibáñez et al., 2020)
2	Human, article, procedures, female, 3D imaging, simulation training, clinical competence, medical education, software, computer simulation, etc.	3D imaging, simulation training: (Anton et al., 2018); (Goh et al., 2021); (Christopoulos et al., 2022)



3	Education, learning, student, covid-19, curriculum, anatomy, student medical, major clinical study, adolescent, young adult, undergraduate education, etc.	Education, student medical: (Moro et al., 2017); (Martín-Gutiérrez et al., 2015)
4	Human experiment, knowledge, pilot study, nursing education, nursing student, health education, radiology, etc.	Nursing education: (Uymaz & Uymaz, 2022)

Cluster 1

Santos et al., (2013) discussed that Augmented Reality Learning Experiences (ARLEs) have unique advantages that can influence the learning experience. Development of ARLEs involves hardware, software, and content creation. The current use of ARLEs has an average effect of 0.56 on student performance, but there is wide variation due to different ways of using ARLEs and differences in experimental design. AR technology transforms the learning experience and can provide exciting new experiences that lead to better learning.

Huang et al., (2016) also showed that using AR in field learning and eco-education can enhance students' learning experiences and stimulate positive emotions while helping them develop stronger bonds with the natural environment.

In their research, Ibáñez et al., (2020) stated that augmented reality technology positively impacts the learning outcomes of secondary school students in Mexico. However, the impact varies depending on whether the student is enrolled in a public or private school. The research results show that: (1) there is an interaction between the type of technology, type of school, and assessment time when student achievement scores are measured; (2) students who used augmented reality-based learning environments scored higher in post-tests compared to those who used web-based applications; (3) augmented reality learning environments are more effective in learning compared to web-based learning environments in public schools, but not in private schools; (4) there is no interactive effect between type of technology, type of school, and assessment time when student motivation is measured; (5) students from private schools reported higher levels of motivation compared to those from public schools when using augmented reality learning environments.

Cluster 2

Anton et al., (2018) stated that Augmented Reality (AR) and Virtual Reality (VR) technologies have become more affordable with cheap 3D cameras, mixed reality headsets and 3D displays available in the consumer market. Although this technology has been adopted in the video gaming and entertainment industries, its use for professional purposes, such as in industrial and business settings, healthcare, and education, still lags. 3D systems for communication have been proposed to overcome these limitations; however, very little research has examined performance and interaction with such technologies.

Goh et al., (2021) reviewed the existing literature on applying augmented reality technology to practice planning and intraoperative navigation in knee arthroplasty. This study concludes that augmented reality technology has great potential to improve orthopedic surgical practice, but further research is needed to understand its impact more deeply and evaluate the cost-effectiveness of its use in training and clinical practice. Various potential applications in orthopedic surgery include training and improving surgical skills.

Christopoulos et al., (2022) contribute by guiding how AR-supported interventions can be integrated into medical education and providing empirical evidence on the benefits such approaches can provide to students' academic performance and knowledge acquisition.

Cluster 3

Moro C., Stromberg Z., Raikos A., and Stirling A. (2017) researched to assess whether learning structural anatomy using VR or AR is as effective as tablet-based applications and whether this mode allows for increased



student learning, engagement and performance. The results showed no significant difference between the average VR, AR, or TB assessment scores. However, VR participants were more likely to experience side effects such as headaches, dizziness, or blurred vision during lessons. Nonetheless, VR and AR have the same value in teaching anatomy as tablet devices and promote intrinsic benefits such as increased immersion depth and learning engagement. This shows great potential for the use of virtual and augmented reality as a means to complement course content in anatomy education.

Martín-Gutiérrez et al., (2015) have proven the effectiveness of Augmented Reality (AR) in learning to improve learning quality, overcome practical lab overcrowding, and update teaching methods. AR enables independent learning, reduces lecturers' teaching time, and provides a motivational tool for students. The integration of AR in the curriculum has been successful in an electrical machines course in an electrical engineering program, and the positive results of this research suggest expanding the use of this technology to other programs that teach the same course. It is hoped that AR can increase student motivation and academic performance. Additionally, AR is considered a cost-effective solution for presenting engaging content, and expansion of AR is proposed for other engineering laboratories.

Cluster 4

Uymaz & Uymaz (2022) stated that nursing students believe AR technology will improve their academic performance. Although this study only involved nursing students, the results provide insight into AR technology's potential use in general health education. AR technology that can be accessed via mobile phone provides flexibility and active engagement, which can motivate students. Demand for AR applications is predicted to be high due to their ability to provide holistic teaching and be an alternative to textbooks. Additionally, teachers can use AR for interactive online education, improving students' clinical skills and assisting in training health workers. However, it is important to remember that strong mentorship remains important in nursing education. By utilizing AR technology, teachers can provide a better learning experience for students.

Countries Co-occurrence Analysis

Figure 7 represents the co-occurrence analysis in a country for at least ten documents per country. The total number of countries detected was 44, with 425 links. Six clusters were found, including the United States, Spain and China, representing the largest papers.

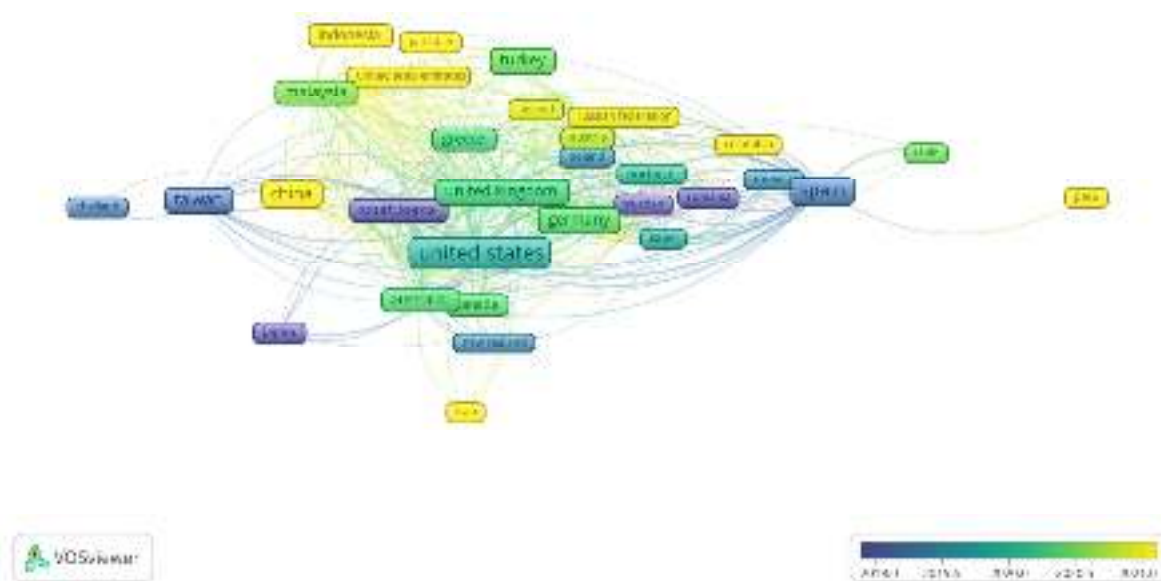




Figure 7. VosViewer Countries Co-Occurrence Analysis

Based on the Vos Viewer analysis, the countries co-occurrence analysis presents the countries where the author's institution is located. Cluster 1 mostly contains Asian countries except the Russian Federation and Serbia. Cluster 2 is mostly from American countries except Switzerland. Cluster 3 shows a more diverse mix of Australia, America (Canada, Hong Kong, Ireland, New Zealand, and South Korea), North America (the United States), East Asia (Japan), and West Asia (Iran). Cluster 4 is made up of European countries (Austria, Cyprus, Finland, Greece, the Netherlands, and the United Kingdom). Cluster 5 is mostly South American countries except Spain. Cluster 6 is East Asian countries (China, Taiwan) and Southeast Asia (Thailand). Most countries with a minimum of 10 documents per country are from America. However, the composition of the cluster shows that there is strong international collaboration between authors from various countries. For more details, see table 4 below.

Table 4. Cluster Countries (Countries with 10 or More Documents)

Cluster	Cluster countries
Cluster 1	India; Indonesia; Kazakhstan; Malaysia, Pakistan, Russian Federation; Saudi Arabia; Serbia; Singapura; Turkey; United Arab Emirates
Cluster 2	Brazil; France; Germany; Israel; Italy; Poland; Portugal; Romania; Sweden; Switzerland
Cluster 3	Australia; Canada; Hong Kong; Iran; Ireland; Japan; New Zealand; South Korea; United States
Cluster 4	Austria; Cyprus; Finland; Greece; Netherlands; United Kingdom
Cluster 5	Chile; Colombia; Mexico; Peru; Spain
Cluster 6	China; Taiwan; Thailand

4. CONCLUSION

Based on the research results, several main findings can be concluded, namely: 1) Distribution of Publications by Year: Research related to augmented reality (AR) in education has experienced a significant increase over time, with the number of publications being low in the early 2000s and increasing rapidly in the following years. Recent years, especially in 2021–2023, This finding is, according to the opinion of previous researchers, that AR has begun to appear significantly in educational applications in the last decade. 2) Distribution of Publications by Country: The United States dominates in the number of educational publications related to AR, followed by Spain and China. These findings reflect the United States' preeminence in AR research and the strong international collaboration between researchers from different countries. 3) Co-occurrence Structure: Analysis of co-occurrence keywords shows that the most frequently discussed topics in the context of AR in education include AR, VR, education, teaching, students, and learning. These findings indicate a strong interest in using AR to enhance learning and teaching experiences. 4) Cluster Analysis: The clustering of research shows that studies of AR in education cover a wide range of topics, including student motivation, interactive learning, student engagement, clinical training, and curriculum development. This shows that AR has great potential to be applied in various educational contexts and scientific disciplines. 5) Co-occurrence Analysis by Country: Co-occurrence analysis by country shows strong international collaboration between researchers from various countries, with the United States dominating the number of publications. This international collaboration reflects the complexity and importance of AR research in education as a global topic.

In connection with the research results and conclusions above, the recommendations from this research are:

- 1) Research shows a significant increase in interest and publications related to AR in education, so it is recommended that this research be further developed. This could include research on the application of



AR in more specific educational contexts, the development of innovative learning methods using AR, and the exploration of AR's potential to improve student learning outcomes.

- 2) Given the diversity of countries involved in AR research in education, it is advisable to encourage more collaboration and international cooperation between researchers from different countries. This can increase the exchange of knowledge and experience and expand the scope of research carried out.
- 3) AR can be an effective tool for enhancing students' learning experiences in various fields of study. Therefore, it is recommended that AR be integrated into formal and informal education curricula at the school and college levels. This will help create a more engaging and technology-oriented learning environment for students.

5. ACKNOWLEDGMENTS

This research was sponsored and funded by Lembaga Pengelola Dana Pendidikan (LPDP), the Ministry of Education, Research, and Technology (Kementerian Pendidikan, Kebudayaan, Riset, and Teknologi) of Indonesia.

6. REFERENCES

- Akçayır, M., & Akçayır, G. (2017). Advantages and challenges associated with augmented reality for education: a systematic review of the literature. *Educational Research Review*, 20, 1–11. <https://doi.org/10.1016/j.edurev.2016.11.002>
- Anton, D., Kurillo, G., & Bajcsy, R. (2018). User experience and interaction performance in 2D/3D telecollaboration. *Future Generation Computer Systems*, 82, 77–88. <https://doi.org/10.1016/j.future.2017.12.055>
- Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Arici, F., Yildirim, P., Caliklar, Ş., & Yilmaz, R. M. (2019). Research trends in the use of augmented reality in science education: content and bibliometric mapping analysis. *Computers & Education*, 142, 103647. <https://doi.org/10.1016/j.compedu.2019.103647>
- Baashar, Y., Alkawsi, G., Ahmad, W. N. W., Alhussian, H., Alwadain, A., Capretz, L. F., Babiker, A., & Alghail, A. (2022). Effectiveness of using augmented reality for training in the medical professions: meta-analysis. *JMIR Serious Games*, 10(3), e32715. <https://doi.org/10.2196/32715>
- Bacca Acosta, J. L., Baldiris Navarro, S. M., Fabregat Gesa, R., & Graf, S. (2014). Augmented reality trends in education: a systematic review of research and applications. *Journal of Educational Technology and Society*, 2014, Vol. 17, Núm. 4, p. 133-149.
- Bacca, J., Baldiris, S., & Fabregat, R. (2018). Insights into the factors influencing student motivation in augmented reality learning experiences in vocational education and training. *Frontiers in Psychology*, 1486. <https://doi.org/10.3389/fpsyg.2018.01486>
- Barmaki, R., Yu, K., Pearlman, R., Shingles, R., Bork, F., Osgood, G. M., & Navab, N. (2019). Enhancement of anatomical education using augmented reality: an empirical study of body painting. *Anatomical Sciences Education*, 12(6), 599–609. <https://doi.org/10.1002/ase.1858>
- Behzadan, A. H., & Kamat, V. R. (2013). Enabling discovery-based learning in construction using telepresent augmented reality. *Automation in Construction*, 33, 3–10. <https://doi.org/10.1016/j.autcon.2012.09.003>



- Billingshurst, M., & Duenser, A. (2012). Augmented reality in the classroom. *Computer*, 45(7), 56–63. <https://doi.org/10.1109/MC.2012.111>
- Bork, F., Lehner, A., Eck, U., Navab, N., Waschke, J., & Kugelman, D. (2021). The effectiveness of collaborative augmented reality in gross anatomy teaching: a quantitative and qualitative pilot study. *Anatomical Sciences Education*, 14(5), 590–604. <https://doi.org/10.1002/ase.2016>
- Bujak, K. R., Radu, I., Catrambone, R., MacIntyre, B., Zheng, R., & Golubski, G. (2013). A psychological perspective on augmented reality in the mathematics classroom. *Computers & Education*, 68, 536–544. <https://doi.org/10.1016/j.compedu.2013.02.017>
- Chen, C., Yang, C., Huang, K., & Yao, K. (2020). Augmented reality and competition in robotics education: effects on 21st century competencies, group collaboration and learning motivation. *Journal of Computer Assisted Learning*, 36(6), 1052–1062. <https://doi.org/10.1111/jcal.12469>
- Chen, Y. (2019). Effect of mobile augmented reality on learning performance, motivation, and math anxiety in a math course. *Journal of Educational Computing Research*, 57(7), 1695–1722. <https://doi.org/10.1177/0735633119854036>
- Cheng, K.-H., & Tsai, C.-C. (2014). Children and parents' reading of an augmented reality picture book: analyses of behavioral patterns and cognitive attainment. *Computers & Education*, 72, 302–312. <https://doi.org/10.1016/j.compedu.2013.12.003>
- Christopoulos, A., Pellas, N., Kurczaba, J., & Macredie, R. (2022). The effects of augmented reality-supported instruction in tertiary-level medical education. *British Journal of Educational Technology*, 53(2), 307–325. <https://doi.org/10.1111/bjet.13167>
- Dalim, C. S. C., Sunar, M. S., Dey, A., & Billingshurst, M. (2020). Using augmented reality with speech input for non-native children's language learning. *International Journal of Human-Computer Studies*, 134, 44–64. <https://doi.org/10.1016/j.ijhcs.2019.10.002>
- Di Serio, Á., Ibáñez, M. B., & Kloos, C. D. (2013). Impact of an augmented reality system on students' motivation for a visual art course. *Computers & Education*, 68, 586–596. <https://doi.org/10.1016/j.compedu.2012.03.002>
- Dong, S., Behzadan, A. H., Chen, F., & Kamat, V. R. (2013). Collaborative visualization of engineering processes using tabletop augmented reality. *Advances in Engineering Software*, 55, 45–55. <https://doi.org/10.1016/j.advengsoft.2012.09.001>
- Eck, N., & Waltman, L. (2017). Citation-based clustering of publications using CitNetExplorer and VOSviewer. *Scientometrics*, 111(2). <https://doi.org/10.1007/s11192-017-2300-7>
- Feng, S., He, W., Zhang, X., Billingshurst, M., & Wang, S. (2023). A comprehensive survey on AR-enabled local collaboration. *Virtual Reality*, 27(4), 2941–2966. <https://doi.org/10.1007/s10055-023-00848-2>
- Garzón, J. (2021). An overview of twenty-five years of augmented reality in education. *Multimodal Technologies and Interaction*, 5(7), 37. <https://doi.org/10.3390/mti5070037>
- Georgiou, Y., & Kyza, E. A. (2018). Relations between student motivation, immersion and learning outcomes in location-based augmented reality settings. *Computers in Human Behavior*, 89, 173–181.



<https://doi.org/10.1016/j.chb.2018.08.011>

- Goh, G. S., Lohre, R., Parvizi, J., & Goel, D. P. (2021). Virtual and augmented reality for surgical training and simulation in knee arthroplasty. *Archives of Orthopaedic and Trauma Surgery*, 141, 2303–2312. <https://doi.org/10.1007/s00402-021-04037-1>
- Gonzalez, A. A., Lizana, P. A., Pino, S., Miller, B. G., & Merino, C. (2020). Augmented reality-based learning for the comprehension of cardiac physiology in undergraduate biomedical students. *Advances in Physiology Education*, 44(3), 314–322. <https://doi.org/10.1152/ADVAN.00137.2019>
- Herbert, B., Ens, B., Weerasinghe, A., Billinghamurst, M., & Wigley, G. (2018). Design considerations for combining augmented reality with intelligent tutors. *Computers & Graphics*, 77, 166–182. <https://doi.org/10.1016/j.cag.2018.09.017>
- Herbert, B., Wigley, G., Ens, B., & Billinghamurst, M. (2022). Cognitive load considerations for Augmented Reality in network security training. *Computers & Graphics*, 102, 566–591. <https://doi.org/10.1016/j.cag.2021.09.001>
- Huang, T.-C., Chen, C.-C., & Chou, Y.-W. (2016). Animating eco-education: to see, feel, and discover in an augmented reality-based experiential learning environment. *Computers & Education*, 96, 72–82. <https://doi.org/10.1016/j.compedu.2016.02.008>
- Ibáñez, M. B., Portillo, A. U., Cabada, R. Z., & Barrón, M. L. (2020). Impact of augmented reality technology on academic achievement and motivation of students from public and private Mexican schools. A case study in a middle-school geometry course. *Computers & Education*, 145, 103734. <https://doi.org/10.1016/j.compedu.2019.103734>
- Karakus, M., Ersozlu, A., & Clark, A. C. (2019). Augmented Reality Research in Education: a Bibliometric Study. *EURASIA Journal of Mathematics, Science and Technology Education*, 15(10). <https://doi.org/10.29333/ejmste/103904>
- Kaur, D. P., Mantri, A., & Horan, B. (2020). Enhancing student motivation with use of augmented reality for interactive learning in engineering education. *Procedia Computer Science*, 172, 881–885. <https://doi.org/10.1016/j.procs.2020.05.127>
- Klopfer, E., & Squire, K. (2008). Environmental Detectives—the development of an augmented reality platform for environmental simulations. *Educational Technology Research and Development*, 56, 203–228. <https://doi.org/10.1007/s11423-007-9037-6>
- Koutromanos, G., Sofos, A., & Avraamidou, L. (2015). The use of augmented reality games in education: a review of the literature. *Educational Media International*, 52(4), 253–271. <https://doi.org/https://doi.org/10.1080/09523987.2015.1125988>
- Küçük, S., Yilmaz, R., Baydas, Ö., & Göktas, Y. (2014). Augmented reality applications attitude scale in secondary schools: validity and reliability study. *Egitim ve Bilim*, 39(176). <https://doi.org/10.15390/EB.2014.3590>
- Kumar, A., Mantri, A., & Dutta, R. (2021). Development of an augmented reality-based scaffold to improve the learning experience of engineering students in embedded system course. *Computer Applications in Engineering Education*, 29(1), 244–257. <https://doi.org/10.1002/cae.22245>



- Lai, A., Chen, C., & Lee, G. (2019). An augmented reality-based learning approach to enhancing students' science reading performances from the perspective of the cognitive load theory. *British Journal of Educational Technology*, 50(1), 232–247. <https://doi.org/10.1111/bjet.12716>
- Ma, M., Fallavollita, P., Seelbach, I., Von Der Heide, A. M., Euler, E., Waschke, J., & Navab, N. (2016). Personalized augmented reality for anatomy education. *Clinical Anatomy*, 29(4), 446–453. <https://doi.org/10.1002/ca.22675>
- Maas, M. J., & Hughes, J. M. (2020). Virtual, augmented and mixed reality in K–12 education: a review of the literature. *Technology, Pedagogy and Education*, 29(2), 231–249. <https://doi.org/10.1080/1475939X.2020.1737210>
- Martin-Gomez, A., Hill, C., Lin, H. Y., Fotouhi, J., Han-Oh, S., Wang, K.-H., Navab, N., & Narang, A. K. (2021). Towards exploring the benefits of augmented reality for patient support during radiation oncology interventions. *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization*, 9(3), 322–329. <https://doi.org/10.1080/21681163.2020.1835547>
- Martín-Gutiérrez, J., Fabiani, P., Benesova, W., Meneses, M. D., & Mora, C. E. (2015). Augmented reality to promote collaborative and autonomous learning in higher education. *Computers in Human Behavior*, 51, 752–761. <https://doi.org/10.1016/j.chb.2014.11.093>
- Masalimova, A. R., Erdyneeva, K. G., Kryukova, N. I., Khlusyanov, O. V, Chudnovskiy, A. D., & Dobrokhotoy, D. A. (2023). Bibliometric analysis of augmented reality in education and social science. *Online Journal of Communication and Media Technologies*, 13(2), e202316. <https://doi.org/10.30935/ojcmnt/13018>
- Moro, C., Štromberga, Z., Raikos, A., & Stirling, A. (2017). The effectiveness of virtual and augmented reality in health sciences and medical anatomy. *Anatomical Sciences Education*, 10(6), 549–559. <https://doi.org/10.1002/ase.1696>
- Pathania, M., Mantri, A., Kaur, D. P., Singh, C. P., & Sharma, B. (2023). A chronological literature review of different augmented reality approaches in education. *Technology, Knowledge and Learning*, 28(1), 329–346. <https://doi.org/10.1007/s10758-021-09558-7>
- Pritchard, A. (1969). Statistical bibliography or bibliometrics. *Journal of Documentation*, 25, 348.
- Ronald T. Azuma. (1997). *Augmented Reality Educational Games*. 6(5).
- Sahin, D., & Yilmaz, R. M. (2020). The effect of Augmented Reality Technology on middle school students' achievements and attitudes towards science education. *Computers & Education*, 144, 103710. <https://doi.org/10.1016/j.compedu.2019.103710>
- Salar, R., Arici, F., Caliklar, S., & Yilmaz, R. M. (2020). A model for augmented reality immersion experiences of university students studying in science education. *Journal of Science Education and Technology*, 29, 257–271. <https://doi.org/10.1007/s10956-019-09810-x>
- Santos, M. E. C., Chen, A., Taketomi, T., Yamamoto, G., Miyazaki, J., & Kato, H. (2013). Augmented reality learning experiences: survey of prototype design and evaluation. *IEEE Transactions on Learning Technologies*, 7(1), 38–56. <https://doi.org/10.1109/TLT.2013.37>
- Shirazi, A., & Behzadan, A. H. (2015). Design and assessment of a mobile augmented reality-based information



delivery tool for construction and civil engineering curriculum. *Journal of Professional Issues in Engineering Education and Practice*, 141(3), 4014012. [https://doi.org/10.1061/\(ASCE\)EI.1943-5541.0000229](https://doi.org/10.1061/(ASCE)EI.1943-5541.0000229)

- Singh, G., Mantri, A., Sharma, O., Dutta, R., & Kaur, R. (2019). Evaluating the impact of the augmented reality learning environment on electronics laboratory skills of engineering students. *Computer Applications in Engineering Education*, 27(6), 1361–1375. <https://doi.org/10.1002/cae.22156>
- Talan, T. (2021). Augmented Reality in STEM Education: bibliometric analysis. *International Journal of Technology in Education*, 4(4), 605–623. <https://doi.org/10.46328/ijte.136>
- Topu, F. B., Yilmaz, R. M., & Tulgar, A. T. (2023). The effects of using augmented reality on vocabulary learning and attitude of pre-school children in English education. *Education and Information Technologies*, 1–32. <https://doi.org/10.1007/s10639-023-12284-5>
- Tuli, N., Mantri, A., & Sharma, S. (2022). Augmented reality in education: a systematic study on technical and usability issues. *International Journal of Computer Aided Engineering and Technology*, 17(2), 164–183. <https://doi.org/10.1504/ijcaet.2022.125048>
- Tuli, N., Singh, G., Mantri, A., & Sharma, S. (2022). Augmented reality learning environment to aid engineering students in performing practical laboratory experiments in electronics engineering. *Smart Learning Environments*, 9(1), 1–20. <https://doi.org/10.1186/s40561-022-00207-9>
- Turkan, Y., Radkowski, R., Karabulut-Ilgu, A., Behzadan, A. H., & Chen, A. (2017). Mobile augmented reality for teaching structural analysis. *Advanced Engineering Informatics*, 34, 90–100. <https://doi.org/10.1016/j.aei.2017.09.005>
- Uymaz, P., & Uymaz, A. O. (2022). Assessing acceptance of augmented reality in nursing education. *PLoS One*, 17(2), e0263937. <https://doi.org/10.1371/journal.pone.0263937>
- Wei, X., Weng, D., Liu, Y., & Wang, Y. (2015). Teaching based on augmented reality for a technical creative design course. *Computers & Education*, 81, 221–234. <https://doi.org/10.1016/j.compedu.2014.10.017>
- Wu, H.-K., Lee, S. W.-Y., Chang, H.-Y., & Liang, J.-C. (2013). Current status, opportunities and challenges of augmented reality in education. *Computers & Education*, 62, 41–49. <https://doi.org/10.1016/j.compedu.2012.10.024>
- Yilmaz, R. M. (2016). Educational magic toys developed with augmented reality technology for early childhood education. *Computers in Human Behavior*, 54, 240–248. <https://doi.org/10.1016/j.chb.2015.07.040>
- Yilmaz, R. M., & Goktas, Y. (2017). Using augmented reality technology in storytelling activities: examining elementary students' narrative skill and creativity. *Virtual Reality*, 21, 75–89. <https://doi.org/10.1007/s10055-016-0300-1>



IMPROVING THE ABILITY TO UNDERSTAND AND SOLVE MIXED AUTOMATION OPERATIONS THROUGH LEARNING MODELS STUDENT TEAMS-ACHIEVEMENT DIVISIONS (STAD) FOR CLASS VI PRIMARY SCHOOL STUDENTS

Andika Mardiansah*

Universitas Muhammadiyah Purwokerto, Indonesia

*andikamardiansah7@gmail.com

ABSTRACT

This research aims to increase motivation and learning outcomes in Mathematics through the Student Teams Achievement Divisions (STAD) learning model. This type of research is classroom action research carried out in two cycles with mixed arithmetic operations as the material. The subjects of this research were class VI students at SD Negeri 1 Talagening, Bobotsari, Purbalingga, Central Java, totaling 24 students in the 2022–2023 academic year. This research was carried out in 2 cycles, each consisting of 2 meetings and each meeting included the planning, implementation, observation and reflection stages. The action hypothesis in this research is that the use of the STAD-type learning model increases motivation and Mathematics learning outcomes.

An indicator of success is when student activity in the learning process reaches a score of 75% or more. The average class score for each cycle is at least 75. Students who achieve a score of 75 or 80% of the total number of students. Based on the results of observations of students, it was 37.50% in cycle I, meeting 1 and 58.33% in meeting 2. Meanwhile, in cycle II, meeting 1, the score was 70.83% and in meeting 2, the score was 83.33%. The number of students who obtained a score of 75 or more in cycle I was 16 students or 66.67%, while in cycle II there were 21 students or 87.50%. In cycle II and the final results it was found that students had exceeded the specified success indicators.

Keywords: *STAD Learning Model, Motivation, Mathematics Learning Outcomes.*

1. INTRODUCTION

Educators are professional staff tasked with planning and implementing the learning process, assessing learning outcomes, providing guidance and training as well as conducting research and community service for higher education (UU No. 23 of 2003 concerning the National Education System Chapter XI Article 39 paragraph 2). From the identification of the definition above, the teacher as an element of education has the task of planning and implementing the learning process, assessing learning outcomes, and providing guidance and training to students.

The success of students is largely determined by the teacher's professionalism in carrying out the learning process, which includes determining the learning objectives that will be delivered in the form of a learning implementation plan (RPP). A teacher must master at least two national education standards from the eight National Education Standards, namely Process Standards and Assessment Standards. Teachers feel satisfied and proud if the delivery of lesson material is well received by students and the grades obtained in each assessment are satisfactory. However, this hope has not been realized in practice because it has been hampered by several problems.

According to Hamijoyo regarding educational innovation, he states that "Educational innovation is a change that is new and qualitatively different from what existed before and is deliberately sought to improve abilities to achieve certain goals in education."

Researchers immediately respond and overcome problems that occur in the learning process so that they do not drag on and hurt the success of students' subsequent learning. Problem-solving begins with collecting data, identifying the problem, creating a solution hypothesis, and testing it again.



Learning activities in class require careful planning so that learning objectives are successful. Teachers are one of the determining factors for the success of learning, so before implementing learning, it is best to prepare a learning plan that is packaged hierarchically to provide an active and enjoyable learning process for students. The teacher will feel satisfied if, at the end of the lesson, the students can master the subject matter well. The success of students in the learning process can be seen, among other things, from satisfactory daily test results, the fact that students can carry out practical assignments well and the fact that they can answer questions well and correctly. However, the reality of what is happening at the school where the researcher works has not yet been realized.

In the Mathematics subject 'Mixed Arithmetic Operations', the results of the formative test show that the level of ability in solving mixed arithmetic operation questions is still very low. Of the 24 students, only 6 students, or 25% got a score above 7.5. If this is left untreated and not immediately addressed, it will hurt the student's subsequent learning process and outcomes. Realizing this situation, teachers reflect on themselves to make efforts to improve the learning process through Classroom Action Research (CAR).

From the study problem, the researcher determines an alternative solution to the perceived problem that is appropriate for increased results. Study participants were educated on Mathematics with the material " Operation Count Mixed " through learning models Student Teams-Achievement Divisions (STAD). Through a learning model Student Teams-Achievement Divisions (STAD) are expected to activate participant education so that understanding participant education can improve and become capable of solving various form problems with the material so that results and repetitions also increase.

With the existence of the STAD learning model, participants will get experience directly as guiding teacher friends who haven't controlled material, as well as participant, education for those who haven't yet controlled material No shyness; ask his friend already Can in his group so that the expected understanding and mastery of problem solving can increase. On the other hand, through the STAD learning model, participants will be more interested and involved in learning. With conditions like that, it is also hoped that participants' problems with education can be minimized, and their use can increase performance. Study participants are educated on the material so that expected marks in the National Eye Exam lesson Mathematics can increase in class average.

From the various existing problems the researcher mentioned above, the main priority is to increase motivation and results in studying students in lesson Mathematics. The problems above need to happen while all parties cooperate. To increase the quality of participant education. In following every lesson teachers should use learning models that are fun and appropriate to the characteristics participants educate so that motivation, activity, and results from study participant education can be constant.

2. METHODS

The subject study is student Class VI Semester II 2022/2023 academic year SD Negeri 1 Talagening regional coordinator bobotsari regency education and culture office Purbalingga, totaling 24 students consisting of 13 men and 11 women. Study carried out at Talagening 1 elementary school regional coordinator bobotsari regency education and culture office Purbalingga. mathematics subjects, competency base using the properties of arithmetic operations including mixed operations, FPB, and LCM. A study was held for two months that is March and April 2023.

Procedure classroom action research is held through a review process consisting of cycles of 4 stages, namely planning (planning), doing the action (acting), observing (observing), and reflecting (reflecting). Reflection results from actions carried out will be used in return for revised plan action on the cycle next. The cycle in this PTK takes place several times, and it ends with what you want. In terms of this PTK cycle with objectively planned repairs, it has already ended, however, it usually will appear as a problem or cause for concern. So you can solve it through the PTK cycle.

A detailed channel repair study can be seen in the picture below:

Research Preparation

(Literary Studies and Discussion)

1. Equalization Concept, Methods, Examples, and Intermediate Stages Research and Observers



2. Sheet preparation observation
3. Compilation Format Interview
4. Test preparation

Preliminary studies

1. Learning Process
2. Diagnostic tests (obtaining initial data)
3. Document Analysis
4. Interview with Students
5. Discussion with the Supervisor: Initial Idea

Cycle I Actions

1. Improvement Planning
2. Implementation of Improvements
3. Observation
4. Discussion with observers
5. Cycle I Reflection

Succeed

Cycle II Actions

1. Improvement Planning
2. Implementation of Improvements
3. Observation
4. Discussion with observers
5. Cycle II Reflection

Data, Data Collection Techniques, and Data Analysis

The data used in this research are two types of data, namely qualitative data and quantitative data. Qualitative data is related to the learning process while quantitative data is in the form of student learning scores. Data collection is carried out using data collection tools in the form of Written tests are used to determine students' absorption and memory of lesson material. Observation is used to observe student and teacher activities during the learning process. Qualitative data is analyzed in the form of a narrative presentation that describes the quality of learning, while quantitative data is analyzed descriptively from student learning outcomes figures and the results of the recapitulation of average scores in Cycles I, II, and III.

3. RESULTS & DISCUSSION

In cycle I, in the planning stage, the results achieved were not significant because there were more students who had not yet completed their studies than those who had completed their studies. In cycle I, significant results are planned in the sense that there must be more students who have completed than the number of students who have not completed. Researchers plan to use the STAD learning model to increase student motivation and learning outcomes.

Learning Outcomes in Pra Syclus Can be Presented in The Table Below:

No		complete	incomplete
1	Total	8	16
2	Percentage	33,33%	66,67%

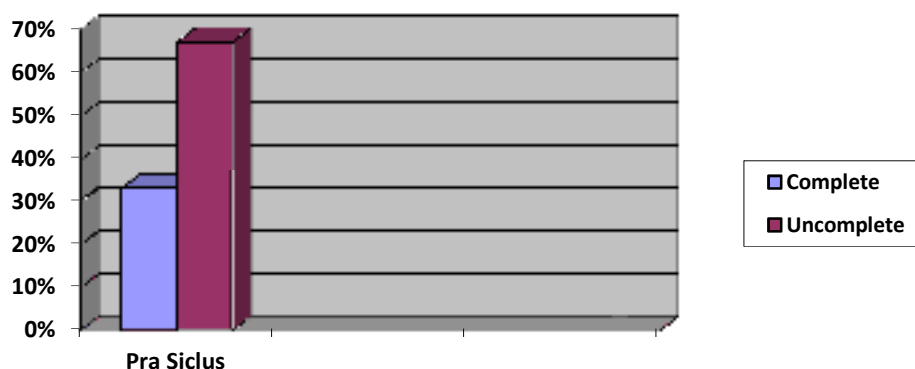


Figure 1. Pra Siklus

Researchers felt that studying Natural Knowledge (Science) on the subject of Energy and its Changes in this first cycle had not been successful. Because there are still 10 children who have not yet finished. After researchers, supervisors and observers discuss the results of observations and interviews which are linked to the results of formative tests, in the second cycle it is necessary to address and explore students' initial perceptions about the material to be studied before the learning process.

Learning Outcomes in Cyclus 1 Can be Presented in The Table Below:

No		complete	incomplete
1	Total	16	16
2	Percentage	66,67%	66,67%

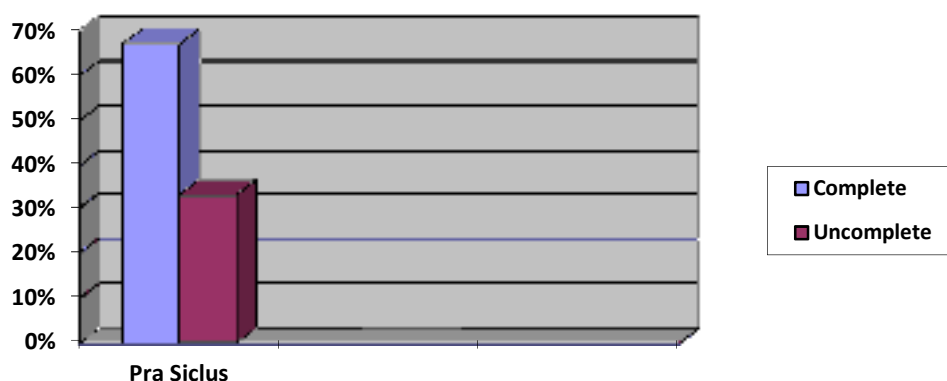


Figure 2. Siklus 1



from initial conditions to Cycle I there was an increase of 33.67%. For more details, see the diagram below:

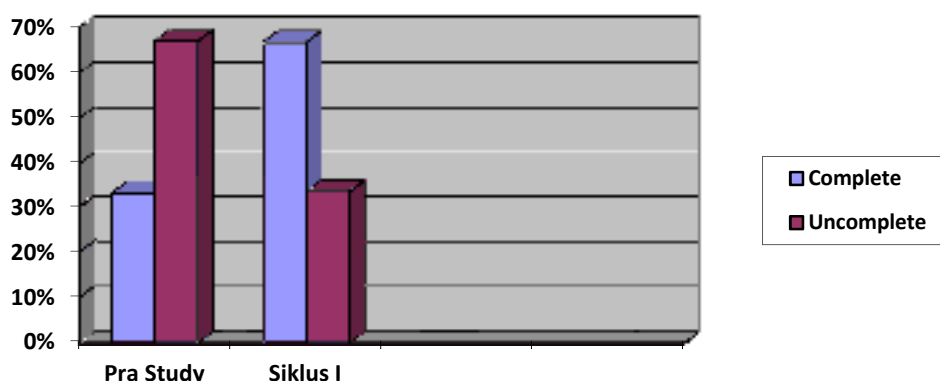


Figure 3. Bar Diagram of Class VI Students' Learning Accomplishments in Initial Studies and Cycle I

Based on the results of the research, there is an enhancement to the results of study participant education. Lots of participants who completed education studied in Cycle I as many as 16 participants had education (66.67%) while 21 students completed Cycle II (87.50%). This matter shows existing enhancement results Study participants educated from cycle I to cycle II also achieved indicator success.

From the observations of Cycle I students on the observation sheet, the following data was obtained:

Table 1. Recapitulation of Mathematics Learning Activity Values Mixed Calculation Operations Material Cycle I Meeting 1 and Meeting 2

No	Number of Students	Activeness					
		A1	B1	C1	A2	B2	C2
1	24	9	8	7	15	10	9
Percentage		37,5	33,3	21,2	62,5	41,7	37,5

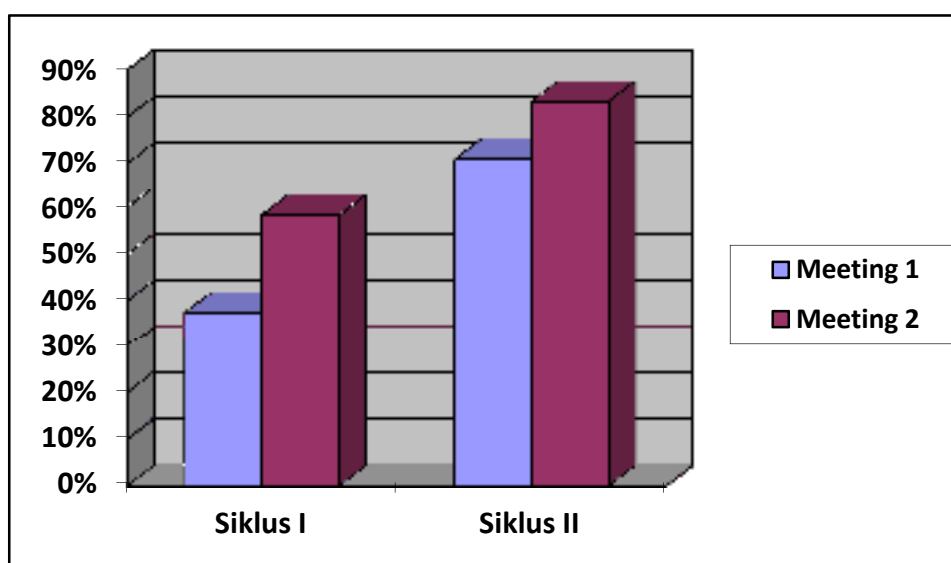




Figure 4. Bar Diagram of Class VI Students' Learning Accomplishment in Initial Study and Cycle I

Based on the results of cycle I and cycle II in the planning stage, it is hoped that the results achieved will be significant in order to achieve indicators of learning completeness. In cycle II, significant results are planned in the sense that the number of students who have completed must be greater than the number of students who have not yet completed and achieved the indicators of success. In cycle II, the researcher plans to use the STAD learning model with a smaller number of students in the group and provide slight modifications in learning that serve to increase cohesiveness in the team so that it can increase the motivation and learning outcomes of students in the group and end with a successful independent evaluation.

Based on the results of research on student activities, it was found that there was an increase from cycle I to cycle II. This is shown from the results of student observations in cycle I that student activity in lesson 1 reached 37.50% in lesson 2 reached 58.33%. Meanwhile, in cycle II meeting 1 obtained a score of 70.83%, and meeting 2 obtained a score of 83.33%. Hence, after learning in cycle II activities participants have already reached indicator-determined success.

From the observations of Cycle II students on the observation sheet, the following data was obtained:

Table 2. Recapitulation of Mathematics Learning Activeness Values Material for Mixed Counting Operations Cycle II Meeting 1 and Meeting 2

No	Number of Students	Activeness					
		A1	B1	C1	A2	B2	C2
1	24	17	3	4	20	3	1
Percentage		70,8	12,5	16,7	83,3	12,5	4,2

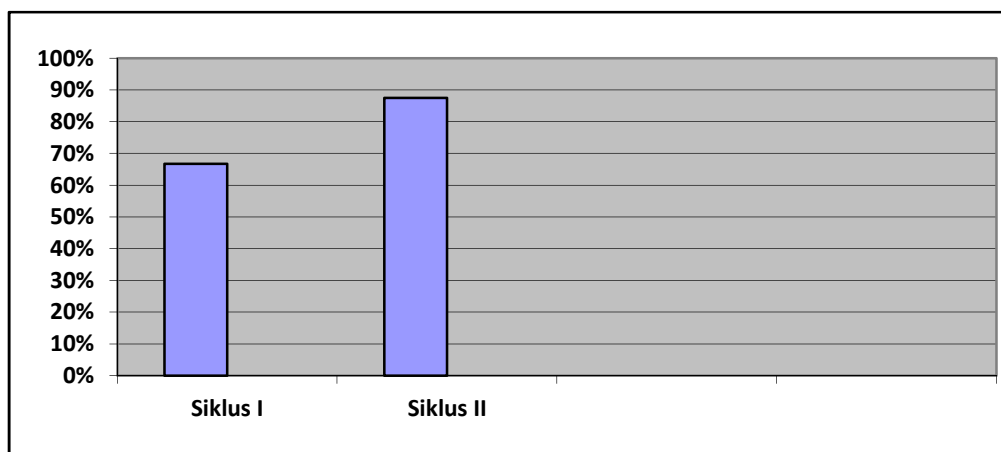


Figure 5. Bar Diagram of the Percentage of Student Learning Completeness in Each Cycle

4. CONCLUSION

Based on the findings obtained from improving learning through PTK, it can be concluded:



Applying the STAD learning model to learning the concept of "Mixed Whole Number Calculation Operations with Whole Numbers" can increase students' motivation to learn.

Efforts to improve student learning outcomes regarding "Mixed Whole Number Calculation Operations with Whole Numbers" through the STAD learning model have proven successful. From the two learning improvement cycles, it turns out that the final learning achievement achieved by students was 87.50%.

From the conclusions above, the researcher provides suggestions to teachers, especially elementary school teachers, as follows:

Teachers should always improve learning by applying expert learning theories so that students are motivated to learn and learning outcomes improve.

Teachers should always avoid conventional learning patterns. Moreover, learning Mathematics requires learning that can shape students to think critically. For example, learning improvement practices using the STAD learning model have been proven to be able to motivate students to learn actively and be able to find information well.

Teachers should always strive to improve student learning outcomes by implementing learning approaches, and methods, and utilizing the environment as a learning resource for students. Facts show that teachers tend to only use the classroom as a place to learn. They rarely take their students to study outdoors. This results in the concepts received by students tending to be verbal.

To improve student learning outcomes, teachers should always be willing to innovate in their learning practices. The method includes teachers looking for reference books related to learning practices. In this way, teacher professionalism will continue to increase.

REFERENCES

- Anita, Y. (2014). Penerapan model pembelajaran cooperative learning tipe student team achievement division (STAD) untuk meningkatkan hasil belajar IPS pada pokok bahasan masalah sosial di lingkungan setempat. Skripsi: Universitas Pendidikan Indonesia.
- Huda, M. (2015). Cooperative learning. Yogyakarta: Pustaka Pelajar.
- Suharsimi, A., & Suhardjono, S. (2021). Penelitian tindakan kelas. PT. Bumi Aksara



EXPLORING MULTI-REPRESENTATION LEARNING APPROACH IN MATHEMATICS ELEMENTARY SCHOOL STUDENTS

Evi Faujiah^{1*}, Yurniwati², Gusti Yarmi³
^{1,2,3} Universitas Negeri Jakarta, Jakarta
*evifaujiah97@gmail.com

ABSTRACT

The purpose of this study was to analyze the effectiveness of the multi-representation learning approach in improving the understanding of mathematical concepts for elementary school students. The inclusion criteria in this review include studies that clearly apply a multi-representation approach in primary school settings and have relevant data to evaluate. Studies that do not provide adequate data or do not meet the inclusion criteria are excluded. Sources of information used to identify these studies include various academic databases such as ERIC, Springer, Elsevier, Ebscohost, Taylor & Francis, the ACM Technical Symposium on Computer Science Education and MDPI publishers. The last search was conducted last month before the writing of this abstract. Methods of evaluating bias risk in included studies include methodological quality assessment, data quality control, and evaluation of the accuracy of the statistical analysis used. The main findings of the study are presented through thematic and narrative analysis, with a total of 75 scientific studies included in this review. The characteristics of relevant studies will be discussed further in the analysis which includes research content, study design, type of participants, learning domain, and year of publication. The findings show that with various forms of representation students can improve their understanding of mathematics from informal to formal levels, in addition to the fact that multi-representation learning can deepen students' understanding of complex mathematical concepts.

Keywords: *Multi Representation Learning, Mathematics Elementary School, Algebraic Thinking*

1. INTRODUCTION

The use of various representations in mathematics education has been a major focus for many educators and is supported by NCTM Standards (NCTM, 1989). Mathematical ideas can be communicated and demonstrated in many different ways using representations (Greeno & Hall, 1997; Pape & Tchoshanov, 2001). Mathematical representations, such as diagrams, graphs, tables, and symbols, are important for broadening students' understanding and improving their ability to solve mathematical problems. According to NCTM (1998), mathematics instructional programs should emphasize the use of representations to develop students' overall understanding of mathematics, enabling them to create, use, and communicate with mathematical representations effectively. Based on observational studies conducted and literature reviews, research studies on the use of multi-representation are implemented in mathematics learning, especially in teaching complex concepts such as algebra. Although various representations have been recognized as powerful tools for expanding students' understanding, challenges arise in determining how many representations should be used and how to properly integrate them in teaching. This is compounded by the complexity of the interaction between external and internal representations in the minds of students, which can affect the effectiveness of multi-representational learning.

Some research suggests that different combinations of external representations do not always produce the desired results and may even worsen students' understanding. Therefore, it is important to understand how to manage the complex interaction between external and internal representations as well as how to choose representations that best fit the learning context. This study aims to explore the effectiveness of multi-representation learning approaches in improving students' understanding of mathematical concepts, particularly in the context of algebraic thinking.

The results of research by Flores, R., Inan, F. A., Han, S., and Koontz, E. (2019) show advantages in performance from both teaching (MR and TA), and the use of multi-repressions has a statistically higher influence on students' understanding of traditional algorithms. In addition, the results of other studies by (Adadan, E., & Ataman, M. M. 2021) show that carefully designed inquiry instruction with multiple representations (IIMR) is



very useful for fostering students' scientific understanding of the particulate nature of matter (PNM) compared to regular instruction (RI). Instructors can use visual representations (1) to familiarize students with visual conventions commonly used in the math community, (2) to illustrate abstract complex concepts, (3) to enlarge the set of tools students have for engaging mathematics, and (4) to enhance students' subjective preferences and experience (see Acevedo Nistal et al., 2009; Singer 2007). Representations in the context of mathematics education may vary. Most researchers distinguish between external representations, such as graphs and tables, and internal representations, which are cognitive models that a person has (Janvier et al., 1993).

The multi-representation approach attracts attention because of the principle of multiple embodiments, which suggests that mathematical concepts must be presented in multiple forms in order for students to gain a deeper understanding. Although many studies have highlighted the importance of various representations in mathematics learning, challenges arise when deciding how many representations to use. Some research suggests that using too many representations can confuse students and hinder learning (Sweller et al., 1998). In addition, complex interactions occur between external representations and mental representations constructed by learners, affecting the effectiveness of multi-representational learning materials (Schnotz, 2014). In the context of more complex mathematical concepts, such as functions, learning with multiple representations plays a key role. External representations such as equations, graphs, tables, verbal descriptions, or real-world situations allow access to abstract concepts of functions (Duval, 2006). However, it is important to understand that the use of representations should be judicious, taking into account the complex interactions between external and internal representations as well as the needs of students to avoid confusing information overload. In this context, our research aims to explore the effectiveness of multi-representation learning approaches in enhancing students' understanding of mathematical concepts. Through a systematic literature review, we will identify trends, findings, and pedagogical implications for enriching mathematics learning practices at the primary school level

2. METHODS

The research focused on analyzing various articles that have been published in scientific journals in the field of mathematics education. The approach used is systematic literature review (SLR) by following the steps outlined in the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) flow chart (Page et al., 2018). The process within the PRISMA framework includes the stages of identification, screening and inclusion as illustrated in Diagram 2. In the initial stage (identification), a search was carried out on 45 articles found through various academic databases such as ERIC, Springer, Elsevier, Ebscohost, Taylor & Francis, the ACM Technical Symposium on Computer Science Education, and MDPI publishers. The search was conducted using the keywords "multi representation learning approach" and "Multiple Representation" for the period 2010 to 2023. Then, a selection was made based on the title of the article and abstracts that were relevant to the context of mathematics education. In the next stage (screening), articles are classified based on criteria such as content suitability, study design, type of publication, learning domain, and year of publication. The third stage (included), then the selected articles are 10 and then compiled for further investigation in the literature review.

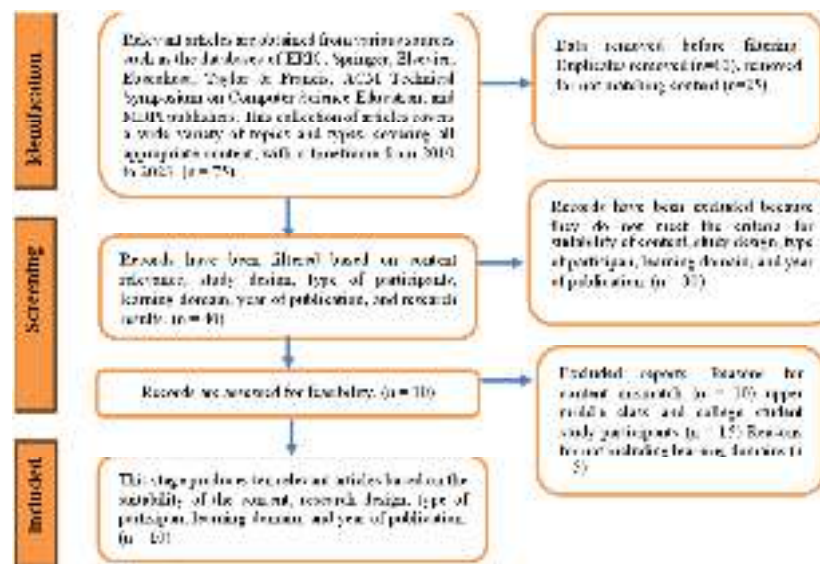


Figure 1. PRISMA Statement
(Page et al., 2018)

2.1 Data Sources

The data sources in this study are ERIC, Springer, Elsevier, Ebscohost, Taylor & Francis databases, the ACM Technical Symposium on Computer Science Education, and MDPI Publisher. The following explanation is contained on the pages of each database: 1) ERIC is a comprehensive, easy-to-use, searchable, Internet-based bibliographic and full-text database of education research and information. It is sponsored by the Institute of Education Sciences within the U.S. Department of Education. <https://eric.ed.gov/?faq>; 2) Springer We are a world-leading research, educational, and professional publisher. Visit our main website for more information. <https://www.springernature.com/gp/authors>; 3) Elsevier As a global leader in information and analytics, we help researchers and healthcare professionals advance science and improve health outcomes, striving to create a better future worldwide. <https://www.elsevier.com/about>; 4) EBSCOhost is an intuitive online research platform used by thousands of institutions and millions of users worldwide. With quality databases and search features, EBSCOhost helps researchers of all kinds find the information they need fast. <https://www.ebsco.com/products/ebscohost-research-platform>; 5) Taylor & Francis is one of the world's leading academic publishers and one of its most enduring. <https://taylorandfrancis.com/about/>; 6) The Technical Symposium addresses problems common among educators working to develop, implement and/or evaluate computing programs, curricula, and courses. The symposium provides a forum for sharing new ideas for syllabi, laboratories, and other elements of teaching and pedagogy, at all levels of instruction. <https://sigcse.org/events/symposia/index.htm>; 7) MDPI is a member of the Committee on Publication Ethics (COPE). MDPI takes on the responsibility of enforcing rigorous peer review together with strict ethical policies and standards to ensure the addition of high-quality scientific works to the field of scholarly publication. <https://www.mdpi.com/about>

2.2 Research Instrument

Research Instruments The instrument used for this study is to classify related aspects observed in Table 1. There are five main aspects of this study. Research content, study design, type of participants, learning domain, and year of publication. Furthermore, researchers make exceptions to the aspects of data collection instruments and analytical methods provided, since this aspect has been very common in previous studies. These existing categories are discussed in Table 1, and then the research design is divided into two categories, namely quantitative and qualitative, and not applied to the general research conducted. The subjects of the study include,



Elementary School (SD), and junior high school (SMP). The treatment provided includes a multi-representation approach.

Table 1. Research Instrument

Aspects	Category
Content Research	<ol style="list-style-type: none"> 1. Characterizing the growth of one student's mathematical understanding in a multi-representational learning environment. 2. Using the onto-semiotic approach to analyze novice algebra learners' meaning-making processes with different representations. 3. Interacting with indeterminate quantities through arithmetic word problems: Tasks to promote algebraic thinking at elementary school 4. Analysis of peer learning behaviors using multiple representations in virtual reality and their impacts on geometry problem solving 5. Mono-and multi-representational learning of the covariational aspect of functional thinking. 6. Abstraction through multiple representations in an integrated computational thinking environment. 7. Improvement Algebraic Thinking Ability Using Multiple Representation Strategy on Realistic Mathematics Education 8. Three Phase Ranking Framework for Assessing Conceptual Understanding in Algebra Using Multiple Representations. 9. Visual representations in mathematical word problem solving among form four students in Malacca 10. On the promises and pitfalls of collaborative learning with multiple representations.
Study Design	<ol style="list-style-type: none"> 1. Experiment 2. Experiment 3. Experiment 4. Experiment 5. Experiment 6. Experiment 7. Quasi Experiment 8. Qualitative Analysis 9. Qualitative Analysis 10. Qualitative Analysis
Type of Participants	<ol style="list-style-type: none"> 1. Junior High School 2. Junior High School 3. Junior High School 4. Junior High School 5. Junior High School 6. Junior High School 7. Junior High School 8. Primary School 9. Primary School 10. Primary School
Learning Domain	<ol style="list-style-type: none"> 1. Algebraic Thinking 2. Algebraic Thinking 3. Algebraic Thinking 4. Algebraic Thinking 5. Computational Thinking 6. Functional Thinking



Aspects	Category
	7. Geometry Problem Solving 8. Mathematics Understanding 9. Problem Solving 10. Problem Solving
Year of Publication	1. 2010 2. 2010 3. 2011 4. 2013 5. 2018 6. 2020 7. 2020 8. 2022 9. 2022 10. 2023

2.3 Data Analysis

Data Analysis Each article that has been identified has been classified according to carefully established criteria, paying attention to every predetermined aspect. It is important to note that each article must meet every predefined category to get the classification. This decision-making process is based on a thorough evaluation of the information available in the abstract, research methods, discussion, and research results of each article. In the next stage, the data that has been collected and classified is presented in the form of a bar chart. This approach aims to ensure that data is presented systematically, transparently, and documented in detail, thus enabling comprehensive understanding and accurate analysis.

3. RESULTS & DISCUSSION

3.1 Research Design

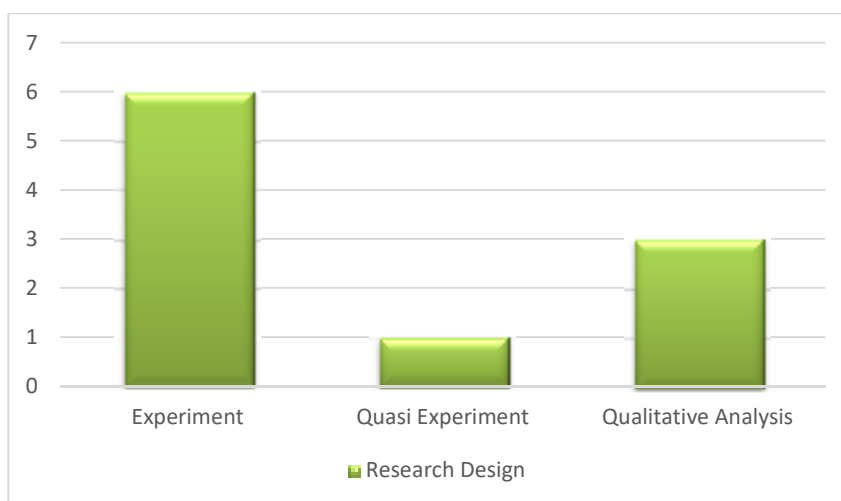


Figure 2. Research Design

Based on Figure 3.1 from several studies that have been analyzed, in general, as many as six articles using experimental design, the focus is on observing the effects or impact of a multi-representation approach on students' thinking skills in a mathematical context. This involves measuring the effectiveness of multi-



representation methods in helping primary school students understand mathematical concepts. Quasi-experimental articles, however, do not fully control for the factors affecting the dependent variable. Researchers are concerned about the impact of multi-representation learning approaches on students' math achievement. Furthermore, through research using qualitative analysis methods, researchers can explore more in-depth aspects of student and teacher experiences in adopting a multi-representation learning approach. Qualitative analysis allows the disclosure of complex patterns in perceptions, attitudes, and learning experiences, which cannot always be measured directly through experimental approaches.

3.2 *Type of Participant*

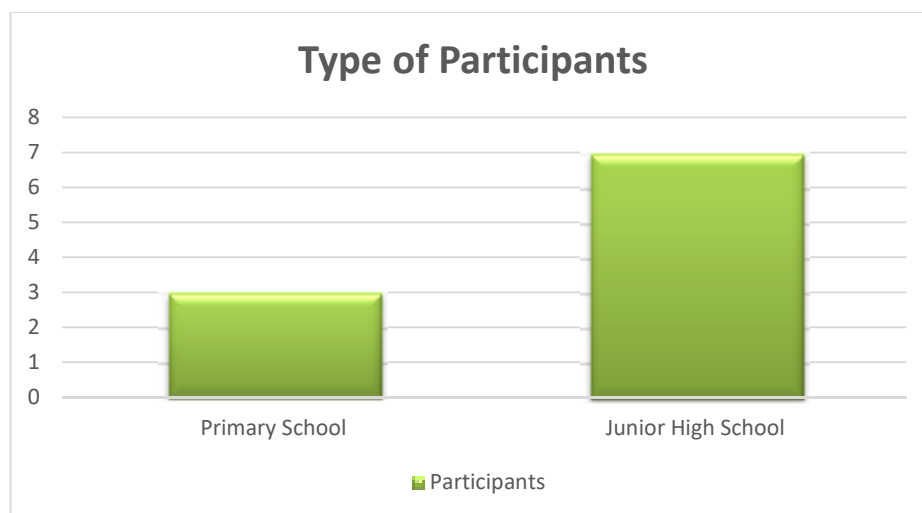


Figure 3. Type of Participants

Based on Figure 3, 2 types Participants in high school who dominate more than elementary school students may have different cognitive development characteristics, such as shorter concentration skills, limited understanding of abstractions, and varying levels of motivation. Therefore, in interpreting findings from articles involving primary school students, it is important to take into account how a multi-representation approach can be adapted to the level of cognitive development and individual needs of this population. On the other hand, junior high school participants may have more mature cognitive abilities, but may also face new challenges in understanding more abstract mathematical concepts. Thus, an analysis of articles focusing on junior high school students should consider how a multi-representation approach can provide appropriate support in overcoming these barriers and deepening the understanding of complex mathematical concepts. In addition, differences in learning environments, teaching methodologies, and curriculum approaches among elementary and junior high school students can also influence how they respond to multi-representation learning approaches.



3.3 Learning Domain

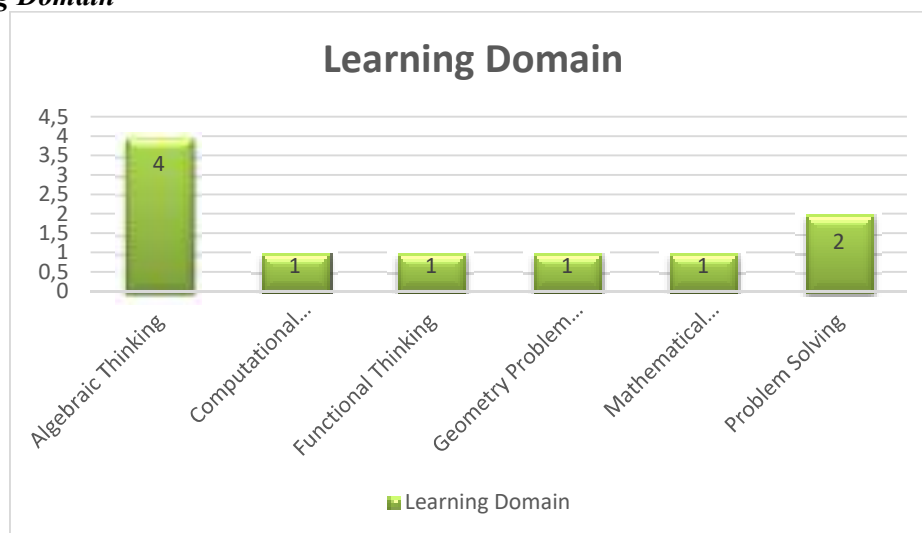


Figure 4. Learning Domain

Based on Figure 3.3, the learning domain refers to the diverse aspects of mathematics that are the focus of the multi-representation learning approach explored. Given the variation in learning domains among the articles investigated, complex interpretations are needed to understand how multi-representation approaches can be effectively applied in primary school math contexts. Articles highlighting learning domains such as algebraic thinking explore students' understanding of fundamental algebraic concepts, such as patterns, relationships, and generalizations. Interpretation of findings from these articles requires an in-depth analysis of how visual, symbolic, and verbal representations can be used to facilitate a better understanding of algebraic concepts for elementary school students. Meanwhile, articles on computational thinking and functional thinking bring an additional dimension to the understanding of mathematical concepts, with an emphasis on problem solving and the use of mathematics in a broader context. Complex interpretations of these articles may involve analysis of how a multi-representation approach can enrich students' computational and functional skills, as well as how this contributes to the development of more in-depth mathematical problem-solving. Furthermore, articles highlighting geometry problem solving explore students' ability to apply geometry concepts to solve problems relevant to the real world. The interpretation of this article can pay attention to how visual representations of geometric objects and spatial relationships can improve students' understanding and ability to solve geometry problems. Finally, articles that discuss problem solving in general provide insight into the use of a multi-representation approach in facilitating the solving of mathematical problems in general, without restrictions on specific learning domains. Complex interpretations of these articles may require analysis of how multi-representation approaches can be adapted to meet problem-solving needs in a variety of mathematical contexts.



3.4 Year of Publication

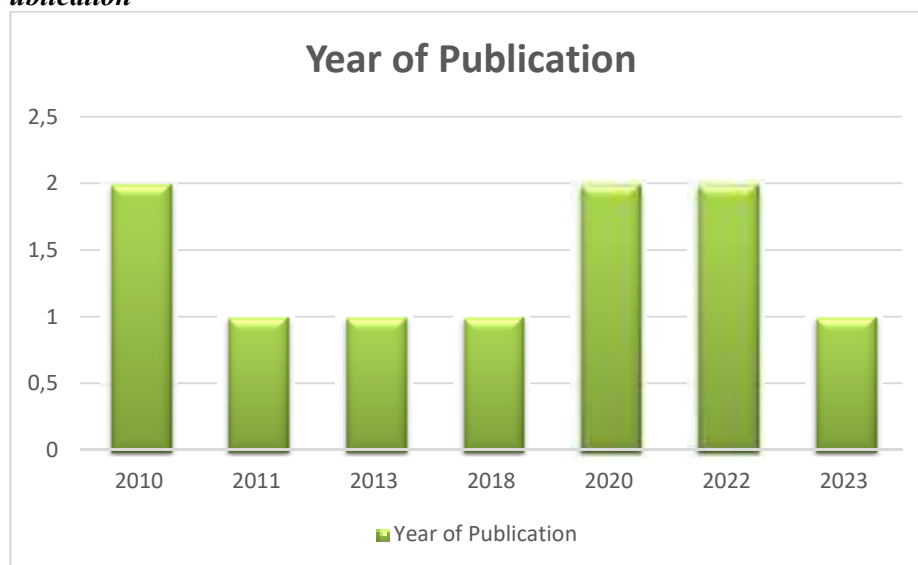


Figure 5. Year of Publication

Figure 3.4 in this study reflects the evolution and development of multi-representation learning approaches in the context of mathematics education for elementary school students. Taking into account variations in the distribution of articles by year of publication, we can see how this research has evolved over time and how the findings can be understood in the context of the development of mathematics learning theory and practice. Articles published in 2010 reflect early attempts to understand the potential and challenges of this approach, as well as gain early insight into its impact on students' mathematical understanding. Later, articles published in 2011 and 2013 continued to explore the multi-representation learning approach, with further research on its application and effectiveness in various contexts of mathematics learning. The development of methodologies and theories underlying the multi-representation learning approach, as well as efforts to overcome obstacles that arise in its implementation. In 2018, the single article may reflect the growing interest in multi-representation learning approaches, with researchers focusing on specific aspects such as problem-solving development or technology integration in mathematics learning. Interpretations of this article may take into account growing trends in the literature and attempt to answer more specific research questions in the domain of multi-representation learning. Finally, the articles published in 2020 reflect the peak of research interest and activity in this field, with researchers expanding the scope of their research to cover a wide range of aspects of a multi-representation learning approach by highlighting the most relevant and cutting-edge trends and findings in the literature.

3.5 Research Results

The results showed that students were able to advance in their mathematical understanding from the informal level to the formal level in the Pirie-Kieren model. This shows that the multi-representation learning approach has a positive impact on the development of students' mathematical understanding (Gulkilik, H., Moyer-Packenham, P. S., Ugurlu, H. H., & Yuruk, N., 2020). Other findings highlight that verbal representations have a significant influence on students' abilities, and their interaction with other representations can affect students' mathematical comprehension (Erbilgin, E., & Gningue, S. M., 2023). Reflection on the interpretation of equations has also been shown to favor the identification of meanings associated with indeterminate quantities, contributing to students' understanding of mathematical concepts (Ayala-Altamirano, C., Pinto, E., Molina, M., & Cañadas, M. C., 2022). Multi-representation learning, such as virtual manipulatives, written mathematical formulas, and verbal explanations, is proven to help students build mathematical concepts and develop critical thinking (Hwang, W.



Y., & Hu, S. S., 2013). The influence of learning with representation is evident as a process of complex interaction between learning content and forms of representation, highlighting the importance of the integration of representation in the learning process (Rolfes, T., Roth, J., & Schnotz, W., 2022). Multi-representation in the curriculum can transform a student's ability from learning abstractly to learning through abstraction, showing a positive impact on student understanding (Gautam, A., Bortz, W., & Tatar, D., 2020). Students who use multiple representation strategies are shown to have better algebraic thinking skills, emphasizing the importance of using multi-representation in math learning (Kusumaningsih, W., & Herman, T., 2018). Multi-representation has been shown to improve students' understanding of linear equations, demonstrating the relevance and effectiveness of this learning approach in the context of high school mathematics (Panasuk, R. M., 2010). Nonetheless, less than two percent of problems were solved using pictorial representations, suggesting that students' preferences tended toward more schematic solutions (Ahmad, A., Tarmizi, R. A., & Nawawi, M., 2010). Managing challenges in the use of mathematical representations requires regular opportunities for students to reconsider their roles and use flexible tools in solving complex mathematical tasks (White, T., & Pea, R., 2011).

The results showed that students were able to improve their mathematical understanding from informal to formal levels in the Pirie-Kieren model. This suggests that a multi-representation learning approach has a positive impact on the development of students' mathematical understanding. Other findings suggest that verbal representations have a significant influence on students' ability to understand math, with their interactions influencing students' understanding of the concepts. Reflection on the interpretation of equations has also proven useful in helping students identify the meanings associated with complex mathematical concepts. Multi-representation learning, which includes the use of virtual manipulatives, written mathematical formulas, and verbal explanations, has proven effective in helping students build mathematical concepts and improve their critical thinking skills. The influence of learning with representation suggests that it is a complex process of interaction between learning content and forms of representation, highlighting the importance of the integration of representation in mathematics learning. The application of multi-representation in the curriculum has a positive impact on students' understanding, transforming their ability from learning abstractly to learning through abstraction. Students who use multiple representation strategies are shown to have better algebraic thinking skills, emphasizing the importance of using multi-representation in math learning. Multi-representation has also been shown to improve students' understanding of linear equations, demonstrating the relevance and effectiveness of this learning approach at the secondary school level. Nonetheless, students' preferences tend towards more schematic solutions rather than using pictorial representations. Overcoming challenges in using mathematical representations requires regular opportunities for students to reconsider their roles and use flexible tools in solving complex mathematical tasks.

4. CONCLUSION

In this study, an analysis of the literature has been carried out that discusses the exploration of multi-representation learning approaches among elementary school students in mathematics subjects. Over the last thirteen-year period, there has been a significant increase in the number of publications adopting a multi-representation learning approach. The articles found tend to be dominated by experimental studies. The main research subjects were junior high school students, with special emphasis on elementary school students. The most prominent finding is related to the development of algebraic thinking skills in students. The findings suggest that with different forms of representation, students can improve their understanding of mathematics from an informal level to a formal level. In addition, the results of multi-representation learning can deepen students' understanding of complex mathematical concepts.

5. ACKNOWLEDGMENTS

The author would like to thank the reviewers who have provided suggestions and comments so that this article becomes more qualified.



6. REFERENCES

- Adadan, E., & Ataman, M. M. (2021). Promoting senior primary school students' understanding of the particulate nature of matter through inquiry instruction with multiple representations. *Education 3-13*, 49(3), 317-329.
- Ahmad, A., Tarmizi, R. A., & Nawawi, M. (2010). Visual representations in mathematical word problem solving among form four students in Malacca. *Procedia-Social and Behavioral Sciences*, 8, 356-361.
- Ayala-Altamirano, C., Pinto, E., Molina, M., & Cañadas, M. C. (2022). Interacting with indeterminate quantities through arithmetic word problems: tasks to promote algebraic thinking at elementary school. *Mathematics*, 10(13), 2229
- Blanton, M., Brizuela, B. M., Gardiner, A. M., Sawrey, K., & Newman-Owens, A. (2017). A progression in first-grade children's thinking about variable and variable notation in functional relationships. *Educational Studies in Mathematics*, 95, 181-202.
- Blanton, M., Stephens, A., Knuth, E., Gardiner, A. M., Isler, I., & Kim, J. S. (2015). The development of children's algebraic thinking: the impact of a comprehensive early algebra intervention in third grade. *Journal for research in Mathematics Education*, 46(1), 39-87.
- Cobb, P., Yackel, E., & Wood, T. (1992). A constructivist alternative to the representational view of mind in mathematics education. *Journal for Research in Mathematics Education*, 23(1), 2-33. <https://doi.org/10.2307/749161>
- Duval, R. (2006). A cognitive analysis of problems of comprehension in a learning of mathematics. *Educational Studies in Mathematics*, 61(1-2), 103-131. <https://doi.org/10.1007/s10649-006-04>
- Erbilgin, E., & Gningue, S. M. (2023). Using the onto-semiotic approach to analyze novice algebra learners' meaning-making processes with different representations. *Educational Studies in Mathematics*, 114(2), 337-357.
- Flores, R., Inan, F. A., Han, S., & Koontz, E. (2019). Comparison of algorithmic and multiple-representation integrated instruction for teaching fractions, decimals, and percent. *Investigations in Mathematics Learning*, 11(4), 231-244.
- Gautam, A., Bortz, W., & Tatar, D. (2020, February). Abstraction through multiple representations in an integrated computational thinking environment. In *Proceedings of the 51st ACM Technical Symposium on Computer Science Education* (pp. 393-399).
- Goldin, G. A. (1998). Representational systems, learning, and problem solving in mathematics. *The Journal of Mathematical Behavior*, 17(2), 137-165.
- Greeno, J. G., & Hall, R. P. (1997). Practicing representation: Learning with and without representational Conclusions forms. *Phi Delta Kappan*, 78, 361-367.
- Gulkilik, H., Moyer-Packenham, P. S., Ugurlu, H. H., & Yuruk, N. (2020). Characterizing the growth of one student's mathematical understanding in a multi-representational learning environment. *The Journal of Mathematical Behavior*, 58, 100756.
- Hwang, W. Y., & Hu, S. S. (2013). Analysis of peer learning behaviors using multiple representations in virtual reality and their impacts on geometry problem solving. *Computers & Education*, 62, 308-319.
- Janvier, C.; Girardon, C. ; & Morand, J. (1993). Mathematical symbols and representations. In P. S. Wilson (Ed.) *Research Ideas for the Classroom: High School Mathematics* (pp. 79-102). Reston, VA: NCTM.
- Kusumaningsih, W., & Herman, T. (2018). Improvement Algebraic Thinking Ability Using Multiple Representation Strategy on Realistic Mathematics Education. *Journal on Mathematics Education*, 9(2), 281-290.



- Morgan, C., Mariotti, M. A., & Maffei, L. (2009). Representation in computational environments: epistemological and social distance. *International Journal of Computers for Mathematical Learning*, 14(3), 241-263.
- Moschkovich, J., Schoenfeld, A. H., & Arcavi, A. (1993). Aspect of understanding: on multiple perspectives and representations of linear relations and connections among them. In T. A. Romberg, E. Fennema, & T. P. Carpenter (Eds.), *Integrating research on the graphical representation of functions* (pp. 69–100). Erlbaum.
- Nakahara, M., & Ohmi, T. (2008). *Quantum computing: from linear algebra to physical realizations*. CRC press.
- NCTM (1989). *Curriculum and evaluation standards for school mathematics*. Reston, VA: Author.
- NCTM. (1998). *Principles and standards for school mathematics discussion draft Standards 2000* [On-line]. Available: <http://www.nctm.org/standards2000/download.html>
- Page, M. J., McKenzie, J. E., & Higgins, J. P. T. (2018). Tools for assessing risk of reporting biases in studies and syntheses of studies: a systematic review. *BMJ Open*, 8(3). <https://doi.org/10.1136/bmjopen-2017-019703>
- Pape, S. J., & Tchoshanov, M. A. (2001). The role of representation(s) in developing mathematical understanding. *Theory into Practice*, 40(2), 118–127. https://doi.org/10.1207/s15430421tip4002_6
- Piez, C. M. & Voxman, M. H. (1997). Multiple representation-Using different perspectives to form a clearer picture. *The Mathematics Teacher*, 90(2), 164- 166
- Pinto, E., & Cañadas, M. C. (2021). Generalizations of third and fifth graders within a functional approach to early algebra. *Mathematics Education Research Journal*, 33(1), 113-134.
- Radford, L. (2018). The emergence of symbolic algebraic thinking in primary school. Teaching and learning algebraic thinking with 5-to 12-year-olds: The global evolution of an emerging field of research and practice, 3-25.
- Rolfes, T., Roth, J., & Schnotz, W. (2022). Mono-and multi-representational learning of the covariational aspect of functional thinking. *Journal for STEM Education Research*, 5(1), 1-27.
- Schnotz, W. (2014). *Integrated model of text and picture comprehension*. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (2nd ed., pp. 72–103). Cambridge University Press.
- Schroeder, N. L., & Cenkei, A. T. (2018). Spatial contiguity and spatial split-attention effects in multimedia learning environments: a meta-analysis. *Educational Psychology Review*, 30(3), 679–701. <https://doi.org/10.1007/s10648-018-9435-9>
- Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive load theory*. Springer.
- White, T., & Pea, R. (2011). Distributed by design: on the promises and pitfalls of collaborative learning with multiple representations. *Journal of the Learning Sciences*, 20(3), 489-547.



DIGITAL EMPOWERMENT IN ENGLISH LANGUAGE TEACHING (PERSPECTIVE OF JEAN PIAGET-LEARNING THEORY)

Ni Putu Ratni*

Universitas Negeri Makassar, Indonesia

*puturatnii@gmail.com

ABSTRACT

Digital Empowerment in English Language Teaching (Perspective of Jean Piaget-Learning Theory) is a library project by Ni Putu Ratni based on curiosity about excessive positive and negative phenomena among students from utilizing digital education. The objectives of the research were the elaboration of (1) how the education world perceives the digital era; (2) how the English language field is empowering digital learning and teaching environments; and (3) how the challenges of utilizing digital in ELT. This research was conducted using a qualitative approach and utilized the library research method. Documentation, data collection method, and data triangulation method of data analysis the result of the research as follows:

(1) The world of education considers the digital era has the possibility to transform education into a modern and more accessible way that attracts global interest in supporting massive educational institution development. It could promote various types and forms of educational media and facilities, such as e-books and video materials, giving the students many chances to explore and experience knowledge in a fun way, as Jean- piaget emphasized about the critical point of learning; (2) The English language field is empowering digital into the learning and teaching environment by utilizing it to make the learning process enjoyable and by providing learning strategies that consider student unique characteristics to provide a better learning atmosphere; and (3) the challenges in utilizing digital facilities into ELT came from the digitalization side effects on students, student, teacher, and environments; therefore, English teachers should do more research and training in empowering it.

Keywords: *Digital Education, Digital Education in ELT, Digital Language Learning.*

1. INTRODUCTION

Since the world suffered from the attack of COVID-19, the world of education has significantly transformed in every aspect of its field, such as school and class management, curriculum, education facilities, etcetera. Based on the formal notification letter issued by the Ministry of Education and Culture of the Republic of Indonesia number 4, year 2020 concern on *Pelaksanaan Kebijakan Pendidikan dalam Masa Darurat Penyebaran Coronavirus Disease (Covid-19)*, Indonesian education policy implemented online/virtual strategy of learning as the preventive solution to the massive spreading of the pandemic within Indonesia. One of the emphases of the notification letter was about the variety of learning activities and assignments for the students. It guided teachers to imply a variety of home learning among students based on individual student's interests and considering the differences in their condition and their available home facilities (Mendikbud RI, 2020). Up to now, even though the home learning policy has already been replaced by a joint decree of four Ministers of the Republic of Indonesia, the virtual/online strategies in learning for the students are still implemented by teachers even though they are not employing fully online classes. The joint decree document responded to the government's notice about the necessity of the conventional class learning process for students who had difficulties joining distance learning (Mendikbud-Menag-Menkes-Mendagri, 2020).

The evaluation of the learning-from-home strategy, which is conducted by the government, besides the finding that there were students who have difficulties in joining distance learning, also delivered a result that vocational students necessary to receive practice and train class opportunities for developing their appropriate skill and competence for the world of Industry, business field, and working field (Mendikbud-Menag-Menkes-Mendagri, 2020). Those evaluation results showed that virtual learning, supported by digital facilities and linkage



with modern world technology, still needs to be deeply studied to find the best form and strategy to implement it in Indonesia's learning process. Some researchers elaborate the negative impact of virtual learning to the students, as follows: (1) Muassomah et al., (2022) in their research, entitled *the Academic Demoralization of Students in Online Learning During Covid-19 Pandemic* elaborate that online education as a learning solution during the pandemic has caused students became irresponsible, lazy, dishonest, and lose an sense of discipline and responsibility; (2) Umeogu & Ojiakor (2014) in their research, entitled *the Internet Communication and the Moral Degradation of Nigerian Youth* described that one of their research results showed extension of internet role to students' education and morality has responded by students' negative attitude in the online classroom, such as chatting and internet browsing during the learning class; (3) Karmen & Pribadi (2022) in their research, entitled *Dampak Positif Negatif Pembelajaran Online dalam Sistem Pendidikan Indonesia Pasca Pandemi Covid-19* elaborated the negative impact of online learning one of them as the disability of the students to do pear socialization, disability to recognize their teachers, and they have to experience the learning process that rolled by their parents, instead of their school teacher.

The negative impact of virtual/online learning is not the only thing that happens to the students because there are studies that found a positive impact of this way of learning, some of them as follows: (1) Firda-L et al., (2019) in their research, entitled *Pemanfaatan Portal/Web E-Learning pada Mata Pelajaran Bahasa Indonesia di SMA Negeri 4 Singaraja* emphasized that e-learning does not only make the students sit and learn but also make them active in observing and demonstrating their knowledge. E-learning also enables the virtualization of learning materials into various type of formats so it becomes more attractive and motivated for the students to take further lessons on it; and (2) Isma et al., (2022) in their research entitled *Urgensi Digitalisasi Pendidikan Sekolah* elaborated that school digital education is essential for science development requirement, it enables to increase students' learning quality, allow students to creativity, critical thinking, and collaboration, it also enables to support government education program of *merdeka belajar* that requires free space and time to be implemented.

Based on the general knowledge about the positive and negative possible impacts of online/virtual learning on students, it became interesting to comprehend English language teaching and learning in this digital education world and how digital technology links with English language education. It is understood that English as an international language has been utilized as the intermediate language to communicate between the virtual world and digital users. From another point of view, to achieve English proficiency skills, students will need to learn and practice intensively utilizing the language, either in reading, writing, listening, or speaking skills. The role of digital technology is required to acquire language learning targets. Therefore, the effort to empower it and use it in designing a teaching and learning environment for the student becomes essential for the teacher.

Previous studies that elaborate on the essential knowledge that supports teacher's consideration in empowering digital education for the excellent purpose of English Language Teaching and have become the primary rationale of this recent research consist of (1) Srinivas (2023) in his journal article, entitled *Digital Technology in English Language Teaching* elaborated that Language teaching practice often assumes as most of the difficulties that learners face in the study, it is the consequence of the degree to which their native language differs from English (a contrastive analysis approach). He implied that technology has become integral to education, making English language learning and teaching more convenient while opening new opportunities.; and (2) Yuan et al. (2019), in their journal article entitled *Empowering English Language Learners Through Digital Literacies: Research, Complexities, and Implications*, describe the characteristics of digital literacies, which include critical thinking, multimodal learning, and participation, create an environment that empowers English Language Learners (ELLs) to take an active role in their education. This approach promotes student autonomy and develops English language competencies both inside and outside of the classroom.

Both of the previous research elaborated deeply on the aspects of digital technology for English language teaching and learning, its potential, and how the most significant part of the technology can provide better support for teaching the English language. Still, neither provided the knowledge about how the solution in managing the



differences among students consists not only of financial differences but also of characteristics and living environment differences along with the implementation strategy of the online/virtual learning process with those differences attached. Therefore, it became interesting to conduct research about digital empowerment in English language teaching (ELT) based on the perspective of Jean Piaget-learning theory.

To describe digital empowerment for ELT and align it with Jean Piaget's learning theory, the research problem statements were compiled as follows: (1) how does the education world perceive the digital era? (2) how does the English language field empower digital in the learning and teaching environment? and (3) how do the challenges become obstacles to utilizing digital in ELT? Based on those research problem statements, this research aims to elaborate on how the education world perceives the digital era, how the English language field empowers the digital learning and teaching environment and the challenges of utilizing digital learning in ELT. The research objectives' data required some theories to be utilized as the analyzer; those theories consisted of (1) Perception Theory, (2) Jean Piaget – Learning Theory, and (3) Challenges Theory.

The second theory utilized in this research was Jean Piaget's learning theory. Piaget is widely recognized for his theory of the stages of cognitive development. He conducted extensive research, starting with his own children. The first theory utilized in this research was the perception theory of Gestalt. The theory of perception was built in 1910 by Max Wertheimer, K. Koffka, and Köhler based on Gestalt Psychology theory, which describes how visual perception works in physiology and psychology. Gestalt Theory is the notion that the summation of parts and how they interact, or the whole of something, is more significant than the individual pieces. This theory emphasizes that the individual parts that make up the whole cannot be individualistically used to describe the entire completely (Kwasniewski, 2023). Max Wertheimer described the principles of the Gestalt theory of perception as follows: 1) the principle of similarity, which explains that humans utilize similar components to group pieces together; 2) the principle of continuation, which is explaining that humans will follow the easiest, or smoothest, path along linear visuals, even if other parts of the visual change; 3) the principle of closure which is explaining that human's brains will complete visuals with missing pieces if enough data is available; 4) the principle of proximity which is explaining that human mind will organize individual components that are relatively closer to one another; 5) the principle of figure/ground which is explaining that human mind can produce many images from one visual by distinguishing between the foreground and background; and 6) the principle of symmetry & order (also called *Prägnanz*) which is explaining that human simplify a complex shapes into simple or more symmetric shapes. These principles, also known as the laws of organization, were explained in the context of perception and problem-solving (Culatta, 2024). And then Leung (2023) explains that perception is a multi-stepped process. The two major processes, receiving stimuli and making meaning of the stimuli, can be divided into smaller steps as follows: 1) stimulation (understanding stimuli exist); 2) organization (comparing existing knowledge with the stimuli); 3) interpretation (making meaning of the stimuli); 4) memory (storage of one's experience about the stimuli); and 5) recall (using the stored knowledge in the future). The process of human perception, as emphasized in Gestalt theory, has been utilized to investigate the education world perception in the digital era and discovered several stages in which a child's mind develops. However, what's more relevant in our current discussion is how Piaget described the gradual process of developmental changes in children's knowledge construction. He proposed two mechanisms for incorporating new information into existing knowledge structures, called schemes: assimilation and accommodation. Assimilation is the process of understanding new information so that it can seamlessly fit into existing schemes. Accommodation, on the other hand, requires people to modify their schemes significantly to accommodate new information. For example, when students learn multiplication for the first time, they may initially try to understand it as an addition, but eventually, they will comprehend it as repeated addition. In contrast, when students encounter imaginary numbers for the first time, they may need to fundamentally change their understanding of a number to accommodate this new concept. Ultimately, the goal is to use assimilation and accommodation to adapt to the world (Doroudi, n.d.). Ornstein & Levine (1985) described human intelligence development stages according to Jean Piaget's explanation, which was divided into four stages, namely: (1) sensorimotor (18 months – 2 years old); (2) preoperational (2 – 7 years old); (3) concrete operations (7



– 11 years old); and (4) formal operations (11 – 15 years old). At the stage of concrete operations (elementary school students' stage of age in Indonesia), children have the ability to isolate the general characteristics of objects, size, duration, length, etc. Then, they use them in more complex mental operations; they become more abstract and able to comprehend the number of signs, processes, and relationships. They might appear to accept the adult authority, but in their mind, they question it. Jean Piaget urged that human growth and development occur in sequential stages, that there are stages of readiness, and that there are activities appropriate to each stage. Therefore, the learning process has to be done sequentially, and cumulative instruction should begin at an early age. The role of the teacher for the students is to assist them in their learning processes, and they have to notice that students cannot be forced to learn before they are ready. Teachers should encourage students to explore and experiment, instruction has to be given individually depending on students' readiness, and teachers should provide them with concrete materials to touch, manipulate, and use (Abdi et al., 2011), based on Jean Piaget's theory, explained that children's learning is based on children's activities when they interact with their social environment and their physical environment.

The third theory utilized in this research was the challenge of Sanford's theory. The role of a challenge claimed by Sanford (1967) in his challenge and support theory emphasizes that people grow best when they continuously experience an appropriate balance of support and challenge (Sanford, 1967). Sanford's significant assumption that supports were pre supposed to be related to academic achievement and satisfaction (Strayhorn, 2013). He posited that students experience challenges when they face situations in which they are not prepared with the appropriate skills or knowledge. Conversely, he defined "supports" as the people and services in the student's environment that help them navigate challenges successfully. Importantly, Sanford suggested that student development is a product of person-environment interaction and surmised that for students to grow, they must be ready to do so. Such "readiness" is determined by the student's maturation and/or environmental conditions that support growth (Virtue et al., 2020).

Based on the description of the theories used in this research, the problem question of the research, and the primary rationale of previous studies of this research, it showed that the novelty of this recent study was a finding in the form of reference, which possible to be used in managing the differences among students that not only consists of financial differ, but also characteristic and living environment differ combined with the implementation strategy of online/virtual learning process with those differences attached

2. METHODS

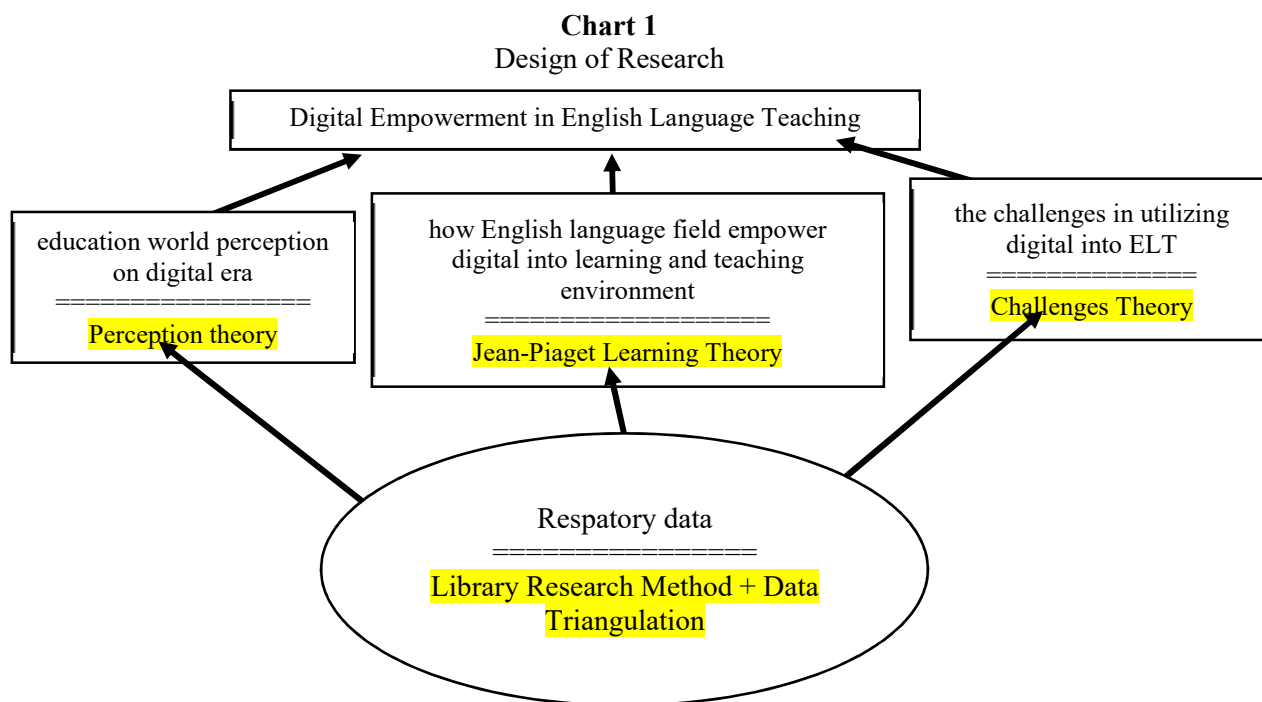
Sugiyono (2022) explained that qualitative research has descriptive characteristics because the collected data is in words without emphasis on numbers. Some other experts explained qualitative research approaches as follows: (1) Qualitative research is research in which one of its utilization is to examine something deeply or to examine the background of something that makes it happen, such as the motivation background, roles background, values background, attitudes background, and perceptions background (Moleong, 2016); and (2) The results of qualitative research more emphasize the significance rather than a generalization, the type of qualitative research data is data that related to the categorization, data characteristics are intangible in words, and it also subjective because it can be interpreted differently from one person to another (Riduwan, 2013). The qualitative approach in this research is focused on library research, where the data was collected from the second source, such as research reports and articles from previous studies that various researchers and other literature and report documents, including other available media, have conducted. Some characteristics of the library method of research consist of (1) the researcher face-to-face with data documentation; (2) the data is ready-made; the researcher does not need to collect it by him/herself from the research field; (3) the type of data is secondary data, it did not come directly from first source; and (4) the literature data condition is not bound by time and space because the data is static, never change, already recorded (in texts, numbers, pictures, voice recorder, or movies) (Zed, 2014).

This research utilized the descriptive method, specifically the library descriptive method. The descriptive method of research is defined by the experts as follows: (1) Nawawi & Hadari (2006) emphasizes that descriptive



study focuses on the discovery of the facts according to the actual situation, and (2) Sanjaya (2014) explains that descriptive research is a type of research that associated with the efforts to find the solution for the problems that exist at present and expose it based on the data that found. Therefore, the data collection method in this research will be documentation from the selected library data, and the data triangulation method will be utilized for data analysis. Triangulation was combining data from different sources to study a particular social phenomenon. In 1978, Norman Denzin identified four basic types of triangulations as follows: (1) data triangulation, which is defined as the use of multiple data sources in a single study; (2) investigator triangulation, which is defined as the use of multiple investigators/researchers to study a particular phenomenon; (3) theory triangulation, which is defined as the use of multiple perspectives to interpret the results of a study; and (4) methodological triangulation, which is defined as the use of multiple methods to conduct a study (Hales et al., 2010).

Those elaborations clarified the design of the research was qualitative research that utilized library descriptive method and documented related data repository as data collection method and technique, which means all data from this research was secondary data, which are collected from static data as the subjects, such as Journal articles, related works of literature, and written and digitally documents. The instrument used to collect data was the list of questions related to the research problem statements, with the documentation tool consisting of a note taker and a laptop. A variety of data from journal articles, books, and other documentation were utilized to analyze data by data to find the description of (1) the education world perception of the digital era; (2) how the English language field empowers digital learning and teaching environment; and (3) the challenges in utilizing digital into ELT. The design of the research was illustrated as follows:



Anotation:

The library method in conducting this research has collected data from various static data repositories and provides various data collections needed for data triangulation analysis. All data was categorized into focus points (objectives) of the research and was combined with related theory, which was used to analyze each problem statement. Selected and related data that combined with perception theory has been utilized to describe education



world perception in the digital era; selected and related data that combined with Jean-Piaget Learning Theory has been utilized to describe how the English language field empower digital in learning and teaching environment; and selected and related data that combined with Challenges Theory has been utilized to describe about the challenges in utilizing digital into ELT; the conclusion about Digital Empowerment in English Language Teaching based on the perspective of Jean-Piaget Learning Theory can be compiled by analyzing the answer of all problem statements of the research.

3. RESULTS & DISCUSSION

In this digital era, almost everything depends on technology and depend on technology-based information. Most things and activities in every field of the human world have become more accessible and faster, including education. Every aspect of education is invaded by digitalization, such as material studies, classroom management, peer interaction, and even student and teacher interaction touched by digitalization. Education transformation into digital education happened rapidly after the COVID-19 pandemic because it was driven by necessary government regulation, which was issued in order to prevent much more massive spreading of the virus within the country. Digital education provides speed-up knowledge, motivation boosters, and adequate learning time. However, many research findings show a negative impact on the digitalization of learning and a positive impact on it. Therefore, this recent research focused on finding the education world's perception in the digital era, how the English language field empowers digital technology learning and teaching environment, and the challenges in utilizing digital technology in ELT.

Focus data for the first problem statement has been elaborated on using Gestalt perception theory. The Gestalt theory of perception consists of 1) the principle of similarity, 2) the principle of continuation, 3) the principle of closure, 4) the principle of proximity, 5) the principle of figure/ground, and 6) the principle of symmetry and order. Those principles elaborated into the aspects of world perception in the digital era, as illustrated in Table 1, as follows:

Table 1. World Perception on the Digital Era

Principle	Similarity	modern technology makes life easier
	Continuation	everyone has to follow the rhythm if does not want to be left behind
	Closure	social media can be dangerous
	Proximity	by following digital development, we can leap in life
	Figure/ground	innovation requires information and technology
	Symmetry & Order	consider the positive benefit first before the consequence

Based on published data from the Ministry of Communication and Information, Puspitasari (2022) elaborated that information technology, digital media, and the internet are the keys to the daily lives of global society, including Indonesian society. Specifically for Internet use, it is used not only as an entertainment medium but also for other activities such as school, work, health services, and even politics. The number of internet users in Indonesia is very high. However, it is interesting to note whether there is a correlation between the high number of internet users in Indonesia and the users' awareness of human rights in the digital world as legal subjects.

There are still several things that need to be done by the Indonesian Government in the efforts to fulfill digital human rights; some of them are: (1) increasing digital literacy and capacity building to ensure internet users understand their rights and obligations in the digital world; (2) fulfilling digital infrastructure needs to



support equal distribution of internet access for all Indonesian people; (3) accelerate the implementation of the laws and regulations needed to protect human rights in the digital sector, such as Personal Data Protection; and (4) determining the appropriate role, in order to balance the protection of individuals and societal values with the provision of the right for expression freedom in the digital world. But besides the government, the public is also expected to be able to activate control functions over internet use so that digital human rights can be fulfilled and protected.

Based on the data analysis, it can be described that the world of education considers the digital era as the possibility to transform education into a modern and more accessible way that attracted global interest for supporting massive educational institution development; it could promote new digital products and services in the education sector such as e-books and video materials, giving the students many chances to explore and experience knowledge in a fun way as Jean-Piaget emphasized about the critical point of learning.

Focus data for the second problem statement has been elaborated on using the Jean-Piaget Learning Theory. The elements of Jean Piaget's Learning theory have been used to analyze the data about the English language field to empower digital learning and teaching environment; the elements described in Table 2:

Table 2. ELT Empowers Digital

Elements of Jean Piaget's learning Theory	Stage of Student	elementary school level of student (stage of concrete operations)
	Characteristics	their cognitive isolates the general characteristics of objects, size, duration, length, etcetera, and then they use them in more complex mental operations
	Cognitive Development	they use their comprehension in more complex mental operations; they become more abstract, able to comprehend the number of signs, processes, and relationship
	Psychology Development	they might appear to accept the adult authority, but in their mind, they grow question about it
	Material Readiness	it depends on student readiness
	Activities Readiness	it depends on student readiness
	Role of Teacher	encouraging students to explore and experiment, giving instructional individually depending on students' readiness, providing them with concrete materials to touch, manipulate, and use, also considering their interaction with their social environment and their physical environment

Piaget urged that learning strategy has to consider students' stage of age because it aligns with their cognitive development. They can isolate the general characteristics of objects, size, duration, length, etcetera, and then they use them in more complex mental operations and transform them into more complex mental operations, they become more abstract, able to comprehend the number of signs, comprehend processes, and comprehend about relationship even though those abilities are still in the primary stage because they possible to have some questions about something that interest them, but they consider to keep it in their mind. In this stage of cognitive development, the teacher must patiently encourage students' motivation to explore and experiment. In order to do that, the teacher must understand that every student is unique and comes from different social and physical environments.

The role of the teacher as facilitator and learning guide is essential in the world of education, especially for students in the elementary stage. There are some researchers have proven this statement, some of them as follows: (1) Simbolon & Hamdan (2020), in their research entitled Appreciation of Poetry from Class V SD Negeri 3 Awirarangan described one of their findings, showed that the students' appreciation on poetry were low. When this finding is compared with the elements of Jean Piaget's Learning Theory, it can be concluded that the



finding possibly arose from the lack of material and activity readiness from the students, mainly because the material did not meet the students' interest (2) Rezeki (2021), in the research, entitled *Children's Language Acquisition due to the Influence of Animation Film* had finding that showed the words that Omar Hana used in the film influenced the children's language acquisition aged three years old and five years old. When this finding is compared with the elements of Jean Piaget's Learning Theory, it can be concluded that the finding possibly arose from the activities readiness of the children; and (3) Novitasari et al., (2023) in their research, entitled *Kemampuan Bahasa Inggris Awal pada Periode Linguistik Anak Usia Dini* find that children able to listen to related songs to the vocabulary that they learn, lower than the first one was able to listen to random vocabulary, lower than the second one was able to listen to short stories, lower than the third one was able to listen to vocabulary in sequence, and lower than the fourth one was able to listen to the pictures pointing instructions according to the vocabulary they hear. When this finding is compared with the elements of Jean Piaget's Learning Theory, it can be concluded that the finding possibly arose from the fulfillment of the element of characteristics, cognitive development, material readiness, and, most importantly, the role of the teacher because the stage of students in their research is under elementary school students.

Based on the data analysis, it can be described that the English language field is empowering digital learning and teaching environment by utilizing it to make the learning process more fun and relatable and by creating opportunities for personalized learning, helping students to learn at their own pace and helping educators with limited resources to be able to provide students with better learning opportunities. This can be possible when the teacher considers the elements of Jean Piaget's learning theory in preparing, conducting, and evaluating the student's learning journey.

Focus data for the third problem statement has been elaborated on using Sanford's challenges theory. The elements of the challenges theory of Sanford have been used to analyze the data about the challenges in utilizing digital into ELT, the elements described as following Table 3:

Table 3. Digital Utilize Challenges in ELT

Elements of Sanford's Challenges Theory	challenging Situation	students experience challenges when they face situations in which they are not prepared
	appropriate skills or knowledge	preparation will eliminate challenges
	social and environmental support	confidence will grow among students
	Facility environmental support	convenience will make learning easier
	Student's readiness	it depends on student readiness
	Teacher's readiness	it depends on student readiness

Sanford urged that challenges will only arise when the situation becomes difficult for the students to deal with, especially when they are unprepared because of a lack of knowledge and skill. Challenges also arise when students do not receive support from their social and facility environment and when they and their teacher are not ready for the potential aspects that can transform into challenges. Prihatmi (2018), in her research entitled *Pengaruh Media Sosial terhadap Prestasi Belajar Bahasa Inggris pada Program Studi Teknik Mesin ITN Malang*, elaborated that the duration of social media use has a negative influence on students' English learning achievement. When this finding is compared with the elements of Sanford's challenges theory, it can be concluded that the finding possibly arose from a lack of students' and teachers' readiness to utilize digital for the positive purpose of ELT. The teacher should train more about design strategies for utilizing digital technology in



classroom management and classroom environments so that the students have no chance to use it for negative purposes during the learning process. Therefore, based on the data analysis, it can be described that the challenges in utilizing digital facilities in ELT came from the following: digitalization side effects, students, teachers, and the environment.

As the complete result of data analysis, it can be concluded that the similarities and the differences between this research and the previous research are as follows: (1) the similarity: the previous and the current research emphasized the potential use of the digital or empowering digital into the world of education; (2) the differences: the previous studies focus on the elaboration of the digital education; meanwhile this current research focuses on the empowering digital into ELT and provides reference about the stages of concern aspects for a better result of teaching, and introduce the challenges in digitization ELT.

4. CONCLUSION

Based on the data analysis, the findings of this current research consist of the following: the world of education considers the digital era can transform education into a modern and more accessible way that attracts global interest for supporting massive educational institution development, it could promote new digital products and services in the education sector such as e-books and video materials, giving the students many chances to explore and experience knowledge in a fun way as Jean-Piaget emphasized about the critical point of learning; that English language field is empowering digital into learning and teaching environment by utilizing it in making the learning process more fun and relatable, and by creating opportunities for personalized learning, helping students to learn at their own pace and helping educators with limited resources to be able to provide students with better learning opportunities. This can be possible when the teacher considers the elements of Jean Piaget's learning theory in the process of preparation, conducting, and evaluation of the learning journey of the students and the challenges in utilizing digital facilities in ELT came from the digitalization side effect; student and teacher, and environment. Those are the conclusions of this research finding; however, this research only provides an introduction to the challenges in empowering digital education into ELT. Therefore, it could be suggested that further researchers continue the work in related studies more deeply.

5. ACKNOWLEDGMENTS

The author would like to deliver gratitude to all the professors of the Doctoral Program at the English Department - Universitas Negeri Makassar, who has been kindly sharing their knowledge and experiences in academic and research fields with every postgraduate student in the program, and the author also would like to deliver great appreciation to the 3rd ICE (International Conference on Education) of FKIP USM committee for providing opportunity to all of presenter to present their work in this particular occasion.

REFERENCES

- Abdi, I. N., Syahri, A. A., & Fitriany. (2011). Teori perkembangan kognitif piaget dan implikasi dalam pembelajaran matematika. *Sigma (Suara Intelektual Gaya Matematika)*, 3 Ed. 1.
- Culatta, R. (2024). *Gestalt theory (Wertheimer)*. InstructionalDesign.Org.
<https://www.instructionaldesign.org/theories/gestalt/>
- Doroudi, S. (1985) (n.d.). *A primer on learning theories*. Retrieved March 4, 2024, from
<https://sites.google.com/uci.edu/shayan-doroudi/blog/learning-theories>



- Firda-L, Utama, I. B., & Wisudariani, N. R. (2019). Pemanfaatan portal/Web E-Learning pada mata pelajaran bahasa indonesia di SMA Negeri 4 Singaraja. *Jurnal Pendidikan Bahasa Dan Sastra Indonesia UNDIKSHA*, Vol. 9 No.1, 13–22.
- Hales, D., Peersman, G., Rugg, D., & Kiwango, E. (2010). *An introduction to triangulation*. UNAIDS Monitoring and evaluation division.
- Isma, C. N., Rahmi, R., & Jamin, H. (2022). Urgensi digitalisasi pendidikan sekolah. *At-Ta'dib: Jurnal ilmiah prodi pendidikan agama islam*, Vo. 14 No. 2, 129–141. <https://doi.org/10.47498/tadib.v14i2.1317>
- Karmen, R. F., & Pribadi, F. (2022). Dampak positif negatif pembelajaran online dalam sistem pendidikan indonesia pasca pandemi Covid-19. *Adalah: buletin hukum dan keadilan V Ol. 6, No. 3 (2022), Vol. 6 No. 3*, 62–75. <https://doi.org/10.15408/adalah.v6i1.26053>
- Kwasniewski, H. (2023, March 3). *What is gestalt theory? Theories on perception, learning & art*. <https://study.com/academy/lesson/the-gestalt-theory-and-perceptual-development.html>
- Leung, J. W. S. (2023, November 21). *Perception in psychology: overview & purpose*. Study.Com. <https://study.com/learn/lesson/stages-perception-overview-purpose.html>
- Mendikbud RI. (2020). *Surat edaran No. 4 Tahun 2020*.
- Mendikbud-menag-menkes-mendagri. (2020). Revisi keputusan bersama 4 menteri republik indonesia. In *4 ministry Office*. 4 ministry office.
- Moleong, L. J. (2016). *Metodologi penelitian kualitatif* (Ed. rev, cet.25). Remaja rosdakarya.
- Muassomah, M., Abdullah, I., Hasanah, U., Dalmeri, D., Sihombing, A. A., & Rodrigo, L. (2022). The academic demoralization of students in online learning during the COVID-19 Pandemic. *Frontiers in education*, 7. <https://doi.org/10.3389/educ.2022.888393>
- Nawawi, H., & Hadari, M. M. (2006). *Instrumen penelitian bidang sosial*. Gadjah mada University.
- Novitasari, Y., Prastyo, D., Reswari, A., & Ifitah, S. L. (2023). Kemampuan bahasa inggris awal pada periode linguistik anak usia dini. *Jurnal obsesi : Jurnal pendidikan anak usia dini*, 7(5), 5343–5350. <https://doi.org/10.31004/obsesi.v7i5.5324>
- Ornstein, A. C., & Levine, D. U. (1985). *An introduction to the foundation of educations* (3rd ed.). Houghton mifflin.
- Prihatmi, T. N. (2018). Pengaruh sediaan sosial terhadap prestasi belajar bahasa inggris pada program studi teknik mesin ITN malang. *Jurnal flywheel*, Vol. 9 No. 1. <https://id.techinasia.com>.
- Rezeki, T. I. (2021). Children's language acquisition due to the influence of animation film. *English teaching and linguistics journal (ETLiJ)*, 2(1), 122–132.
- Riduwan. (2013). *Metode dan teknik menyusun tesis*. Alfabeta.
- Sanford, N. (1967). *Where colleges fail: a study of the student as a persons*. Jossey-bass.
- Sanjaya, W. (2014). *Penelitian pendidikan jenis, metode dan prosedur*. Kencana.
- Srinivas, A. (2023). Digital technology in english language teaching. *AMERICAN Journal of language, literacy and learning in STEM education* www.grnjournal.us *AMERICAN Journal of language, literacy and learning in STEM education*, 01(6), 238–256.



- Strayhorn, T. L. (2013). *Theoretical frameworks in college student research*. University press of america.
- Sugiyono. (2022). *Metode penelitian kuantitatif, kualitatif, dan R & D* (Ed. 2). Alfabeta .
- Umeogu, B., & Ojiakor, I. (2014). The internet communication and the moral degradation of the nigerian youth. *international journal of computer and information technology*, 2279–0764. www.ijcit.com450
- Virtue, E. E., Root, B., & Lenner, R. (2020). Appreciative advising as a mechanism for student development. *College student affairs journal*, 39(2), 200–213.
- Yuan, C., Wang, L., & Eagle, J. (2019). Empowering english language learners through digital literacies: research, complexities, and implications. *Media and communication*, 7(2 Critical Perspectives), 128–136.
<https://doi.org/10.17645/mac.v7i2.1912>
- Zed, M. (2014). Metode penelitian kepustakaan. In *yayasan obor indonesia*. Yayasan pustaka obor indonesia.



MOBILE LEARNING: FUTURE LEARNING TECHNOLOGIES FOR ISLAMIC FORMAL EDUCATION (A LITERATURE STUDY)

Miftah Hur Rahman Zh¹, Zahid Zufar At Thaariq^{2*}, Arief Ardiansyah³

¹²Universitas Negeri Malang, Indonesia

³Universitas Islam Malang, Indonesia

*zahid.zufar.2201218@students.um.ac.id.

ABSTRACT

The utilization of mobile learning media is a manifestation of 21st century educational methodologies. This research is prompted by the rapid rise in the usage of smartphones, iPads, and other mobile devices. This study aims to conduct literature research on how effective the use of mobile learning is, the challenges in its implementation, and the extent of mobile learning development in the scope of Islamic religious education. To find out this, the researcher used the Systematic Literature Review (SLR) method. Data and information were collected by reviewing every article that has a relationship with the effectiveness of mobile learning in the scope of Islamic Religious Education from 2018 to 2023. The results show that mobile learning is effectively used in the scope of Islamic Religious Education by integrating several media such as Android-applications, E-books and other media, but with a note that it is necessary to hold mobile media-based content creation training for teachers.

Keywords: *Mobile learning, Islamic Education*

1. INTRODUCTION

The fact that technology today has advanced rapidly. According to Arjunaita (2020), human life has transitioned into the 5.0 era. As the younger generation, we, as the inheritors of the Indonesian nation, must diligently acquire knowledge from all available sources worldwide to ensure that we do not lag behind other nations (Zh, Ardiansyah, Dewi, et al., 2022).

Technology and communication play a crucial role in contemporary digital life. Within the context of education, communication technology facilitates the learning process, particularly through mobile learning or learning based on mobile devices. Mobile learning is an extension of the concept of E-learning, which encompasses computer-based, web-based, and virtual classroom learning. E-learning utilizes many technological media such as the internet, satellite broadcasting, TV, audio, radio, and others for the learning process. Unlike Mobile learning, which focuses on learning through mobile devices such as Android, smartphones, and tablets that have limited storage capacity. The learning materials in Mobile learning typically consist of text and images. However, with technological advancements, content such as videos, animations, and audio can also be incorporated into mobile learning (Kulbi, 2019).

Mobile learning is believed to enhance the effectiveness of ongoing learning processes because of its alignment with technological and informational advancements (Kusuma et al., 2022). Mobile learning emerged as a response to the rapid advancements in information and communication technology in the early 21st century (Haq & Sujatmiko, 2021). This is considered a solution to the problem of access to education through a compact and easily accessible medium. Within a short period, learners can access learning materials, complete assignments, and utilize intuitive features to enhance learning efficiency. Wulandari et al., (2019) claim that mobile learning offers an opportunity to learn without the limitations of space and time according to the flexibility of the devices used. This creates a high spirit as well as opportunities for students to learn in a new place easily, beneficially, and in an enjoyable environment. The inclusion of additional learning materials, exercises, educational videos, animations, and other features in smartphones makes learning more exciting and engaging, avoiding frustration, and enabling learners to absorb the learning material more easily.

Talking of education, Islamic Religious Education (PAI) is one of the subjects that can be found in many educational institutions in Indonesia (Zh, Ardiansyah, & Dewi, 2022). PAI is an essential element of the educational curriculum at all levels of the national education system. The purpose of this is to provide students



with the necessary knowledge, comprehension, experience, and application of Islamic teachings derived from its fundamental sources, namely the Quran and the Hadith. These efforts are carried out through guidance, teaching, training, and the application of learning experiences.

Islamic education focuses on developing students' cognitive, emotional, and psychomotor skills to foster their religious consciousness (Chanifah et al., 2021). A significant number of students describe PAI as a complex subject, mostly due to factors such as ineffective teaching methods, diverse instructional materials, and the extensive breadth of the PAI curriculum (Nusroh & Ahsani, 2019). Given these challenges, mobile learning is considered a viable method to address the issues encountered in the PAI learning process.

The conviction in the efficacy of mobile learning to address challenges in the domain of formal Islamic education is closely intertwined with the positive impact it offers. While there is a limited number of literature research discussing mobile learning as the future technology for Islamic Education, numerous earlier researches showed the effectiveness and advantages of mobile learning. A research conducted by (Nasution et al., (2021) indicates that mobile learning enhances the accessibility of learning materials, enabling students to learn at their convenience and location based on their individual requirements. In addition, research by (Cahyanto et al., (2021) shows that the use of mobile learning can increase student engagement in learning, due to interactive features and the use of attractive multimedia. The ability to personalize learning is also one of the advantages of mobile learning, as highlighted in a research by Ninghardjanti et al., (2020), who noted that mobile learning allows teachers to present learning materials according to students' individual learning styles. Thus, mobile learning not only facilitates more inclusive and affordable learning, but also increases student engagement and personalization of learning according to students' needs.

To ascertain the progress, difficulties, and efficacy of mobile learning in the PAI learning process, the researcher will employ a literature review approach, wherein the author will conduct a search for and evaluate various relevant previous research. The utilized research sources are recorded in both national and international journal indexes. Following collection, research journals conduct dissection or evaluation through the use of Systematic Literature Review (SLR).

2. METHODS

This study is a comprehensive overview, namely a Systematic Literature Review. By utilizing the 4 stages of Systematic Literature Review (SLR), one can obtain a synthesis of accurate and relevant academic literature that aligns with the research problem at hand (Moher et al., 2010). The subject of this research is mobile learning media in the context of Islamic formal education. The selection of mobile learning-based teaching in Islamic Religious Education (PAI) in this study is justified by the following reasons: a variety of purposes is to determine the extent of the development, feasibility, and effectiveness of mobile learning in the learning process.

Before conducting a review, it is essential to formulate research questions that will be subject to review. Specifically, RQ1. What is happening with the development of mobile learning in the area of Islamic religious education? RQ2. What is the viability and efficacy of mobile learning in the context of formal Islamic religious education? RQ3. What challenges and obstacles arise when trying to implement mobile learning in the context of formal Islamic religious education?

The stages of the research were conducted using a Systematic Literature Review (SLR). The literature review phase begins with:

- a. Article Search: The articles chosen for review were gathered from various sources, including Research Rabbit, Google Scholar, Publish or Perish (POP), and Litmap. The initial step to get useful data for research is a literature search. The research begins by searching for relevant literature on the research subject.
- b. Criteria selection: This study concentrates on conducting a search using the terms efficacy, development, mobile learning, and Islamic religious education for review.
- c. Quality Assessment: This discussion is based on an article or journal published by Open Journal Systems (OJS), which has a good reputation. The researchers restrict the search for articles to those with a



minimum S4 index (Sinta 4). Subsequently, the research is conducted on the issues raised by the author by reviewing the title, followed by the abstract to ascertain the quality and relevance of the literature.

- d. Data Extraction: In the data extraction phase, 13 journals were selected based on the author's chosen problem, which is about mobile learning-based instructional media in the subject of Islamic religious education. The selection was made from the past 5 years, specifically between 2018 and 2023. It includes a total of 13 journals, with 5 of them written in English and 8 written in Indonesian.

3. RESULTS & DISCUSSION

The analysis of the scientific article reveals that 13 journals have been identified, which are relevant to this research and focus on mobile learning in Islamic religious education. The assessment of the 13 journals revealed that 4 of them employed experimental methods, 1 journal used quantitative descriptive methods, 4 journals utilized Research and Development (R&D) methods, 2 journals employed qualitative methods, 1 journal employed a mixed method approach, and 1 journal employed a systematic review method. To enhance the findings of the review, the author incorporates several pertinent books that are directly related to the study subject.

Table 1. Data Extraction Results

No	Author/year	Title	Journal	Purpose
1	(Hamdani, 2021)	Enhancing Students' Learning Motivation and Knowledge: Implementing Mobile Learning in Islamic Religious Education	Jurnal Pendidikan Agama Islam <i>Al-Thariqah</i>	Proving the impact of implementing mobile learning on the improvement of learning motivation and knowledge of students at SMK Negeri Samarinda.
2	(Ahmadi, 2022)	The Effect of Online Learning Assisted by Learning Videos to Improve Learning Outcomes of Islamic Religious Education Subjects Moderated by Student Learning Motivation	Jurnal Nalar Pendidikan	Knowing the effectiveness of online learning assisted by Zakat video to encourage learning of grade VI content students to improve learning outcomes of Islamic religious education subjects.
3	(Nawawi, 2019)	Mobile learning based on Html 5 in Islamic Religious Education Subjects	Jurnal Perspektif	Examining the efficacy of implementing HTML 5-based mobile learning to enhance student academic performance in PAI subjects.
4	(Purwowidodo, 2023)	<i>M-learning</i> -E-Book: Higher Level Thinking Skills, Retention, Motivation of Junior High School Students	Jurnal <i>Iqra'</i> : Kajian Ilmu Pendidikan	Evaluating the impact of implementing M-learning- E-Book on higher-order thinking skills, retention, and learning motivation.
5	(Muana et al., 2021)	The Impact of Mobile Learning on Enhancing Self-directed Learning During the Covid-19 Pandemic	<i>Edudeena: Journal of Islamic Religious Education</i>	Determining the impact of mobile multimedia learning on students' self-directed learning.
6	(Kusuma et al., 2022)	The impact of mobile application-based media learning on students' learning motivation	<i>International Journal of Evaluation and Research in Education</i>	Understanding the learning conditions during the pandemic and the development of mobile application-based learning media.



7	(Yusro et al., 2022)	The utilization of m-PAI as a mobile learning media for Islamic Religious Education courses at Universitas Negeri Jakarta.	<i>Proceedings of the 5th International Conference on Current Issues in Education (ICCIE 2021)</i>	Developing mobile learning for Islamic Education and assessing its suitability at Universitas Negeri Jakarta
8	(Hanafi, 2019)	Designing an Islamic Religious Education Learning Media based on an Android Application for Grade XI Vocational High School Students, focusing on the topic of Funeral Management.	<i>Attthulab</i>	Developing PAI learning material using an Android application with the topic of funeral management.
9	(Sibilana et al., 2020)	<i>Mobile learning</i> Development Based on Android Application for Islamic Education	<i>Letters in Information Technology Education (LITE)</i>	Developing an Android-based learning media for Islamic religious education subject in grade XI at SMA Negeri 2 Malang.
10	(Kulbi, 2019)	Android-based Mobile Learning as a media for Islamic Religious Education	<i>Nazhruna: Jurnal Pendidikan Islam</i>	Describe Android-based mobile learning as a learning medium for Islamic religious education in vocational schools.
11	(Zakaria et al., 2020)	Integrating 21st Century Skills in the Teaching and Learning of Islamic Education: An Innovative Approach	<i>ICOCIT-MUDA</i>	Investigating the feasibility of utilizing mobile technology in the area of Islamic education. Outline the difficulties and obstacles encountered by users in their quest to locate resolutions for these issues.
12	(Oktavia & Khotimah, 2023)	Development of Islamic Religious Education Teaching Methods in the Digital Era	<i>Jurnal An Najah : Jurnal Pendidikan Islam dan Sosial Keagamaan</i>	Exploring and developing innovative methods of Islamic religious education in the digital era.
13	(Salsabilla et al., 2021)	The Benefits of Technology for Islamic Education Subjects During the Covid-19 Pandemic	<i>Edunesia : Jurnal Ilmiah Pendidikan</i>	Examining the advantages of utilizing technology for PAI individuals within the Covid-19 epidemic

RQ 1 : Development of Mobile Learning in Islamic Religious Education Area.

Mobile learning is a development of the concept of E-learning, encompassing computer-based, web-based, and virtual classroom learning. There are various types of mobile learning that can be developed in the learning process, such as applications, mobile websites, hybrid applications, and E-Books. (Reiser & Dempsey, 2018).

Media development refers to the systematic process of either producing new media or enhancing existing media by conducting a thorough analysis of demands. Media functions as a means of transmitting messages from a sender to a recipient and functions as educational material to enhance the process of learning. The adoption and advancement of mobile learning became prevalent with the onset of the global covid-19 pandemic. (Aeni et al., 2022). Despite the widespread use during the COVID-19 pandemic, mobile learning can still be seamlessly integrated now, in accordance with the assessment of technological advancements and the current characteristics of students. In the area of Islamic education, numerous endeavors have been conducted to develop mobile learning and incorporate it into the educational process. These include the creation of android-



based applications, HTML-based mobile learning, mobile-based movies, digital Qur'an development, and the production of e-books. (Kusuma et al., 2022; Salsabilla et al., 2021; Sibilana et al., 2020; Yusro et al., 2022).

The research undertaken by Yusro et al., (2022) focused on developing learning media using the M-PAI application. This program was created in response to the rapid advancement of the digital world, with the purpose of enhancing the student learning experience. In order to develop this media, researchers utilize the ADDIE model by including software, namely Android Studio 4.0.1 for the development of mobile applications, and Microsoft Visual Code as an editor for the creation of web applications.

In addition, Hanafi (2019) did research that resulted in the development of an android application specifically designed for managing corpse-related materials. This development was undertaken with the aim of generating a cutting-edge learning innovation by including the utilization of mobile devices. In the development of this product, researchers employed the ADDIE approach, utilizing Adobe Flash Pro CS 6.0 with the action script 3.0 programming language, which was backed by Adobe Air as the primary software. Furthermore, researchers employ supplementary software applications such as Adobe Photoshop, Adobe Premier, and Any Video Converter.

Furthermore, in the research conducted by Sibilana et al., (2020), an Android-based application titled "Awaken and Rise, Islamic Warriors" was developed. This development is carried out due to the widespread use of mobile devices by students in schools, with nearly all students at SMAN 2 Malang owning a mobile device, reaching a 99% index. This research was conducted using the Borg and Gall development methodology, utilizing Adobe Flash CS 6 action script 3.0 as the main software tool.

In their recent study titled "Mobile application-based media learning and its effect on students' learning motivation," Kusuma et al., (2022) developed a learning application in response to the widespread transmission of the COVID-19 virus throughout that year, which significantly disrupted the mobility of learning activities. This application is designed as a precise solution for innovative and creative learning for Gen Z. The development is carried out using the Alessi and Trollip development process, which consists of 3 stages: planning, design, and product development. The application is developed using three supporting software, including designing the application with Powerpoint, then converting it to HTML5 using Ispring Suite 9, and finally converting it into an application using WEB2APK builder.

From various forms of mobile learning that can be developed, it can be concluded that Android-based applications have dominated development in the past 5 years. The development of Android-based applications has been fueled by the evolving trends in technology utilization and the complexity inherent in these applications. Additionally, the availability of easily accessible software for application development further supports this growth.

RQ 2 : The Feasibility and Effectiveness of Mobile Learning in Islamic Religious Education.

Based on the analysis of literature review on 13 journal articles, it is found that the use of mobile devices or media can be considered effective in supporting formal Islamic religious education. This is supported by findings from the analysis of 13 articles, which indicate a positive effect of mobile devices on PAI learning activities.

Mobile learning is a versatile media that can be used in various educational contexts, including Islamic religious education (PAI). Mobile learning is considered suitable for facilitating learning activities because of its various advantages. (Hanafi, 2019; Kusuma et al., 2022; Sibilana et al., 2020; Yusro et al., 2022). In addition to being appropriate to use in mobile learning activities, it may also enhance the effectiveness of learning in terms of various aspects and learning objectives. According to a study conducted by Hamdani (2021), it is found that mobile learning can enhance the effectiveness of learning, as evidenced by its significant impact on students' motivation and knowledge. The impact on students' learning motivation increased by 34% in the middle category, while the increase in students' knowledge was 70% in the high category. This increase is caused by the stimulation and appeal of the devices provided by mobile learning to students.

Furthermore, in a study conducted by Nawawi (2019), HTML 5-based mobile learning is utilized in the PAI learning process for the thaharah subjects. The results indicate that student learning outcomes in the subject



of Thaharah can be enhanced by the utilization of HTML 5-based mobile learning. Also, in the research conducted by Ahmadi (2022), it was found that distance learning assisted by mobile-based video learning, moderated with good student motivation, can enhance student learning outcomes if the videos are infused with creative and adaptive innovations to maximize student learning results.

The positive outcomes provided by mobile learning extend beyond only enhancing student motivation and learning outcomes. According to the study conducted by Muanas et al., (2021), it is known that mobile learning has an impact on students' self-directed learning, as evidenced by an average research result of 76%. Furthermore, in a study conducted by Purwowidodo (2023), it is said that one type of mobile learning that may be utilized in the learning process is M-learning-E-Book. The implementation of M-learning-E-Book is still not widely conducted by researchers in Indonesia, and their studies are limited to examining the impact of this model on students' learning outcomes. The research findings indicate that M-learning-E-Book has a significant impact on the achievement of higher-order thinking skills, retention, and learning motivation. Furthermore, it demonstrates that M-learning-E-Book is one of the suitable learning alternatives that meet the demands of the 21st century.

Based on the previous studies, it is understood that combining mobile learning into the PAI learning process presents efficiency and effectiveness to students, as demonstrated by the enhancement of student learning motivation, learning outcomes, critical thinking skills, and independent learning abilities.

RQ 3 : Challenges in Implementing Mobile Learning in Islamic Religious Education

Although the implementation of mobile learning for the subject of Islamic Religious Education presents various advantages, both students and educators commonly face some challenges in harnessing its potential. In a study conducted by Kulbi (2019), it is mentioned that several challenges can be encountered in the mobile-based learning process, including: 1) The need for vigilant supervision from teachers to avoid the inappropriate utilization of mobile-based media, such as engaging in gaming activities. 2) The internet network sometimes presents challenges, impeding the learning process. 3) The time available for learning through mobile learning platforms is limited in comparison to PAI learning since educators and students may lack proficiency in information technology. Furthermore, there are parents who view the incorporation of android devices in PAI learning as detrimental and express their disapproval towards mobile learning. They harbor concerns that children may exploit android technology for malicious intentions.

Another challenge frequently encountered in implementing mobile learning in Islamic religious education (PAI) is the insufficient competence of teachers in creating and utilizing technology-based media, which leads to many teachers relying solely on printed books as the primary medium (Hamdani, 2021; Zh, Ardiansyah, Dewi, et al., 2022). In addition, Reiser & Dempsey (2018) state that an essential characteristic of m-learning is its reliable connectivity, meaning that mobile devices used for m-learning must have the ability to connect to a network or the internet with a reliable connection. This can be achieved through cellular networks, wi-fi, or cable connections. Furthermore, it is important to note that m-learning cannot be effectively incorporated or executed in educational settings that are disadvantaged, such as areas classified as 3T regions.

The challenges in implementing m-learning in the process of PAI learning can be prevented through several solutions, such as organizing workshops for teachers on the application or development of mobile learning in the era of education 4.0, and educators can consider mobile learning as an alternative in selecting a learning model by adapting to the characteristics of the material.

4. CONCLUSION

From the various discussions above, it may be concluded: the discussions above, it becomes evident that mobile learning has undergone extensive development within Islamic Religious Education, embracing various formats like Android-based applications, HTML-based modules, mobile videos, digital Quran tools, and e-books. Despite the diversity, the predominant focus in the past half-decade has shifted towards the complexity of Android-based m-learning solutions. The integration of mobile learning in teaching PAI has proven advantageous, fostering increased student motivation, improved learning outcomes, enhanced critical thinking, and self-directed learning capabilities. While mobile learning holds promise for enriching official Islamic religious education, its successful implementation necessitates addressing potential challenges. Accessibility stands out as a major



obstacle, particularly in disadvantaged educational settings such as 3T regions. Despite this hurdle, the anticipated positive impact of m-learning on Islamic religious education remains promising. Looking ahead, it is expected that researchers will continue to explore the broader implications of mobile learning beyond the realm of PAI, extending its potential to address various educational challenges.

5. ACKNOWLEDGMENTS

The author extends appreciation to everyone who contributed to the writing process, including the Master's lecturers in Educational Technology at Universitas Negeri Malang, fellow students from the Educational Technology Master's program at Universitas Negeri Malang in 2023, the Indonesia Bangkit-LPDP Scholarship which provided support throughout the course, and particularly to the entire Heutagogy Team for their constant companionship in every circumstance.

REFERENCES

- Aeni, A. N., Dadan, J., Maulana., Rini, N., Salsabila, B., & Putri, S. (2022). "Pengembangan aplikasi games edukatif word wall sebagai media pembelajaran untuk memahami materi pendidikan agama islam bagi siswa SD." *Jurnal Pendidikan Guru Sekolah Dasar* 11(6): 1835–52.
- Ahmadi. (2022). "Pengaruh pembelajaran daring berbantuan video pembelajaran untuk meningkatkan hasil belajar mata pelajaran pendidikan agama islam dimoderasi motivasi belajar siswa." *Jurnal Nalar Pendidikan* 10: 62–70.
- Arjunaita. (2020). "Pendidikan di era revolusi industri 5.0." *Prosiding Seminar Nasional Pendidikan Program Pascasarjana Universitas PGRI Palembang* 2: 179–96.
- Chanifah, N., Yusuf, H., Choirul, M., & Abu, S. (2021). "Designing a spirituality-based islamic education framework for young muslim generations: a case study from two Indonesian universities." *Higher Education Pedagogies* 6(1): 195–211. <https://doi.org/10.1080/23752696.2021.1960879>.
- Hamdani. (2021). "Peningkatan motivasi belajar dan pengetahuan peserta didik: penerapan mobile learning pada mata pelajaran pendidikan agama islam." *Jurnal Pendidikan Agama Islam Al-Thariqah* 6(2): 297–316.
- Hanafi, R. H. (2019). "Desain media pembelajaran pendidikan agama islam berbasis aplikasi android materi pengurusan jenazah untuk siswa kelas Xi Sekolah Menengah Kejuruan." *Aththulab* 4(1): 99–104. <https://journal.uinsgd.ac.id/index.php/aththulab/article/view/3096/2466>.
- Haq, F., & Bambang, S. (2021). "Studi literatur penggunaan media pembelajaran mobile learning berbasis android pada mata pelajaran sistem operasi." *Jurnal IT-EDU* 06: 78–84.
- Kulbi, Sofia, Z. (2019). "Mobile learning berbasis android sebagai media pembelajaran pendidikan agama islam." *Nashruna: Jurnal Pendidikan Islam* 2(3): 385–406.
- Kusuma, F. I., Nunuk, S., & Sri, S. (2022). "Mobile application-based media learning and its' effect on students' learning motivation." *International Journal of Evaluation and Research in Education* 11(3): 1353–59.
- Moher, D., Alessandro, L., Jennifer, T., & Douglas, G. A. (2010). "Preferred reporting items for systematic reviews and meta-analyses: the prisma statement." *International Journal of Surgery* 8(5): 336–41.
- Muanas, I., Andi, M. & Andi, K. (2021). "Pengaruh mobile learning untuk meningkatkan kemandirian belajar di masa pandemi covid-19." *Edudeena: Journal of Islamic Religious Education* 5(1): 2021.



- Nawawi, I. (2019). "Mobile learning berbasis HTML 5 dalam mata pelajaran pendidikan agama islam." *Jurnal Perspektif* 3(1).
- Nusroh, S., & Eva. L. F. A. (2019). "Analisis kesulitan belajar pendidikan agama islam (PAI) serta cara mengatasinya." *BELAJEA: Jurnal Pendidikan Islam* 4(2).
- Oktavia, P. & Khusnul, K. (2023). "Pengembangan metode pembelajaran pendidikan agama islam di era digital." *Jurnal An Najah (Jurnal Pendidikan Islam dan Sosial Keagamaan)* 02(05): 1–9.
- Purwowododo, A. (2023). "M-learning-e-book: higher level thinking skills, retention, motivation of junior high school students." *Jurnal Iqra' : Kajian Ilmu Pendidikan* 8(2): 300–324.
- Reiser, R. A., & John, V. D. (2018). *Trends & Issues in Instructional Design and Technology, 4th Edition*. Pearson Education.
- Salsabilla, U. H., Alvina, A., Feliana, S., Indrika, S., & Ahmad, S. (2021). "Manfaat teknologi bagi mata pelajaran pai di masa pandemi covid-19." *Edunesia : Jurnal Ilmiah Pendidikan* 2(1): 125–32.
- Sibilana, A. R., Uswatun, H., & Anisatun, N. (2020). "Mobile learning development based on anroid application for islamic education." *Letters in Information Technology Education (LITE)* 3(2): 60–65.
- Wulandari, D. A., Hari, W., Agus, S., & Agus, M. (2019). "Pengembangan mobile learning berbasis android pada mata pelajaran rekayasa perangkat lunak di SMK Sultan Trenggono Kota Semarang." *Jurnal Teknologi Informasi dan Ilmu Komputer* 6(5): 577.
- Yusro, M., Andy, H., Marhamah, S., & Raihan, R. (2022). "M-pai as a mobile learning media for islamic religious education courses at Universitas Negeri Jakarta." *Proceedings of the 5th International Conference on Current Issues in Education (ICCIE 2021)* 640(Iccie): 208–13.
- Zakaria, G., Norkhairiah, H., Aliff, N., & Salwa, M. (2020). "Integration of 21st century skills: an Innovative Alternative Practice in the Teaching and Learning of Islamic Education." *ICOCIT-MUDA* (2009).
- Zh, M. H. R., Arief, A., & Mutiara, S. D. (2022). "Pengembangan media pembelajaran berbasis flipbook online pada pelajaran al-qur'an hadits materi kebenaran penurunan al-qur'an di kelas X Madrasah Aliyah Negeri (MAN) Kota Batu." *VICRATINA: Jurnal Pendidikan Islam* 7(2): 163. <http://riset.unisma.ac.id/index.php/fai/article/view/17298/13005>.
- Zh, M. H. R., Arief, A., Mutiara, S. D., & Fatimah, N. (2022). "Analisis respon siswa dan guru terhadap pengembangan media pembelajaran flipbook online pada pelajaran al-qur'an hadits di Madrasah Aliyah Negeri (MAN) Kota Batu." *Jurnal Literasiologi* 8(2): 49–58. <https://doi.org/10.47783/literasiologi.v8i2.365>.



THE IMPLEMENTATION OF TEACHER RESOURCE MANAGEMENT TO IMPROVE THE COMPETENCE OF TEACHERS AT PRIVATE JUNIOR HIGH SCHOOL OF NAHDLATUL ULAMA MEDAN

Zon Saroha Ritonga*
Universitas Nahdlatul Ulama Medan, Indonesia
*zon.saroha@yahoo.com

ABSTRACT

Teacher resource management must be carried out thoroughly and completely among its functions, namely planning, organizing, directing, controlling, procuring, developing, compensating, integrating, maintaining, disciplining, and finally dismissing, all of which will make human resources or teaching staff truly selected and competing openly. This study aims to describe the implementation of teacher resource management. This research was conducted at the Private Junior High School of Nahdlatul Ulama Medan. It wants to reveal: (1) the recruitment process (2) The teacher selection process (3) The implementation of teacher competency development carried out by the Head of the Private Junior High School of NU Medan. The method used in this study is a qualitative research approach. The validation of research data was carried out using triangulation techniques through observation, interviews and document studies. The results of this study reveal the findings, which are: (1) The teacher recruitment process carried out by the Head of the Private Junior High School of Nahdlatul Ulama Medan is still familial and recommended by local teachers, not informing the general public due to limited funds owned, (2) The selection process carried out by the Head of the Private Junior High School of Nahdlatul Ulama Medan occurs in several stages, namely: completeness of files or administration, interview tests, and placement according to the disciplines possessed by prospective teachers, (3) The implementation of teacher competency development carried out by the Head of Private Junior High School of Nahdlatul Ulama Medan through providing information in the form of seminars, workshops and training such as those held at an educational institution and recitation.

Keywords: *Teacher resource management, teacher competency, teacher selection, teacher recruitment*

I. INTRODUCTION

Human resource management is needed in the progress and maintenance of an organization, especially private schools. In this case teachers are very important in the continuity of learning and education in schools, and at the same time also as a measure of the success of a school in creating productive students and having superior competence. Schools with the above phenomenon are expected to be able to create a pattern of human resource management or teachers for schools, so that schools will not lose and will get teaching staff who are experts in their fields, have competence, and are professional in carrying out their duties and responsibilities as educators at school.

Human resource management is needed to progress and maintain the existence of an organization. In this case, teachers are very important for the continuity of learning and education in schools. Teachers are also the spearhead of determining the success of a school in creating highly intellectual, creative and responsible students.

Considering the importance of teacher resources in the context of the education system, teacher resource management must be done properly. Teacher resource management in organizations, including schools, is not just the procurement of teacher resources, but an integrated action of various management functions ranging from planning, staffing or recruitment, assessment and coaching and development of teacher resources.



Various obstacles faced by schools, especially in rural areas, generally result in a shortage of teachers who are in accordance with the needs. The need in question is the need for subjects or fields of study that are in accordance with the teacher's background. Finally, schools are forced to adopt policies that are not popular with children, with teachers teaching subjects that are not in accordance with their fields. Teacher resource management must be carried out thoroughly and completely among its functions, namely planning, organizing, directing, controlling, procuring, developing, compensating, integrating, maintaining, disciplining, and finally dismissing, all of which will make human resources or teaching staff truly selected and compete openly.

Based on preliminary observations, researchers found data that at Private Junior High School of Nahdlatul Ulama Medan, the recruitment of teaching staff is still not widely open, so that not many prospective teachers apply to then be selected to become professional prospective teachers in accordance with the specialization of the field of study that has been taught, recruiting prospective teachers who do not have an educational background, compensation that is not in accordance with the services provided by teachers to the madrasah, such as the low salary or wages received by teachers, lack of development of teacher competence, such as the lack of training provided by the madrasah to teachers and lack of teacher discipline, such as teacher lateness to class.

Human Resource Management

Management is the art of managing the process of utilizing human resources and other resources effectively and efficiently to achieve a certain goal. Management consists of six elements (6 M), namely: men, money, methods, materials, machines, and markets.

A resource is anything that is an asset for an organization or society to achieve its goals. Resources owned by an organization can be categorized into four types: financial, physical, human, and technological capabilities. It is important to know this to be able to distinguish with the same meaning as the meaning of human resource management, namely personnel administration or personnel management.

Mulyati argues that to obtain qualified teachers in a school, it is very necessary to have a principal who must at least be able to function as an educator, manager, administrator, supervisor, leader, innovator and motivator, abbreviated as EMASLIM (Mulyati, 2022). In carrying out his function as an educator, the principal has the right strategy to improve the professionalism of the education staff in his school. The function of the principal as an educator is to create a conducive school climate, provide advice to school residents, provide encouragement to education personnel and implement interesting learning models, such as team teaching, moving classes and holding acceleration programs for students who are intelligent above normal.

Principals as leaders must be able to provide guidance and supervision, increase the willingness and ability of education personnel, open two-way communication and delegate tasks. In order to carry out its role and function as an innovator, the principal needs to have the right strategy to establish harmonious relationships with the environment, seek new ideas, integrate every activity, provide examples to education personnel and develop innovative learning models. The principal's role as an innovator in improving the professionalism of education personnel will be reflected in the way he works constructively, creatively, delegative, integratively, rationally, objectively, pragmatically, exemplary, disciplined, adaptable, and flexible. As a motivator, the principal has the right strategy to motivate education personnel to carry out their various tasks and functions.

Human resource management is needed in the progress and maintenance of an organization, especially private schools, In this case teachers are very important in the continuity of learning and education in schools, and at the same time also as a measure of the success of a school in creating productive students and having superior competence. Schools with the above phenomenon are expected to be able to create a pattern of human resource management and teachers for schools, so that schools will not lose and will get teaching staff who are experts in their fields, have competence, and are professional in carrying out their duties and responsibilities as educators at school.



Teacher Competency

The process of teacher resource management needs special attention because basically teachers are one capital or one very valuable asset and become one of the initial benchmarks of the success of a school. So a teacher must at least have a competency component. Teacher competence is a set of competency mastery that includes teacher professionalism based on Law No. 14 of 2005 (Dewan Perwakilan Rakyat Indonesia, 2005), concerning teachers and lecturers. It can be seen from four competencies, namely: 1) pedagogic competence, 2) Personality competence, 3) Professional competence, 4) Social competence.

The term professional generally refers to someone who earns a wage or salary for what they do, whether they do it perfectly or not. In this context, what is meant by a professional is a teacher. Professional work is supported by a certain in-depth knowledge that can only be obtained from appropriate educational institutions so that its performance is based on its knowledge that can be scientifically accounted for.

Thus a teacher needs to have special abilities that cannot be possessed by people who are not teachers "A teacher is a person shared with the responsibility of helping others to learn and to behave in new and different ways".

Teacher professionalism is the ability of teachers to perform their main duties as educators and teachers, including the ability to plan, conduct, and evaluate learning. Professionals are jobs or activities carried out by a person that become a source of income that require expertise, proficiency or skills that meet certain quality standards or norms and require professional education.

Teachers are professional educators with the main task of educating, teaching, guiding, directing, training, assessing, and evaluating students in early childhood education through formal education, primary education, and secondary education. The position of teachers as professionals aims to implement the national education system and realize the goals of national education, namely the development of the potential of students to become human beings who believe and fear God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens.

A professional teacher is a teacher who knows about himself, namely that he is a person who is called to assist students in learning. Teachers are required to continuously find out how students should learn. So, if there is a failure by the learner, the teacher is called to find the cause and find a solution with the learner, not to silence him or blame him. The attitude that must always be cultivated is the willingness to recognize oneself and the will to purify one's teaching. Be willing to learn by taking the time to become a teacher. A teacher who is not willing to learn cannot be at home and proud to be a teacher. Feeling at home and proud to be a teacher is a step towards becoming a professional teacher.

Developing and improving the quality of teacher professionalism is not an easy issue. Therefore, teachers, the community and the government must work together and be committed to developing and improving the quality of teacher professionalism. This must be done on an ongoing basis, as teacher professionalism continues to evolve.

2. METHODS

The type of research used by the author is descriptive qualitative research. According to Faisal Abdulloh (2003), descriptive research is intended to explore and clarify a phenomenon or social statement, by describing variables related to the problem and unit under study. This research was conducted at the Private Junior High School of Nahdlatul Ulama which is located on Jalan H. A. Manaf Lubis (Gaperta Ujung), Medan Helvetia District, Medan City.

The determination of sampling in this case is to capture as much information as possible from a variety of sources, which aims to detail the specificity that exists in a unique context. According to Salim (2007), the existence of sampling is also intended to explore information that will form the basis of emerging designs and theories. Therefore, in qualitative research there are no random samples but purposive sampling.



Data collection in qualitative research is carried out directly by researchers through observation, interviews, and documentation review. In the process of collecting data for this study, researchers are really expected to be able to interact with the object that is the target of research. (Sarwono, 2006) states that the success of research is highly dependent on field data, so the accuracy, detail, completeness, and flexibility of recording information observed at the research location are very important. Data collection in qualitative research uses interviews, observations and documents (records or archives). In this study, data were obtained using observation techniques of social situations in the planning process activities, structured and unstructured interviews with school principals and other parties that may later be needed in obtaining data, and a review of documents obtained. Participant observation, interviews and document review support and complement each other in fulfilling the data needed for the research focus. The collected data were recorded in field notes.

The necessary data and information collected are then analyzed in order to find the meaning of the findings. Data analysis is the process of organizing and sorting data into patterns, categories and basic description units so that themes can be found and working hypotheses can be formulated as suggested by the data. Boglan and Biklend in (Salim, 2007) explain that data analysis is a process of systematically searching and organizing interview transcripts, field notes and other materials that have been collected to increase one's own understanding, allowing the findings to be reported to others. Data that has been organized into a pattern and made into categories. Then the data is processed using data analysis and the Miles and Huberman model, namely: 1) Data reduction. Data reduction aims to make it easier to draw conclusions about the data obtained during the research. It is a form of analysis that sharpens, reveals important things, classifies, directs, discards unnecessary information, and organizes data to make it more systematic so that a meaningful conclusion can be drawn. The reduced data can provide a sharp picture of the implementation of strategic planning in improving the quality of education. 2) Data Presentation. A presentation of data is a set of arranged information that allows conclusions to be drawn and actions to be taken. It is carried out after the reduction process. With the presentation of data about the object under study, researchers can understand what is happening in the research scene regarding the implementation of strategic planning in improving the quality of education and what researchers will do to anticipate it. 3) Drawing Conclusions. Data is collected from the research location through interviews, observations and documents. Then the next process is the verification conclusion drawing. Conclusions in the first stage are loose, remain open and unclear then increase to become more detailed and root more firmly as the data increases so that the conclusion becomes a complete configuration. The final conclusion will be obtained as the data increases so that the conclusion becomes a complete configuration.

To strengthen the validity of the data from the findings and to maintain the validity of the research, the researcher refers to the four validation standards suggested by Lincoln and Guba, which consist of: 1) Transferability 2, Dependability, 3. Confirmability.

3. RESULTS AND DISCUSSION

The description of the results of this research is based on answers to research questions obtained through interviews with data sources and direct observations in the field. Among the questions in this study are four things, namely: (1) the process of teacher recruitment carried out by the Head of Private Junior High School of Nahdlatul Ulama Medan, (2) the process of teacher selection carried out by the Head of Private Junior High School of Nahdlatul Ulama Medan, (3) the implementation of teacher competency development carried out by the Head of Private Junior High School of Nahdlatul Ulama Medan.

To calculate the value of HRM implementation and teacher competence, it is calculated using the following formula:

$$Score = \frac{Total\ of\ observation}{Total\ of\ observation\ items} \dots\dots\dots (Piet, 2010)$$

No	Assesment Criteria	Category
----	--------------------	----------



1.	A= 81-100 %	Very high
2.	B=61-80 %	High
3.	C=41-60 %	Fair
4.	D=21-40 %	Low
5.	E=0-20 %	Very low

Description:

$$\frac{\text{Total of observation}}{\text{Total of observation items}} = 47/80 \times 100\% = 58,75 \%$$

Category = Fair

Based on the table above, it is known that the results of observations of the relationship between the implementation of Human Resource Management and improving teacher competence are 58.5% This means that the level of understanding among school residents of the importance of implementing teacher resource management is still in the Sufficient category.

Based on the data description and research findings, the discussion of this research is intended to provide an explanation and conformity of the research results with the theory used. This discussion can be described as:

1. The teacher recruitment process was carried out by the Head of Private Junior High School at Nahdlatul Ulama Medan.

The recruitment process that occurs at SMP Swasta Nahdlatul Ulama Medan occurs in a closed manner. This is due to the limited funds needed to recruit prospective teaching staff. The recruitment process carried out by the Private Junior High School of Nahdlatul Ulama Medan is still family-oriented in nature.

In conducting the recruitment process of teaching staff, the principal informs the teachers and friends, as well as family and the results will also be discussed together with the teachers and the head of the foundation. The principal also provides information in the form of school needs and requirements submitted to applicants.

Recruitment is the process of seeking, finding, and attracting capable applicants for employment in and by an organization. The recruitment process begins when the step of seeking applicants is taken and ends when applicants submit applications. That is, it can be said that the step that immediately follows the recruitment process is a group of applicants.

According to Siagian, various techniques can be used as a source of recruitment, namely direct applicants, written applications, print media such as newspapers, magazines, and leaflets, audio such as radio, and audio-visual such as television (Siagian, 2007).

According to Irwan (2009), to be able to meet the required personnel, various methods can be used, such as: searching from within the school organization, proposals, through employment agencies, universities, and other recruitment sources (Nasution Irwan, 2009).

The school and head of school should be able to recruit prospective teaching staff openly and widely. The recruitment process has advantages if it is carried out widely. The recruitment process that is carried out widely in the community is expected to find many applicants who can later be selected to find the best results. Teachers who are the spearheads of the achievement of educational goals must be considered for their quality.

2. Implementation of teacher selection was carried out by the Head of Private Junior High School at Nahdlatul Ulama Medan.

With regard to the selection of teachers carried out by the head of the Private Junior High School of Nahdlatul Ulama Medan, it shows that the implementation of the selection of teaching staff in the madrasah carries out three stages, namely: (1) interview test, (2) file test in the form of curriculum vitae, application letter, and last diploma, and (3) placement of teachers according to their disciplines.



According to Siagian, the selection process can be carried out in several stages, namely: (1) receipt of application letters, (2) organizing examinations, (3) selection interviews, (4) checking the applicant's background and reference letters, (5) health evaluations, (6) interviews by managers who will be direct supervisors, (7) job introductions and (8) decisions on applications (Siagian, 2007).

The selection process carried out by the madrasah head is slightly different from the actual context. This is due to the small number of applicants who applied to become prospective teachers at the Private Junior High School of Nahdlatul Ulama Medan and the limited funds available to select prospective teachers.

Selection for the acceptance of teachers or employees should be carried out carefully, honestly and objectively so as to obtain qualified employees or teaching staff and their proper placement, so that coaching, development, control, and regulation of employees are relatively easy in achieving the desired goals.

3. Implementation of teacher competency development carried out by the Head of the Private Junior High School of Nahdlatul Ulama Medan

The development of teacher competence carried out by the head to the teachers is by providing various information in the form of seminars, workshops, and training held by educational institutions, such as those held by IAIN, UNUSU, UNIMED, the Ministry of Religion, the Regional Office and the Education Office every month.

The headmaster is unable to carry out the program set by the madrasah to carry out training activities for teachers at school due to a lack of funds and the irregular number of teachers caused by the entry and exit of teachers.

According to Apriliana and Nawangsari (2021), in order for the various benefits of training and development to be reaped as maximally as possible, various steps need to be taken. Training and development experts generally agree that the steps in question consist of seven steps, namely:

1. Determination of needs,
2. Determination of targets,
3. Determination of program content
4. Identification of learning principles,
5. Implementation of the program,
6. Identification of benefits, and
7. Assessment of program implementation.

According to Nasution Irwan (2009), various situations that promise a better future will be able to change and provide opportunities for teachers to be able to develop their careers, such as promotion periods and getting other facilities that make it easier to carry out their duties. One way to improve teacher competence and welfare is through certification.

To create qualified teachers, school principals should pay attention to the welfare of teachers and continuously provide guidance to teachers and provide input on class mastery, self-mastery, and mastery of the material being taught.

4. CONCLUSION

Based on the discussion of the problems related to the title "Implementation of Teacher Resource Management to Improve the Competence of Teachers at the Private Junior High School of Nahdlatul Ulama Medan which has been carried out in the previous discussion, the following conclusions can be drawn:

1. The recruitment process carried out by the Head of Private Junior High School at Nahdlatul Ulama Medan is still family-oriented in nature. In carrying out the recruitment process of teaching staff, the head of the madrasa informs the teachers and friends, as well as family and the results will also be discussed together with the teachers and the head of



- the foundation. The principal also provides information in the form of school needs and requirements submitted to applicants.
2. The teacher selection process carried out by the Head Private Junior High School of Nahdlatul Ulama Medan shows that the implementation of the selection of teaching staff in school carries out three stages, namely: (1) interview test, (2) file test in the form of curriculum vitae, application letter, and last diploma and (3) placement of teachers according to their disciplines.
 3. The implementation of teacher competency development carried out by the principal for the teachers involves providing various information in the form of seminars, workshops, and training held by educational institutions, such as those held by IAIN, UNUSU, UNIMED, the Ministry of Religion, the Regional Office and the Education Office every month.

REFERENCE

- Apriliana, S. D., & Nawangsari, E. R. (2021). Pelatihan dan pengembangan sumber daya manusia (sdm) berbasis kompetensi. *Forum Ekonomi*, 23(4), 804–812. <https://doi.org/10.30872/jfor.v23i4.10155>
- Faisal, A. (2003). *Manajemen Perbankan (Teknik Analisis Kinerja Keuangan Bank)*. UMM Press.
- Mulyati, A. (2022). Peran Kepala Sekolah Dalam Pendidikan. *Jurnal El-Idarah Manajemen Pendidikan Islam*, 8(2), 1–16. <https://journal.parahikma.ac.id/el-idarah>
- Nasution, I. A. S. (2009). *Manajemen Pengembangan Profesionalitas Guru*. Cita Pustaka Media.
- Piet, S. A. (2010). *Konsep Dasar & Teknik Supervisi Pendidikan, Dalam rangka Pengembangan Sumber Daya Manusia*. Rineka Cipta.
- Salim, S. (2007). *Metodologi Penelitian Kulaitatif*. Cita Pustaka Media.
- Sarwono, J. (2006). *Metode Penelitian Kuantitatif dan Kualitatif*. Graha Ilmu.
- Siagian, S. P. (2007). *Manajemen Sumber Daya Manusia*. Bumi Aksara.



ICT TRENDS IN EDUCATION: A BIBLIOMETRICS STUDY OF THE PAST TWENTY YEARS OF STUDIES

Fani Mardianti^{1*}, Winny Liliawati², Parlindungan Sinaga³, Wandu Wandu⁴
^{1,2,3,4}Department of physics education, Universitas Pendidikan Indonesia, Indonesia
*fani.mardianti1403@upi.edu

ABSTRACT

Technology is a major component in education. Therefore, it must be investigated in order to gather knowledge for additional study. 185 articles were assessed using the PRISMA approach in conjunction with VOS-Viewer via Scopus data collection. Analyzing the quantity of articles, countries, citations, journals, and research partnerships on ICT in education is how evaluation is done. Knowledge map analysis is another way to investigate co-occurrence mapping. According to the research findings, the number of articles published rises annually, with the UK having the highest number of published publications. The research with the most citations is "Affordances of ICT in Science Learning: Implications for an Integrated Pedagogy," the journal with the most publications is "International Journal of Science Education," and the most well-liked partnership is the work done in Germany and the United Kingdom. The author with the most citations is "Webb M.E." Additionally, cluster analysis indicates that there are five primary categories—computer science education, education, science education, teaching, and science learning—that are most closely related to one another. Teaching, education, and computer science education are hot subjects right now.

Keywords: Education, ICT, Science Learning

1. INTRODUCTION

The 21st century can be identified as an era dominated by advances in information and communication technology (ICT) (Wu et al., 2018). Rapid developments in this field have brought profound transformation to various aspects of human life. Communication that was once limited is now faster and more efficient, having a significant impact on the way we interact and share information. The internet, as the backbone of the digital revolution, has changed the paradigm in terms of access to information, learning, business and entertainment (Bryda & Costa, 2023). This phenomenon not only broadens global horizons, but also creates new opportunities and challenges that need to be overcome. Therefore, the 21st century can be considered an era that requires understanding and optimal use of information and communication technology so that society can develop sustainably amidst the dynamics of ever-changing times.

The significant impact of advances in information and communication technology (ICT) is clearly visible in the field of education. Changes in the traditional learning paradigm have become more dynamic and open thanks to the adoption of technology. Online learning platforms, educational applications and digital resources have provided wider access for pupils and students to obtain information and learn interactively (Noskova et al., 2021). Distance learning has become the norm, providing students with flexibility in time and place. Additionally, technology enables the integration of innovative learning methods, such as game-based learning, simulations, and augmented reality, which can increase student engagement (Adipat et al., 2021). Thus, advances in ICT have not only changed the way we access information, but have also redefined the way we understand and experience the learning process.

Technology has a very significant role in the world of education today. Its presence is not only a necessity, but also a driving force for the transformation of learning methods. One of the biggest contributions of technology in education is enabling access to distance learning. With the existence of online learning platforms, pupils and students can access study materials from anywhere, overcoming geographical limitations and providing extraordinary flexibility in the teaching and learning process. In this way, technology is not only a tool, but also a foundation for creating an educational environment that is inclusive and accessible to all groups. The use of information and communication technology (ICT) in the education sector is very important, especially during the



Covid-19 pandemic. In the face of situations that require physical restrictions and restrictions on face-to-face activities, educational institutions from school to university level are switching quickly to online learning solutions. Online platforms, video conferencing applications, and digital resources are the main means of maintaining the continuity of education without compromising the safety of students and teaching staff. Distance education via ICT is not only an alternative, but also a necessity to ensure the continuity of the learning process amidst the limitations caused by the pandemic. Thus, the role of ICT in education during the Covid-19 pandemic has proven that technology plays a very crucial role in maintaining the continuity and accessibility of education in these difficult times.

However, several studies highlight that the overall use of technology in the teaching and learning process is not completely effective, and is even considered wasteful (Ulkhay, 2021). Meriyanti and Jasmina (2022) revealed that the availability of ICT facilities in the household has a significant positive effect on the learning performance of junior high school students in Indonesia, however, the availability of ICT access in schools has no effect on student learning achievement. Even though technology makes a positive contribution by opening access to various information and facilitating distance learning, the main role of teachers is still very necessary in the success of education. Teachers are not only transmitters of information, but also as guides, motivators and managers of the learning environment. The teacher's ability to guide, provide in-depth understanding, and provide personal response and support to students, is a key element in forming solid understanding and sustainable skills. Therefore, along with the integration of technology, it needs to be understood that quality teachers remain the main pillar in creating an effective and meaningful learning experience for students.

Therefore, this article will review technology trends in education over the last ten years. The period marked a major shift in how we manage and deliver education. Over the past decade, technology has infiltrated every aspect of learning, from elementary to tertiary levels. Use of the device Educational tools, online platforms, and digital resources have become increasingly common as learning support tools. In addition, the concept of distance education and flexible learning models is increasingly developing, especially amidst events such as the global pandemic that encourage rapid adaptation to online learning solutions. Through this article, we can reflect on the significant changes that have occurred in educational paradigms due to technological advances and assess their impact on the learning experiences of current and future generations.

2. METHODS

This study used the PRISMA framework to review the existing literature. Following the PRISMA guidelines, the scoping process was employed to find the most relevant articles about ICT in education. This research used bibliometric analysis using R software and Vos-Viewer. Bibliometric analysis is carried out to identify technology trends over time. This research used the Scopus database with the keywords. The search was limited to articles that used "English". The document type used is an article. This data was taken at 11:34 on February 19th 2024. A total of 185 documents were processed and then interpreted according to their respective categories. To discover relevant material, the terms "ICT" AND "science education" OR "science learning" OR "physics learning" OR "physics education".

The duration of the literature search was set to cover the last decade (2002-2024) to ensure that current ICT was highlighted. Initially, 185 documents were displayed; however, this contained only research articles and reviews, Then, this study was limited to simply using English. The data was then exported to an Excel file so that the systematic review could begin.

3. RESULTS & DISCUSSION

The field of education is now one of those that is greatly impacted by the trend of information and communication technology's (ICT) rapid development. The learning process has changed as a result of this phenomena, which has also accelerated the growth of research into its implications, difficulties, and new prospects. The goal of this research's bibliometric analysis is to present a thorough picture of ICT trends in education throughout the previous 10 years. Using this methodology, we examined a range of research conducted



throughout that time, highlighting significant trends, contributing authors, cross-national partnerships, and publishing journals.

Annual trends

Over the last several years, research on ICT in education has been steadily increasing. The most significant decline occurred in 2018–2019. Conversely, the most notable decline occurred in 2011–2012. In 2023–2024, it remains to be seen whether public awareness of this research is increasing or decreasing. For this reason, the year 2024 is essentially the beginning of the batch data generation process. This can be seen by looking at **Figure 1** below.

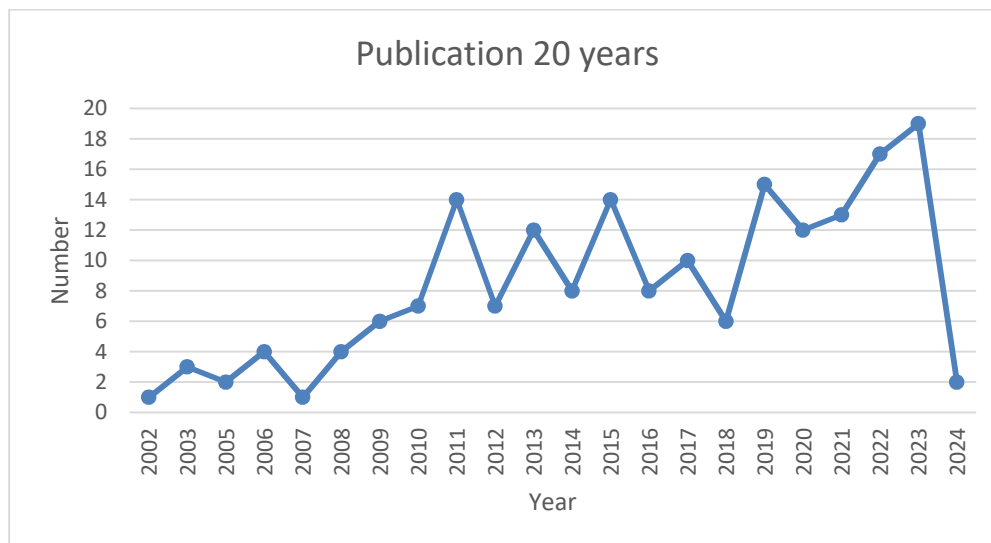


Figure 1. Distribution of Published Documents From 2002 to 2024

The significant increase in research publications in 2018-2019 reflects that research topics are very popular and urgent to research. This is supported by Indonesia's first participation in the computer-based PISA study in 2018. Based on the results of the 2018 PISA study, Indonesia experiences weaknesses in ICT (Putrawangsa and Hasanah, 2022). So, one of the recommendations given by the government is that optimizing information and communication technology (ICT) needs to be used for more effective learning. One form of optimization that can be done is not to use ICT excessively in education (Bhutoria & Aljabri, 2022).

Country

In the discipline of scientific publications, the state plays a major role. A nation's level of research activity can give insight into the popularity and importance of particular subjects in that nation's society. A topic's interest and significance in the academic and social spheres of a nation are more clearly indicated by the number of scientific publications on it. The state-imposed intellectual breakthroughs and research agendas that are deemed essential to the advancement of science and technology are reflected in scientific publications.

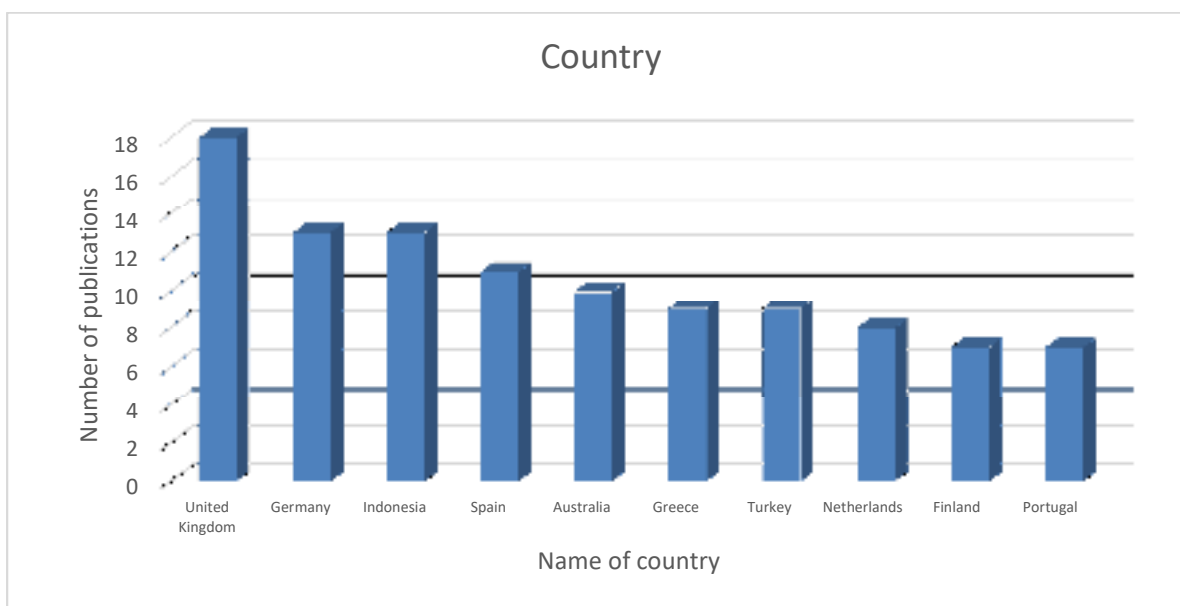


Figure 2. Distribution of Published Documents Among Top 10 Countries

The topic of ICT in Education is dominated by the United Kingdom. The UK's leadership in integrating ICT in educational contexts is reflected in the number of research and scientific publications originating from the country. This is in line with research conducted by González-Zamar et al., (2020) regarding research on ICT management to encourage sustainable education in higher education.

Article the most cited

One common measure of a scientific article's quality is its number of citations by other scholars. When assessing the effect and relevance of research within the scientific community, citation count is a crucial metric to consider. A study's contribution and relevance to the advancement of the relevant field of knowledge are acknowledged to a greater extent when it is cited in more articles. When the writing and research process may contribute meaningfully and positively influence scientific advancement and general comprehension, it is considered to be of higher quality. As a result, a high citation count may be interpreted as an indication of the importance and caliber of a scientific publication.

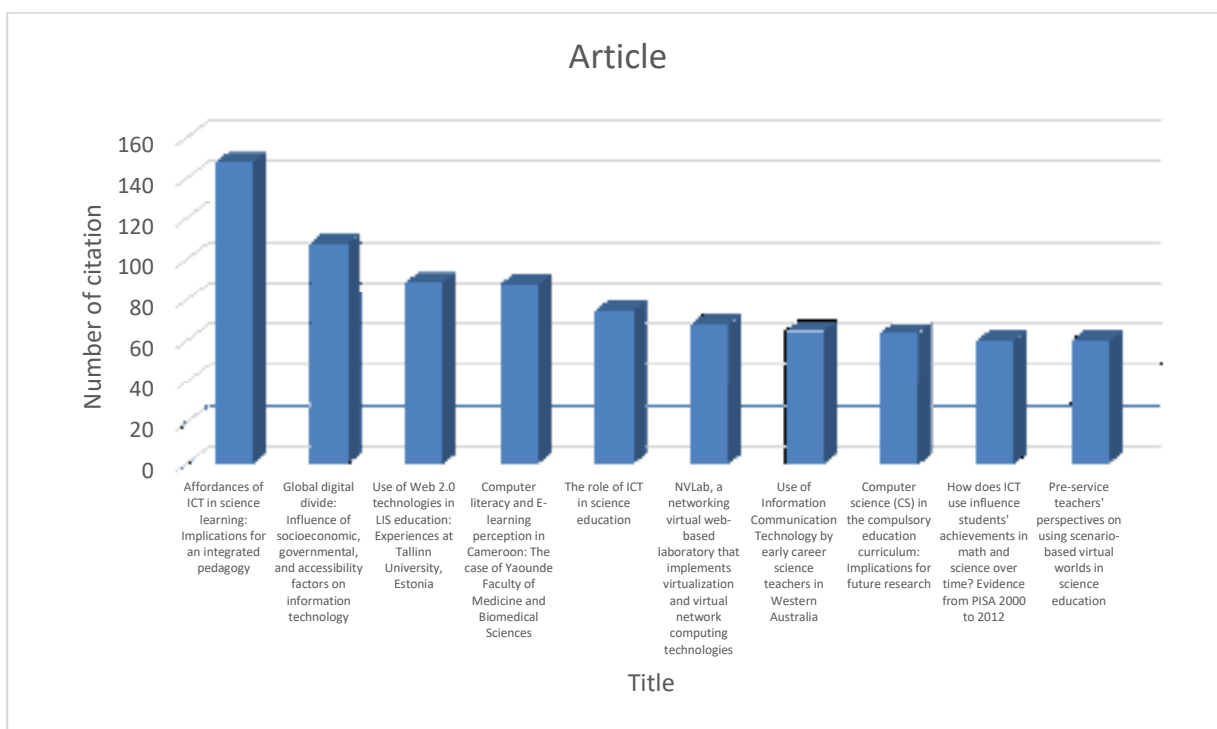


Figure 3. Most Cited Articles in The Last Ten Years

The article with the title "affordances of ICT in science learning: implications for an integrated pedagogy" is the most cited article. This article was published in 2005 and published by the "International Journal of Science Education". This article analyzes how the affordances of ICT-rich environments identified from a literature review support students in learning science at school (Webb*, 2005)

Journal

The journal that publishes the most about ICT is the "International Journal of Science Education". This journal publishes a significant amount about ICT compared to other journals. This journal covers science research, STEM, and the integration of science education with other scientific disciplines. This journal is in the Q1 quartile with the highest percentile of 84%.

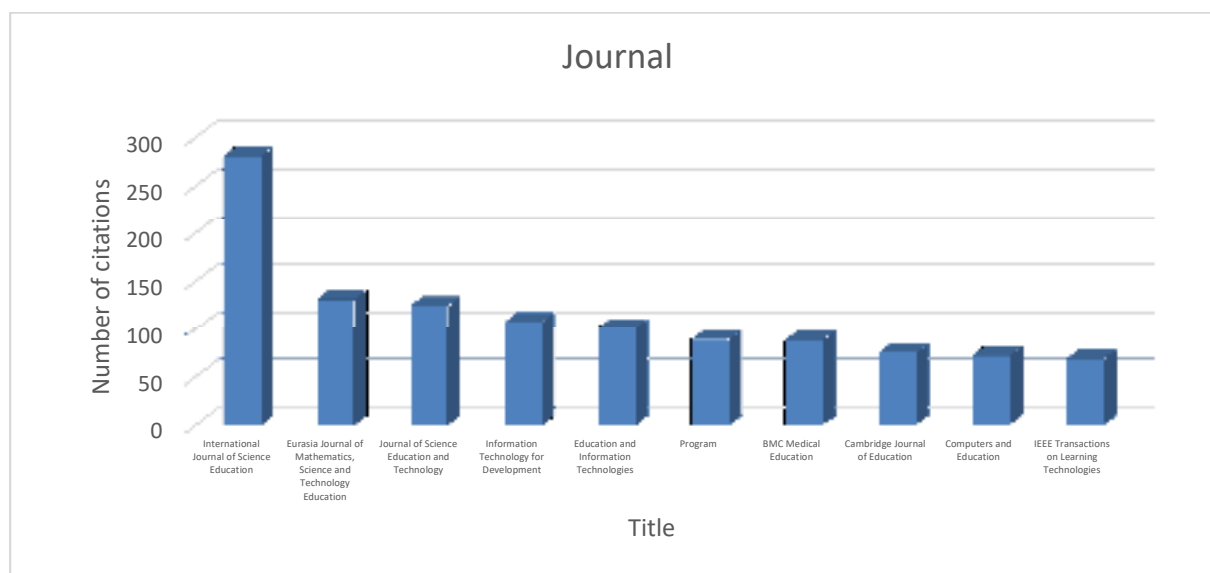


Figure 4. Journal Distribution of Published Records

Collaboration between countries

International research collaboration is one of the keystones supporting the advancement and long-term viability of science. Studying with participants from different nations broadens the range of viewpoints and improves the methods and insights employed. Collaboration between nations makes it possible for various groups of scholars with various academic and cultural backgrounds to share ideas, knowledge, and expertise. This improves study quality and fosters a more thorough comprehension of intricate global concerns. Cooperation among nations also makes it possible to divide the workload, speed up research, and make the most of the resources at hand. Cross-border cooperation so becomes a crucial foundation for improving science and attaining more comprehensive problem solving.

Table 1. Collaboration Between Countries on The Topic of ICT in Education

From	To	Frequency
GERMANY	UNITED KINGDOM	3
GERMANY	AUSTRIA	2
GERMANY	GREECE	2
GERMANY	ISRAEL	2
PORTUGAL	BRAZIL	2
AUSTRALIA	DENMARK	1
AUSTRALIA	SINGAPORE	1
AUSTRIA	ISRAEL	1
AUSTRIA	NORWAY	1
CANADA	RWANDA	1

Based on table 1, collaboration between countries is dominated by Germany and the United Kingdom with a frequency of 3. This means that collaboration between the two countries has occurred three times in ICT research in education. The results of this study are in line with Lee et al., (2019) which states that collaboration between these countries is also known through patent documents: The case of information and communication technology.



Most relevant author

Writing for academic audiences requires writers or authors to plan, produce, and deliver their work in the form of articles, papers, or other scientific publications. A publication's list of authors identifies the people or teams that worked on developing concepts, carrying out investigations, or gathering data.

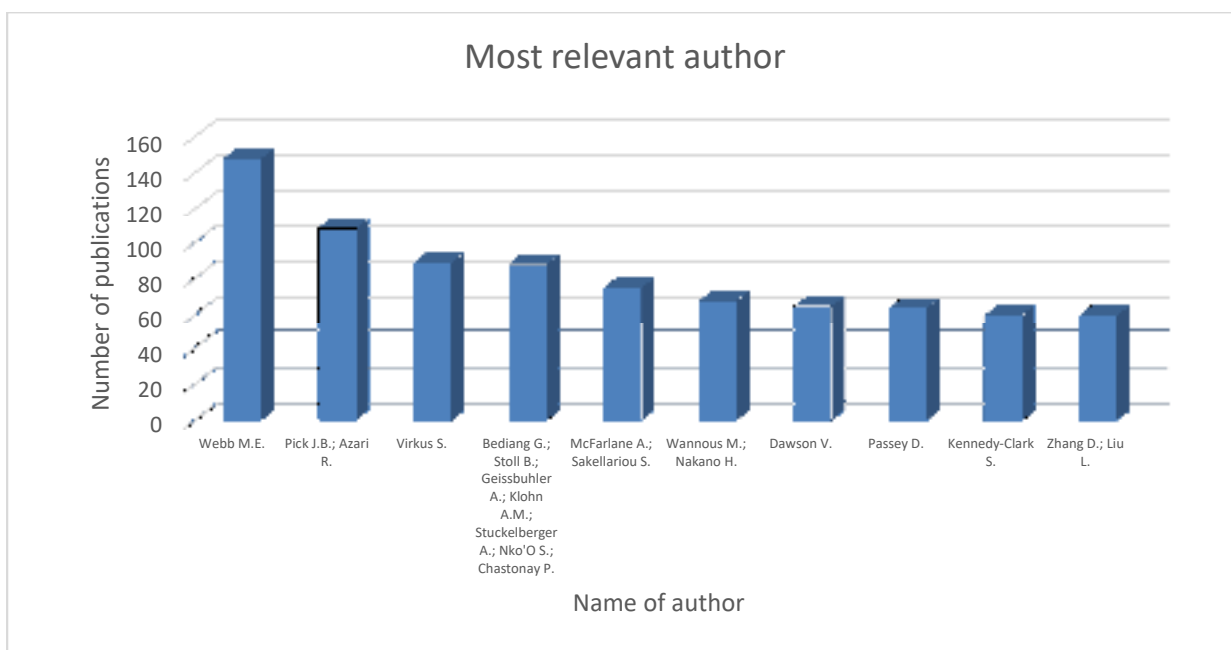


Figure 5. Authors Who Contribute to ICT Research in Education

Webb M.E is the author who has published the most on ICT topics in the field of education. He is also the author of one of the most cited articles on this topic.

Analysis cluster

In VOS Viewer, the term "cluster analysis" is a technique for classifying or clustering things according to connectedness or resemblance patterns inside a network. Cluster analysis aids in locating and visualizing groups or clusters of these elements in the context of VOS Viewer, which is frequently used to examine links between articles or keywords in scientific literature. Element similarity or high association is grouped together into a group in VOS Viewer's cluster analysis method. Researchers can find clusters of related concepts or research foci by using these clusters, which can reflect certain themes or topics in the literature.

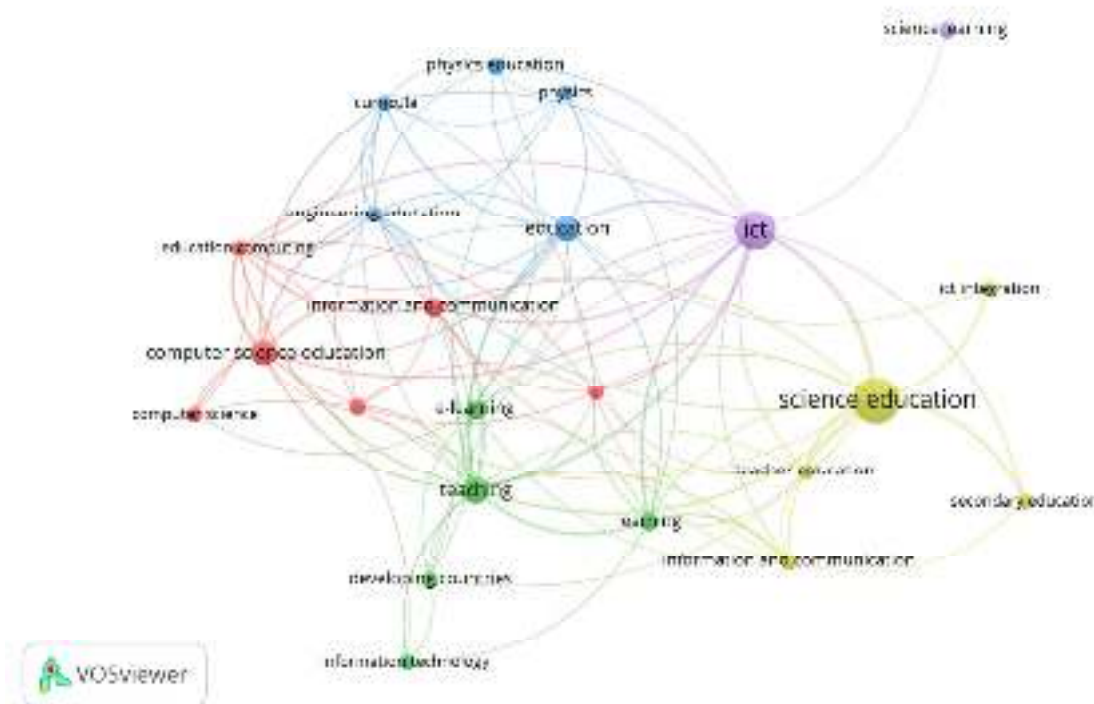


Figure 6. Cluster Analysis Using Vos-Viewer

Based on the figure above, it can be seen that there are five clusters. The five clusters are depicted in purple, yellow, green, red and blue. Computer science education, education, science education, teaching, and science learning that are most closely related to one another. Teaching, education, and computer science education are hot subjects right now.

4. CONCLUSION

Technology plays a pivotal role in the field of education, necessitating comprehensive investigation to accumulate knowledge for further study. To achieve this, 185 articles were meticulously assessed using the PRISMA approach in conjunction with VOS-Viewer through Scopus data collection. The evaluation process involved analyzing the quantity of articles, nations involved, citations, journals, and research partnerships, specifically focusing on digital assessment in education. Co-occurrence mapping through knowledge map analysis was employed as an additional method of investigation. The research findings revealed an annual increase in the number of published articles, with the United Kingdom emerging as the leader in terms of the highest number of publications. The research article titled "Affordances of ICT in science learning: Implications for an integrated pedagogy" garnered the most citations. The "International Journal of Science Education" stood out as the journal with the highest number of publications, and the most notable research partnership was identified between Germany and the United Kingdom. Notably, "Webb M.E." emerged as the author with the most citations. Furthermore, cluster analysis illuminated five primary categories—computer science education, education, science education, teaching, and science learning—that exhibited strong interconnections. Currently, teaching, education, and computer science education are recognized as hot topics within this domain, reflecting the dynamic and evolving landscape of educational technology research.



REFERENCES

- Adipat, S., Laksana, K., Busayanon, K., Asawasowan, A., & Adipat, B. (2021). Engaging students in the learning process with Game-Based learning: The Fundamental Concepts. *International Journal of Technology in Education*, 4(3), 542-552.
- Bhutoria, A., & Aljabri, N. (2022). Patterns of cognitive returns to information and communication technology (ICT) use of 15-year-olds: Global evidence from a hierarchical linear modeling approach using PISA 2018. *Computers & Education*, 181, 104447.
- Bryda, G., & Costa, A. P. (2023). *Qualitative research in digital era: innovations, methodologies and collaborations*. *Social Sciences*, 12(10), 570.
- González-Zamar, M. D., Abad-Segura, E., López-Meneses, E., & Gómez-Galán, J. (2020). *Managing ICT for sustainable education: Research analysis in the context of higher education*. *Sustainability*, 12(19), 8254.
- Lee, C., Kogler, D. F., & Lee, D. (2019). Capturing information on technology convergence, international collaboration, and knowledge flow from patent documents: A case of information and communication technology. *Information Processing & Management*, 56(4), 1576-1591.
- Meriyanti, M., & Jasmina, T. (2022). Access of information, communication, and technology (ICT) and learning performance of junior high school students in Indonesia: Analysis at the District Level. *Jurnal Perencanaan Pembangunan: The Indonesian Journal of Development Planning*, 6(3), 304-326.
- Noskova, T., Pavlova, T., & Yakovleva, O. (2021). A study of students' preferences in the information resources of the digital learning environment. *Journal on Efficiency and Responsibility in Education and Science*, 14(1), 53-65.
- Putrawangsa, S., & Hasanah, U. (2022). Analisis capaian siswa Indonesia pada PISA dan urgensi kurikulum berorientasi literasi dan numerasi. *EDUPEDIKA: Jurnal Studi Pendidikan Dan Pembelajaran*, 1(1), 1-12.
- Ulkhaq, M. M. (2021). Efficiency analysis of Indonesian schools: A stochastic frontier analysis using OECD PISA 2018 data. In *2nd International Conference on Industrial Engineering and Operations Management Asia Pacific Conference*, Surakarta, Indonesia.
- Webb*, M. E. (2005). Affordances of ICT in science learning: implications for an integrated pedagogy. *International journal of science education*, 27(6), 705-735.
- Wu, J., Guo, S., Huang, H., Liu, W., & Xiang, Y. (2018). Information and communications technologies for sustainable development goals: state-of-the-art, needs and perspectives. *IEEE Communications Surveys & Tutorials*, 20(3), 2389-2406.



COMMUNICATION SKILL ENHANCEMENT AND MATHEMATICAL REASONING MADRASAH ALIYAH STUDENTS BY MODEL TYPE COOPERATIVE LEARNING GAMES TEAMS TOURNAMENT

Nur Ainun^{1*}, Kahirul Asri², Cut Nurul Fahmi³, Monadia Liiman⁴, and
Dinda Ayu Sapitri Saragih⁵
^{1,2,3,4,5}Universitas Serambi Mekkah, Indonesia
*nurainun@serambimekkah.ac.id

ABSTRACT

Communication skills and mathematical reasoning are two of the objectives study of mathematics. Communication is defined as the ability to write, read, listen, examine, interpret, and evaluate ideas, symbols, terms, and mathematical information. Mathematical reasoning is a habit that when the brain is well developed and consistent will facilitate the mathematical communication both written and oral. Therefore, the necessary relevant learning model is needed to optimize, improve, and develop the communication and mathematical reasoning abilities of students. One of the learning model is a cooperative learning model called Teams Games Tournament (TGT). The aim of this study is to determine: (1) the increase in communication and mathematical reasoning abilities that students acquire with cooperative learning model TGT better than students who receive conventional learning approaches, and (2) the attitude of students towards learning mathematics with cooperative learning model TGT. This research is an experimental research design with a pretest-posttest control group design. The populations in this study were all students of class XI MAN 2 Aceh Besar, which consists of five classes. While the sample is composed of two classes of experimental classes and control classes were taken by random sampling. The instruments used to obtain research data communications test and mathematical reasoning ability, and attitude scale questionnaire. The statistical test used for analyzing data to increase communication skills and mathematical reasoning is two lanes ANOVA test, while the attitude scale questionnaire is calculated based on a percentage. The results showed that overall improvement in communication and mathematical reasoning abilities that students acquire learning with the cooperative learning model Teams Games Tournament better than students who received study with conventional approaches. The results of student questionnaire concluded that, in general the students have a positive attitude towards learning mathematics using the cooperative learning model TGT.

Keywords: Learning TGT, Communication, Reasoning.

1. INTRODUCTION

In achieving a good quality of education, National Education Standards Agency (Kurniati et al., 2019) stipulates that students from the start of primary school should be equipped with the ability to think logically, analytically, systematically, critically, creatively, and the ability to work together. In addition, the National Council of Teachers of Mathematics (Kurniati et al., 2019) argues that there are five standard processes for students to acquire and using mathematical knowledge: solving problems (*problem solving*), reasoning and proof (*reasoning and proof*), communication (*communication*), connection (*connection*), and representation (*representation*).

Based on the above opinion, it is necessary to develop students' thinking and reasoning in mathematics learning for personal development of students in the future. Through the study of mathematics, thinking students are expected to develop well as mathematical structure and strong and clear linkages between existing concepts that allow can improve reasoning skills. In addition to the ability of mathematical reasoning, mathematical communication skills students need to be developed. Communication in mathematics learning into something in dispensable. According to Afgani (2019), "Communication mathematics (mathematical communication) is defined as the ability to write, read, listen, examine, interpret, and evaluate ideas, symbols, terms, and mathematical information. Students are expected to have the ability to support communication in the classroom



and social activities outside the classroom". (D. Afgani, 2019) also stated that when students understand what is being learned through the activities of thinking, responding to, and discussed in math class, they actually have to use communication skills.

Communication skills and mathematical reasoning is a major part of the learning objectives to be achieved in mathematics. This is in accordance with the Ministerial Regulation No. 20 of 2006 (Wijaya, 2012) about the content standards, stated that the aim of mathematics learning so that students have the following capabilities:

1. Understand the concepts of mathematics, explains the relationship between concepts and apply concepts or algorithms, are flexible, accurate, efficient, and precise, in solving the problem.
2. Using the pattern and nature of the reasoning, mathematical manipulation in making generalizations, compile evidence, or explain ideas and mathematical statements.
3. Solve problems that include the ability to understand the problem, devised a mathematical model, solve the model and interpret the obtained solution.
4. Communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem.
5. Have respect for the usefulness of mathematics in life, namely curiosity, attention, and interest in studying mathematics, tenacious attitude and confidence in solving problems.

Communication skills and mathematical reasoning is an aspect that is very important and essential. (Wahyuni, 2020) says that the aspects of communication and reasoning should be an important aspect in the study of mathematics. Mathematical reasoning is a habit that when the brain is well developed and consistently will make it easier to communicate mathematics both written and oral. Expressing ideas and mathematical ideas is not easy, because there require accuracy and good reasoning power.

This is now implemented is still a lot of learning that uses conventional teaching and learning model which only emphasizes the immediate ends of the curriculum so that in practice the students are passive in the learning process. The involvement of the students tend to be minimized, resulting in communication and mathematical reasoning abilities of students are less well developed.

Relevant models needed to optimize, improve, and develop communication and mathematical reasoning abilities of students. One way to improve the lack of communication and students 'mathematical reasoning is to use a model that is more supportive of learning activities of students in understanding the material and deemphasize the student splay an active role in learning so as to improve students' communication and mathematical reasoning (Faroh, 2011). Effective learning model and is expected to improve communication skills and mathematical reasoning student is cooperative learning model, because there is a cooperative learning model or syntax elements that require students to work together, discussions and group presentations.

Learning Teams Games-Tournament (TGT) is considered as one type of cooperative learning that can motivate students to improve communication skills and mathematical reasoning. Where cooperative learning model Teams Games-Tournament (TGT) has five main components, namely a class presentation, team, game, tournament, and team recognition requires students to work in small groups. Therefore, in an effort to improve communication skills and mathematical reasoning students, cooperative learning model Teams Games Tournament (TGT) is expected to increase the involvement of the student so that they can construct their own knowledge in learning.

(Purnamasari, 2014) to report that an increase in the ability of reasoning and mathematical connections of students who take cooperative learning Teams Games-Tournament (TGT) is better than that following the direct learning, and (Slavin, 1995) also reported that mathematical communication skills of students who take cooperative learning Teams Games-Tournament (TGT) is better than that following the usual learning.

Cooperative learning model Teams Games-Tournament (TGT) it is possible to improve mathematics learning outcomes in the subject matter of statistics that have many diverse problems. The subject matter of statistical have systematic formulas to solve the problems that required a lot of practice using questions that varied so that students gain a better mastery of the material (Rahmat, 2019). With the provision in question in every component of IGT, both given in classical delivered teacher in the classroom and given presentations in groups by using games, students can practice the questions that more and varied in a fun way so that students do not feel



bored and remain viable in the course. Expected with cooperative learning model Teams Games Tournament (TGT), students can obtain a better mastery of the material, so that a better mastery of the material, student learning outcomes will be better.

There are several previous studies that have been done with the cooperative learning model Team Games Tournament (TGT). One is research (Purnamasari, 2014) shows the influence Effect of Cooperative Learning Model Team Games Tournament (TGT) Against Independence Learning and Capacity Building Mathematical Reasoning and Connections Students SMPN 1 Tasikmalaya. Furthermore, the research (Muharom, 2014) conclusion that the effort to improve communication and mathematical reasoning abilities of learners, application of learning models of type Student Teams Achievement Division (STAD) is expected to increase active learners so that they can construct their own knowledge in learning. While previous studies based on gender, one of them in research (Meltzer, 2002) shows the influence of reasoning and communication capabilities to the ability to solve math word problems subject matter set.

2. METHODS

This study used an experimental method with a quantitative approach. There are two groups of samples in this research that the experimental group doing mathematics learning through cooperative learning model TGT and the control group did conventional learning. Both groups were given a pre-test and post-test, using an equivalent test instruments.

The design used in this research is the design of "Pretest-Posttest Control Group Design"(Sugiono, 2014) with a design as shown in Table 3.1 below:

Table 1. Research Design

Groups	Pretest	Treatment	Posttest
Experiment	O	X	O
Control	O		O

Description O: pretest and posttest

X: Learning mathematics with cooperative models TGT

The population in this study were all students of class XI MAN 2 Aceh Besar regency. While the study sample was taken two classes of random sampling of the entire class XI experimental class (XI IPA₁) and the control class (XI IPA₂). Classroom learning experiments conducted with cooperative models TGT, while the other class as a class learning control is done by means of conventional learning.

Test instrument used to measure the ability of communication and mathematical reasoning in this study a set of questions that shape description. Tests communication skills and mathematical reasoning was developed by researchers from the material statistics the first step in devising tests conducted by researchers is to make the lattice about new then continued preparing the questions and answer keys and determine a score for each item. Before use, the instrument validated test first to determine the content validity and face validity. Validation of instruments carried by four men validator which consists of one lecturer of Mathematics Studies Program Faculty and Teaching MT IAIN Ar-Raniry two teachers of mathematics that teachers MAN Darussalam Tungkop Aceh Besar and Banda Aceh office MAN teacher and one colleague. Tests that have been validated and then tested empirically on SMA Negeri 2 Banda Aceh which does not include the study sample. The trial was conducted to determine the level of reliability, validity, and the level of difficulty distinguishing.

Attitude scale questionnaire is given to know the percentage of students' attitudes towards learning mathematics using cooperative learning model TGT. The criteria used in the attitude scale was strongly agree, agree, disagree end strongly disagree, without a neutral choice. This is intended to avoid being hesitant students to choose a statement filed. Given to the student attitude scale experimental class after carrying out final tests.

Test data communication and mathematical reasoning abilities of students learning model cooperative type TGT and conventional learning, analyzed by comparing pretest and posttest scores. Testing was conducted to



gain normalized score data communication skills and mathematical reasoning. The statistical test used level test with the test criteria is received H_0 if sig. Based Mean > significance level ($\alpha = 0.05$). Test two average difference for the data normalized gain scores in both classes. If the average score gain normal distribution and homogeneous, the statistical test used was t-test. Questionnaire used measure student attitudes. Data results of the questionnaire were analyzed using descriptive statistics such as the average score of each question.

3. RESULTS & DISCUSSION

In accordance with the formulation of the problem, then the results of this study describes about the ability of communication and mathematical reasoning, as well as a questionnaire scale of students' attitudes toward cooperative learning model TGT. Increasing students' mathematical abilities can be seen in the results table test average difference communication and mathematical reasoning abilities are shown in the table below.

Table 1. Test Results N-Gain Difference Mathematical Communication Capabilities

Class	t-test	Sig. (2-tailed)	Sig. (1-tailed)	Conclusion
Experiment	1,723	0,090	0,045	H_0 rejected
Control				

Based on Table 1 was obtained sig (2-tailed) = 0.045. Until sig. (1-tailed) = $0.090 / 2 = 0.045 < 0.05$, which indicates that H_0 is rejected. It can be concluded increase students' mathematical communication skills experimental class better than student grade students' mathematical communication skills are reviewed based on the student's overall control.

Table 2. Test Results N-Gain Difference Mathematical Reasoning Ability

Class	t-test	Sig. (2-tailed)	Sig. (1-tailed)	Conclusion
Experiment	-0,079	0,037	0,0035	H_0 rejected
Control				

Based on Table 1 was obtained sig (2-tailed) = 0.0035. So sig. (1-tailed) = $0.037/2 = 0.0035 < 0.05$, which indicates that H_0 is rejected. It can be concluded in crease students' mathematical reasoning abilities experimental class better than student grade students' mathematical reasoning abilities are reviewed based on the student's overall control.

To class if the students are taken based on the value of N-Gain obtained student. Grouping students are divided into three: high, medium, low. To see the differences increase communication and mathematical reasoning abilities of students in the high group with the experimental class (high, medium, low) control class difference test. The result of differences in the N-Gain is presented in the table below:

Table 3. Results of Student Communication Ability Test Group Differences High

Class	Sub Group	t-test	Sig.(2-tailed)	Sig.(1-tailed)	Conclusion
Experiment	high	2,937	0,010	0,005	H_0 rejected
Control	high				
Experiment	high	16,098	0,000	0,000	H_0 rejected
Control	medium				
Experiment	high	32,256	0,000	0,000	H_0 rejected
Control	low				



Based on Table3 obtained sig. < 0.05 . So it can be concluded that the increase in students' mathematical communication skills high grade experimental group is better than control class.

Table 4. Results of Test of Reasoning Ability Students Group Differences High

Class	Sub Group	t-test	Sig.(2-tailed)	Sig.(1-tailed)	Conclusion
Experiment	high	0,197	0,046	0,023	H_0 rejected
Control	high				
Experiment	high	17,288	0,000	0,000	H_0 rejected
Control	medium				
Experiment	high	12,343	0,000	0,000	H_0 rejected
Control	low				

Based on Table 4 obtained sig. < 0.05 . So it can be concluded that the increase in mathematical reasoning ability in the experimental group students high grade better than the control class.

Table 5. Test Results Student Communication Ability Difference Medium Group

Class	Sub Group	t-test	Sig. (2-tailed)	Sig.(1-tailed)	Conclusion
Experiment	high	-12,027	0,000	0,000	H_0 rejected
Control	high				
Experiment	high	2,921	0,007	0,0035	H_0 rejected
Control	medium				
Experiment	high	17,741	0,000	0,000	H_0 rejected
Control	low				

Based on Table 5 obtained sig. < 0.05 . So that can be concluded that the increase in students' mathematical communication skills class experimental group were better than control class.

Table 6. Results of Test of Reasoning Ability Students Difference Medium Group

Class	Sub Group	t-test	Sig.(2-tailed)	Sig.(1-tailed)	Conclusion
Experiment	high	-17,122	0,000	0,000	H_0 rejected
Control	high				
Experiment	high	0,692	0,045	0,0225	H_0 rejected
Control	medium				
Experiment	high	6,970	0,002	0,001	H_0 rejected
Control	low				

Based on Table 6 obtained sig. < 0.05 . So that can be concluded that the increase in students' mathematical reasoning abilities experimental class groups are better than control class.

Table 7. Test Results Student Group Communication Ability difference Low

Class	Sub Group	t-test	Sig.(2-tailed)	Sig. (1-tailed)	Conclusion
Experiment	low	-48,259	0,000	0,000	H_0 rejected
Control	high				



Experiment	low	-14,530	0,000	0,000	H_0 rejected
Control	medium				
Experiment	low	1,191	0,255	0,0515	H_0 rejected
Control	low				

Based on Table 7 obtained sig. < 0.05. So that can be concluded that the increase in mathematical communication skills in low- grade experimental group students better than control class.

Table 8. Results of Test of Reasoning Ability Students Group Differences Low

Class	Sub Group	t-test	Sig.(2-tailed)	Sig.(1-tailed)	Conclusion
Experiment	Low	-21.252	0,000	0,000	H_0 rejected
Control	High				
Experiment	Low	-11,428	0,000	0,000	H_0 rejected
Control	Medium				
Experiment	Low	-0,781	0,047	0,0335	H_0 accepted
Control	Low				

Based on Table 8 obtained sig. < 0.05. So that can be concluded that the increase in mathematical reasoning ability in low-grade experimental group students better than control class.

To see the results of a questionnaire based on the attitude scale large percentage of indicators statement to the interpretation aspects explored in the experimental class students can be seen in the table below:

Table 9. Students Demonstrate Passions Attitude Towards Mathematics

Indicator	Number and nature	Statement	Number	Frequency and Percentage (%)			
				SS	S	TS	STS
Complete the tasks assigned	10Negative	I am grateful if there is a friend who will complete the tasks assigned	Frequency	7	2	4	17
			Percentage	23,3%	6,7%	13,3%	56,7%
				30%		70%	
	16 Positive	For me complete the task on time is a certain satisfaction	Frequency	14	12	4	0
			Percentage	46,7%	40,0%	13,3%	0,0%
				86,7%		13,3%	
Likes math has been taught	2Positive	Learning mathematics is taught by a teacher can give me the freedom to think	Frequency	7	20	3	0
			Percentage	23,3%	66,7%	10,0%	0,0%
				90%		10%	
	5Negative	I try to avoid math when taught by teachers who do not give a motivation	Frequency	0	4	10	16
			Percentage	0,0%	13,3%	33,3%	53,4%
				13,3%		86,7%	

Based on Table 9 can be seen, almost half (30%) of students grateful if someone is willing to complete the assigned task, and most (70%) students are not grateful if someone is willing to complete the assigned task. In general (86.7%) students completed the task on time is ascertains at is faction and a small portion (13.3%) of



students do not complete the task on time is ascertains at is faction. So in general (78.35%) students have positive attitudes complete the assigned task.

Generally (90.0%) of learning mathematics taught by teachers can give students the freedom to think and a fraction (10%) of learning mathematics is taught by teachers cannot give students the freedom to think. A small portion (13.3%) of students try to avoid math when taught by teachers not provide motivation and in general (86.7%) of students try to avoid math when taught by teachers provide motivation. So, in general (88.35%) students have a positive outlook like math has been taught. In conclusion, in general (83.35%) students have a positive attitude showing liking for math.

Table 10. Attitudes Students Demonstrate Approval of The Use Fulness of Mathematics

Indicator	Number and nature	Statement	Number	Frequency and Percentage (%)			
				SS	S	TS	STS
Mathematics can help solve every day problems	1 Positive	Learn math can help me in solving everyday day problems	Frequency	14	14	2	0
			Percentage	46,7%	46,7%	6,6%	0,0%
				93,4%		6,6%	
	4 Negative	Learning mathematics in school was useless because it cannot be applied in everyday day life	Frequency	1	4	15	10
			Percentage	3,3%	13,4%	50%	33,3%
				16,7%		88,3%	
Resolving mathematics in various ways	6 Positive	By studying mathematics can help me in resolving the problems that exist in other subjects	Frequency	13	14	3	0
			Percentage	43,3%	46,7%	10,%	0,0%
				90%		10%	
	3 Negative	By studying mathematics can help me in completing my thinking about math ability is limited to that exemplified by the existing problems of teachers in other subjects	Frequency	5	4	2	19
			Percentage	16,7%	13,3%	6,7%	63,3%
				30%		70%	

Based on Table 10 it can be seen, in general (93.4%) can help students learn math in solving everyday problems and a small portion (6.6%) studied mathematics cannot assist students in solving everyday problems. While a small proportion (16.7%) of students studying mathematics at school was useless because it cannot be applied in everyday life and in general (88.3%) of students studying mathematics in the school does not seem futile because it can be applied in daily life. So in general (90.85%) students have a positive attitude can help solve problems math every day.

Generally (90.0%) of students to learn mathematics can help students in solving problems that exist in other subjects and a small proportion (10%) of students to learn mathematics cannot assist students in resolving the problems that exist in other subjects. While nearly half (30.0%) students 'ability to think about mathematics is



limited to that exemplified by the teacher and the majority (70%) students' ability to think about mathematics is not limited to that exemplified by the teacher. So, in general (80.0%) students have a positive attitude completing mathematics in various ways. In conclusion, in general (85.43%) students have a positive attitude showing the approval of the use fullness of mathematics.

Table 11. Attitudes Students Demonstrate Approval of Use of Cooperative Learning Model TGT

Indicator	Number and nature	Statement	Number	Frequency and Percentage (%)			
				SS	S	TS	STS
Completing math lessons with various learning models	9 Positive	Learning with teacher taught TGT model can train my skills in solving math problems	Frequency	14	16	0	0
			Percentage	46,7%	53,3%	0,0%	0,0%
				100%		0%	
	12 Negative	Suppose I tend not to be allowed to follow the math using TGT model	Frequency	0	5	11	14
			Percentage	0,0%	16,6%	36,7%	46,7%
				16,6%		83,4%	
	13 Positive	I am grateful for following the math lessons that are taught by using TGT model	Frequency	11	19	0	0
			Percentage	36,7%	63,3%	0,0%	0,0%
				100%		0%	
	7 Positive	For me learning math using TGT model can help me to understand the math	Frequency	9	19	2	0
			Percentage	30,0%	63,3%	6,7%	0,0%
				93,3%		6,7%	
	17 Negative	Learning with TGT model made by the teacher made me hard in doing math problems	Frequency	2	3	19	6
			Percentage	6,7%	10,0%	63,3%	20,0%
				16,7%		83,3%	
	18 Negative	I feel there is no difference between learning model TGT learning model that teachers do during this	Frequency	2	5	17	6
			Percentage	6,7%	16,7%	56,6%	20,0%
				23,4%		77,6%	

Based on Table 11, it can be seen, all (100%) of learning with the teacher taught TGT model can train students 'ability in solving mathematical problems and none (0%) learning with the teacher taught TGT model cannot train students' ability to solve problems of mathematics. So begin small (16.6%) suppose that allowed students are less likely to follow the math using TGT model and in general (83.4%) suppose that allowed students tend to follow the math using TGT model. Entirely (100%) of students are grateful for follow taught math using



TGT model and no (0%) of students who are not grateful for follow taught math using TGT model. In general (93.3%) for students learning mathematics by using TGT model can help students to understand math and a small portion (6.7%) for students learning mathematics by using TGT model cannot help students to understand math. A small portion (16.7%) with a model of learning TGT conducted by the teacher makes students work hard in math and in general (83.3%) with a model of learning TGT conducted by teachers make students not difficult to do about- math problems. While a small proportion (23.4%) of students felt there was no difference between TGT learning model with a model of learning that teachers do for this and in general (77.6%) of students feel there is a difference between learning model TGT learning model that teachers during Here you are. In conclusion, in general (89.6%) students have a positive attitude above shows the approval of the use of cooperative learning model TGT.

Table 12. Attitudes Students Demonstrate Approval of Student Activities in Learning Mathematics

Indicator	Number and nature	Statement	Number	Frequency and Percentage (%)			
				SS	S	TS	STS
Completing math learning activities of students	8 Positive	Learn by my facilitate group discussion in solving math problems	Frequency	13	17	0	0
			Percentage	43,3%	56,7%	0,0%	0,0%
				100%		0%	
	15 Negative	With self, I study concentrate more on completion of math problems	Frequency	1	13	13	3
			Percentage	3,3%	43,3%	43,4 %	10,0 %
				46,6%		53,4%	
	14 Positive	I can share the knowledge with other friends when applied discussion group	Frequency	16	14	0	0
			Percentage	53,3%	46,7%	0,0%	0,0%
				100%		0%	
	11 Negative	Learning with model stand TGT active in the group only a few people	Frequency	3	9	17	1
			Percentage	10,0%	30,0%	56,7 %	3,3%
				40%		60%	

Based on Table 12 it can be seen, all (100%) studied by means of group discussions help students do math and none (0%) studied by means of discussion in the group is not easy for students to do math. Almost half (46.6%) with their own learning students do not concentrate on solving math problems and most (53.4%) with the student's own learning concentrate on solving math problems. Entirely (100%) students can share their knowledge with other friends when applied to a group discussion and no (0%) of students who are not able to share knowledge with other friends when applied to a group discussion. While nearly half (40.0%) of students studying with TGT models are not likely to be active in the group only a few people and the vast majority (60%) of students studying with IGT models tend active in the group just a few people. It can be concluded that in general (78.35%) of students in the experimental class showed a positive attitude to the approval of the student activity in the learning of mathematics.

4. CONCLUSION

Based on the results of research and statistical analysis conducted, it can be given several, conclusions, among others:



1. Improved communication skills students acquire mathematical learning with cooperative learning model Teams tournament games better than students who received conventional approaches in terms of overall and subgroup of students (high, medium, low), except for the subgroup comparisons low in the experimental class and subgroups lower in the control class.
2. Improvement of mathematical reasoning abilities of students who obtain learning with cooperative learning model Teams tournament games better than students who received conventional approaches in terms of overall and subgroup of students (high, medium, low), except for the subgroup comparisons low in the experimental class and subgroups lower in the control class
3. In general, students in the experimental class showed a positive attitude towards learning mathematics favorite approval; approval of the usefulness of mathematics; consent to the use of cooperative learning model TGT; approval of the activity of students in learning mathematics.

REFERENCES

- Afgani, D. J. (2019). Materi pokok analisis kurikulum matematika. In *Surakarta: CV Kekata Group*.
- Faroh, N. (2011). Pengaruh kemampuan penalaran dan komunikasi matematika terhadap kemampuan menyelesaikan soal cerita materi pokok himpunan pada peserta didik semester 2 kelas VII MTs NU Nurul Huda mangkang semarang tahun pelajaran 2010/2011. *Institut Agama Islam Negeri Walisongo*.
- Kurniati, N. S., Ratnaningsih, N., & ... (2019). Implementasi model pembelajaran arias untuk mengeksplor kemamuan komunikasi matematik dan keterampilan Sosial. ... *Seminar Nasional &Call ...*.
- Meltzer, D. E. (2002). The relationship between mathematics preparation and conceptual learning gains in physics: A possible "hidden variable" in diagnostic pretest scores. *American Journal of Physics*, 70(12). <https://doi.org/10.1119/1.1514215>
- Muharom, T. (2014). Pengaruh pembelajaran dengan model kooperatif tipe Student Teams Achievement Division (STAD) terhadap kemampuan penalaran dan komunikasi matematik peserta didik di SMK Negeri Manonjaya Kabupaten Tasikmalaya. *Jurnal Pendidikan Dan Keguruan*, 1(1), 209691.
- Purnamasari, Y. (2014). Pengaruh model pembelajaran kooperatif tipe teams games tournament (TGT) terhadap kemandirian belajar dan peningkatan kemampuan penalaran dan koneksi matematik peserta didik SMPN 1 kota Tasikmalaya. *Jurnal Pendidikan Dan Keguruan*, 1(1), 209664.
- Rahmat, P. S. (2019). Strategi Belajar Mengajar. In *Strategi Belajar Mengajar*.
- Slavin, R. E. (1995). *Cooperatif Learning Mempraktikkan Cooperatif learning di Ruang-ruang Kelas*. Boston London: Allyn and Bacon.
- Sugiono. (2014). Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif dan R&D. In *Alfabeta Bandung*.
- Wahyuni, R. (2020). Efektivitas implementasi lesson study learning community dalam meningkatkan kualitas pembelajaran. *Equity In Education Journal*, 2(1). <https://doi.org/10.37304/eej.v2i1.1681>
- Wijaya, A. (2012). Pendidikan matematika realistik, suatu alternatif pendekatan pembelajaran matematika. *Jurnal Manajemen Dan Bisnis Indonesia*, 8(1).



UNVEILING THE POTENTIAL OF ONLINE PROFESSIONAL DEVELOPMENT: A SELF-STUDY APPROACH FOR EDUCATOR GROWTH

Hery Yanto The¹

¹Sekolah Tinggi Agama Buddha Nalanda, Indonesia

*heryyantothe@gmail.com

ABSTRACT

The digital revolution in education has transformed professional development opportunities for teacher-educators. While a wealth of resources exists for teacher-educators, accessibility remains a significant challenge due to their busy schedules. This study explores the effectiveness of online distance platforms for professional development, specifically emphasizing the self-study of teaching practice (S-STP) approach that provides new perspectives for evaluating my self-motivated and self-directed professional development in obtaining strategies for improving the quality of my teaching practices. This research assesses free online educational webinars, focusing on 10 sessions accessed through the edweb.net platform in February 2024. It presents a detailed examination of the content and structure of these professional development sessions, offering insights into strategies for acquiring and applying new knowledge, skills, and viewpoints shared by professionals in the field. A key component of this study involves maintaining a reflective journal and engaging in active learning reflection through quizzes, program slides, and recorded videos available on the platform. By embracing the S-STP approach, I obtain micro-credentials and gain practical knowledge that can be directly implemented and customized in my daily teaching. The digital landscape providing professional development sessions encourages ongoing professional development and promotes a dynamic exchange of innovative practices within the educational community.

Keywords: Professional Development, Webinar, Self-Study, Educator Growth, Online Training.

1. INTRODUCTION

Active involvement in ongoing professional development is crucial for teacher-educators who aim to enhance their teaching abilities in the current dynamic educational setting (Padillo et al., 2021). Participating in webinars is one way to do it in their busy schedule (Tanucan & Uytico, 2021). Webinars provided by respected educational development organizations have greatly improved access to training, offering valuable insights, knowledge, and strategies to improve teaching and student outcomes (Perkasa & Surono, 2023). Unfortunately, many educators are unaware of these resources, so they miss out on opportunities to stay updated on the latest trends and methodologies.

By being well-informed about online professional development programs, teacher-educators can obtain up-to-date information and new skills for performing their jobs (Thahir et al., 2021). Implementing the information and skills to their teaching practices ensures their students' academic progress is secured (Jiang et al., 2022). Participating in professional development is also the teacher-educator's responsibility for committing continuously to being updated on new teaching techniques and technologies to help their students achieve learning goals effectively (Jin et al., 2021). In short, actively pursuing such opportunities is crucial for educator efficacy and student achievement.

There are several educational webinars available for teachers to explore, some of which offer micro-credentials. Some of the platforms that offer these webinars include National Geographic, Open University, British Council, and edWeb. These online resources provide teachers with the opportunity to expand their knowledge in specific areas, earn credentials, and enhance their professional skills. However, the limited use of these resources by teacher-educators, particularly in Indonesia, highlights the importance of promoting and raising awareness about the benefits of online professional development for teachers.

As a teacher-educator, I have personally experienced the transformative impact of participating in online professional development webinars with micro-credentials. Through these experiences, I have gained invaluable insights and practical strategies that I have been able to directly apply to my classrooms, whether in traditional in-person settings or virtual learning environments. By engaging with these webinars, I have enhanced my teaching



effectiveness, diversified my instructional approaches, and cultivated a deeper understanding of best practices in education.

This study aims to use the self-study of teaching practice (S-STP) approach to evaluate ten webinars that I have attended through the edWeb professional development platform. By reflecting on my experiences as a participant, I plan to demonstrate how teacher-educators can utilize online professional development opportunities to improve their teaching practice. This analysis will emphasize the importance of continuous learning and growth in enhancing pedagogical innovation and achieving better outcomes for students.

Employing the self-study of teaching practice (S-STP) approach, this study seeks to provide a firsthand account of the experiences and insights gained (Craig, 2008) through participation in online professional development webinars. By highlighting the value of self-directed learning and reflective practice (Pinnegar & Hamilton, 2009), this research underscores the importance of agency and self-motivation in driving professional growth and development. As educators continue to navigate the evolving landscape of education, embracing lifelong learning and leveraging digital platforms for professional development will be essential for staying current, effective, and innovative in the field (Adipat et al., 2023; Kong & Lai, 2023).

2. METHODS

This study applies the self-study of teaching practice (S-STP) approach to the systematic sharing of personal experiences for professional development, focusing on agency, self-determination, and motivation. This method allows for an organized assessment of an individual's learning process and the knowledge gained from participating in online professional development (McDaniel & Samaras, 2007). Within the context of self-study of teaching practice (S-STP), the "I" becomes the primary point of departure when expressing a critical examination of one's own experiences, emphasizing the first-person perspective (Hamilton & Pinnegar, 2014b). The customized method is in harmony with the qualitative essence of S-STP, highlighting that each educator possesses distinct viewpoints, ideas, and backgrounds to offer (Craig, 2008). Educators can offer authentic subjective experiences, insights, and reflections to benefit other teacher-educators by using a first-person narrative (Mkhize-Mthembu, 2022). Educators can learn from each other by sharing experiences and applying new knowledge to their teaching practices through reflection and adaptation (Hamilton & Pinnegar, 2014a).

For this study, I conducted a thorough selection process to choose the ten most recent webinars completed in February 2024. This criterion aims to highlight the latest trends and skills that teacher-educators can benefit from and apply in their teaching practices. The study focuses on the latest webinars to offer current insights into the changing landscape of professional development in education. I also gathered data from the transcript section of my edWeb professional development account. This section holds archives of all documents and files pertaining to completed webinars, such as certificates of completion, quiz scores, and records of learning reflections. These documents are the main source of data for analysis.

Converting the collected information from PDFs to Word documents helped with data analysis. This conversion facilitated the consolidation, restructuring, and analysis of the data. I used Word documents to categorize the data into four tables and a pie chart, structured based on themes and categorizations identified during the analysis. Furthermore, I conducted narrative and explanatory analyses using theoretical frameworks related to educators' professional growth, as well as graphically displaying numerical data. This qualitative analysis provides a deep understanding of the results and their implications for enhancing teaching methods and promoting continuous professional development in educational settings.

3. RESULTS & DISCUSSION

This study yielded a wealth of important findings, which I will divide into five parts in this section in accordance with the study's objectives and available space. The first part provided a concise overview of the edweb.net professional development program. The next part lists the webinars that I attended based on themes, and the following part looks at the presenter's expertise in the specific education field. Before I am providing reflective learning, there is a part where I discuss the lessons that I learned from the webinars.



3.1 *Professional Development*

My teaching philosophy revolves around constantly enhancing instructional methods to adapt to the different learners' needs in attaining their educational objectives. Given the diversity of students' cultural backgrounds, socioeconomic situations, learning preferences, and motivations, I recognize the value of accepting uncertainty and consulting with peers in the field for additional insights (Ladson-Billings, 2011). Through cooperative dialogue and experience exchange with other teacher-educators, my goal is to acquire insightful viewpoints and effective approaches to addressing challenges that arise in the context of teaching and learning (Barnard & Henn, 2023).

Although educational institutions typically offer professional development, I acknowledge the limitations imposed by hectic schedules and the necessity of adhering to administrative schedules. As a result, I support teacher-educators like me in taking charge of our professional development by setting up opportunities for ourselves to grow. This method enables us to choose customized programs and training sessions that suit our requirements and preferences. It also offers the freedom to regulate the pace of learning based on our timetables (Meyer et al., 2023).

Online distance-free educational training and professional development provide teacher-educators with plenty of opportunities to enhance their skills and collaborate with peers from various educational backgrounds and locations (Nash, 2022). I dedicate myself to engaging in self-directed professional development online through platforms such as edweb.net webinars. By utilizing these channels, I can broaden my knowledge, improve my teaching methods, and keep up to date with new developments in education, ultimately improving my effectiveness as an educator.

As an educator, edWeb.net is an essential resource for my professional growth. Through its wide range of webinars, workshops, and networking events, I can readily tap into a wealth of specialized knowledge and expertise that meets my requirements. This professional development platform provides a wide array of resources that contribute to my professional development as an educator, encompassing topics such as language learning, literacy instruction, and academic technology trends.

I find edWeb.net's convenience to be especially advantageous. Given my tight teaching schedule, being able to participate in professional development activities from the comfort of my own home or classroom is invaluable. This flexibility enables me to participate in learning opportunities at my preferred speed, ensuring that I can efficiently handle my professional growth while fulfilling my teaching obligations.

The sense of community that edWeb.net cultivates among educators is one of its most satisfying features. I can engage with peers worldwide, sharing experiences, exchanging ideas, and gaining new perspectives about techniques for teaching via online communities and discussion groups. These interactions expand my knowledge and motivate me to consistently pursue excellence in my teaching.

In general, edWeb.net gives me what I need to navigate the constantly changing field of education while remaining informed, engaged, and inspired. EdWeb.net is crucial for my professional development and effectiveness as an educator by offering valuable resources, facilitating collaboration with peers, and supporting continuous learning.

Despite educational institutions typically offering professional development, I acknowledge the limitations imposed by hectic schedules and the necessity of adhering to administrative schedules. As a result, I support teacher-educators like me in taking charge of our professional development by setting up opportunities for ourselves to grow. This method enables us to choose customized programs and training sessions that suit our requirements and preferences. It also offers the freedom to regulate the pace of learning based on our personal timetables.

Online distance-free educational training and professional development provide teacher-educators with plenty of opportunities to enhance their skills and collaborate with peers from various educational backgrounds and locations (Nash, 2022). I dedicate myself to engaging in self-directed professional development online through platforms such as edweb.net webinars. By utilizing these channels, I can broaden my knowledge, improve my teaching methods, and keep up to date with new developments in education, ultimately improving my effectiveness as an educator.



3.2 Themes of the Webinars

Organizing webinars by themes allows for a more comprehensive exploration of specific educational subjects in line with current teaching and learning trends. In my observation, webinars such as "Advancing Reading Skills Through Handwriting Instruction," "Transforming the High School ELA Classroom with Choice Reading," and "Leading a Culture of Reading: How to Engage and Inspire Readers in Your School Community" highlight the significance of enhancing literacy skills and fostering a love for reading among learners, as integral parts of literacy education and reading promotion. These discussions have provided valuable insights into ongoing educational trends that prioritize the development of fundamental literacy skills and encourage the practice of reading in schools.

Table 1. Themes of the Webinars that I Participated

No.	Themes	Title of the Webinar
1.	Literacy Instruction and Reading Promotion	Advancing Reading Skills Through Handwriting Instruction Transform the High School ELA Classroom with Choice Reading Leading a Culture of Reading: How to Engage and Inspire Readers in Your School Community
2.	Language Learning and English Language Development	Empowering Language Learners: Strategies for Success in Self-Paced ESL Classrooms Strategies to Build English Learners' Language Skills: From Newcomers to Advanced
3.	Educational Technology and Digital Citizenship	AI Prompt Engineering for Responsible Digital Citizens Harnessing the Power of Applied Artificial Intelligence for Educators
4.	Professional Development and Teaching Strategies	Using the Science of Learning to Elevate How We Teach and How Students Learn Future-Ready Students: How to Develop and Measure Higher-Order Skills
5.	Current Events and Global Affairs	How to Teach Current Events in Our Interconnected World

During my extensive research on language learning and the development of English language skills, I have come across various sessions that have proven to be effective in empowering language learners. These sessions, such as "Empowering Language Learners: Strategies for Success in Self-Paced ESL Classrooms" and "Strategies to Build English Learners' Language Skills: From Newcomers to Advanced," have provided me with valuable insights and techniques that can aid English learners throughout their language acquisition journey. The presentations highlight the significance of providing tailored assistance and resources to English language learners, which aligns with the current educational trends that prioritize inclusivity and diversity in language instruction (McClure, 2010; Mim, 2023).

Through my research on the integration of artificial intelligence (AI) in education and its impact on digital citizenship, I have uncovered several significant insights. My studies, "AI Prompt Engineering for Responsible Digital Citizens" and "Harnessing the Power of Applied Artificial Intelligence for Educators," have highlighted the increasing importance of equipping students with the skills necessary to navigate digital environments safely and thoughtfully. These findings are in line with current trends that aim to integrate educational technology and foster digital literacy skills among students. It is evident that digital citizenship education, in conjunction with AI, can produce responsible digital citizens equipped with the knowledge and skills needed to navigate the digital world safely and responsibly (Kim & Jang, 2020; Voronkova et al., 2023).

My investigation of webinars centered on professional development and teaching strategies, such as "Using the Science of Learning to Elevate How We Teach and How Students Learn" and "Future-Ready Students: How to Develop and Measure Higher-Order Skills," has highlighted the importance of ongoing learning and teacher advancement. The sessions have equipped me with research-based strategies and techniques to improve



teaching quality and support student success, aligning with current trends in professional development that emphasize evidence-based practices and teacher effectiveness (Jimerson & Haddock, 2015; Kim & Ko, 2020).

I have come to realize the importance of global citizenship education through attending webinars that discuss current events and global affairs. For instance, "How to Teach Current Events in Our Interconnected World" helped me understand the significance of equipping students with the necessary tools to comprehend and evaluate complex global issues. These global issues align with current educational trends that emphasize the need for critical thinking, empathy, and intercultural competence among students (Kim & Ko, 2020). Such skills prepare them to succeed in an interconnected world.

3.3 *The Expertise of Presenters*

The data reveals the number of presenters who participated in each of the ten webinars analyzed. Among the programs studied, 20% featured a single presenter, 40% had two presenters, 30% had three presenters, and 10% had four presenters.

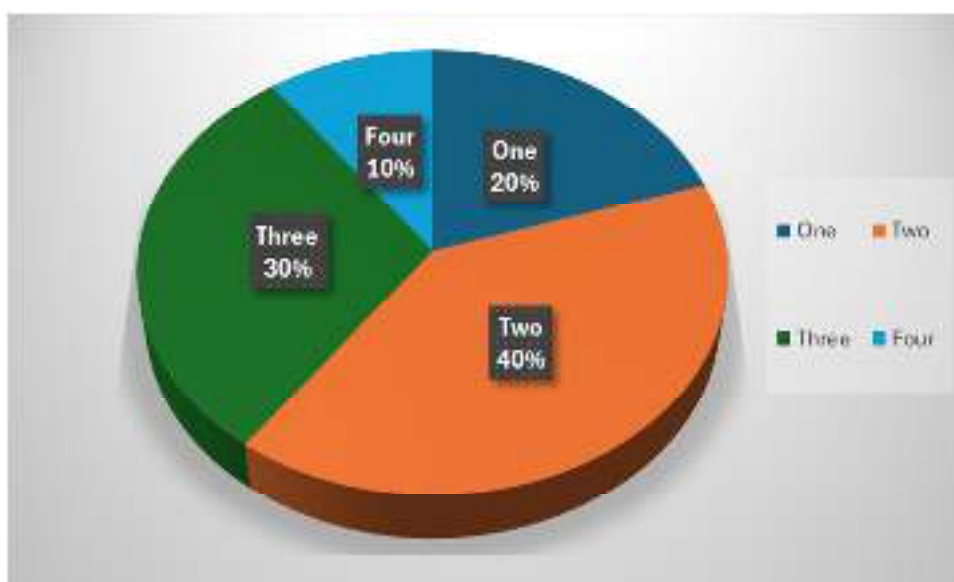


Figure 1. Percentage of Webinars with One to Four Presenters

Most webinars employ a two-presenter format, constituting 40% of all programs. This approach allows experts and speakers to collaborate and share their diverse range of perspectives, experiences, and expertise, making the learning experience more enriching for the attendees. Moreover, having two presenters encourages dynamic interactions, discussions, and idea exchanges, making the webinar sessions more engaging and informative.

On the other hand, 30% of webinars feature three presenters, favoring a collaborative delivery approach. This format allows for a comprehensive exploration of the topic, covering different aspects of the subject with a broad range of perspectives and skills. Having three presenters ensures a diverse and comprehensive examination of the subject, catering to different interests and learning preferences.

Despite being less common, the one-presenter format still accounts for 20% of webinars. A solitary presenter can deliver a more focused and efficient presentation, allowing for a thorough examination of specific facets of the subject. However, it may lack the range of viewpoints and specialized knowledge that multiple presenters can provide. For special occasions or topics requiring in-depth coverage by a panel of experts, the least used format involves four presenters, representing only 10% of the total.

When perusing the biographical information of presenters, my approach involves a thorough examination of their areas of expertise and educational themes. Notably, Christina Bretz and Dr. Cheryl Lundy Swift, who are



experts in literacy education and reading strategies, feature prominently. Their focus is on improving literacy instruction and cultivating successful reading strategies. Their insights and knowledge are invaluable in helping me develop reading skills and advance literacy across various grade levels. This theme underscores the vital role of literacy in academic achievement and presents methods to support students in enhancing their reading skills.

Additionally, Brenda Adeva, Pamela Abbey, and other language learning, language education, and development experts feature prominently in my search for knowledge. Their primary objective is to assist English language learners (ELLs) and foster language development in different classroom settings. Through their presentations, I gain constructive approaches and profound insights that enable me to foster inclusive educational environments and meet the linguistic needs of students (Azam et al., 2021), regardless of their native language.

Table 2. Presenters' Expertise

No.	Field of Expertise	Presenters
1.	Literacy Education and Reading Strategies	Dr. Cheryl Lundy Swift; Christina Bretz; Cicely Lewis; Morgan Taylor; Ronell Whitaker
2.	Language Learning, Language Education and Development	Michelle Spain; Alicia Serafin; Lydia Crush; Toni Rose Deanon; Brenda Adeva; Pamela Abbey
3.	Technology Implementation in Education	Tali Horowitz; Sue Thotz; Laura Burke; Dr. Josh Rayburn; Kiki Huckaby
4.	Educational Leadership and Professional Development	Denise Mutlu, Ed.D. ;Jimmy Han; Dr. Doris Zahner; Lorraine Radice, Ph.D.
5.	Global Affairs and Citizenship Education	Lois MacMillan; Charles Hopkins
6.	Brain-based Learning and Science Education	Glenn Whitman

During my research on the use of technology in the classroom, I have come across several knowledgeable presenters, including Sue Thotz and Tali Horowitz. These individuals specialize in utilizing technology to enhance the teaching and learning experience. By attending their presentations on responsible digital citizenship and practical applications of artificial intelligence in education, I have gained valuable knowledge and skills that enable me to effectively incorporate technology into my teaching methodologies. This, in turn, fosters digital literacy (Bergene et al., 2023) and promotes equal access to technology (Liebenberg et al., 2012) .

In the field of education, educational leadership and professional development are crucial in promoting ongoing development and improving teaching techniques. Denise Mutlu and Jimmy Han are among the presenters who provide advice on educational leadership strategies and successful professional development programs. These programs contribute to fostering supportive school environments that promote academic achievement by cultivating leadership and encouraging collaboration among educators (Adhikary, 2021).

Global affairs and citizenship education are essential in preparing students to navigate an increasingly interconnected world. Lois MacMillan and Charles Hopkins are among the presenters who specialize in educating learners about global issues and promoting global citizenship. Their insights enable me to integrate global perspectives and current events into my teaching, which enhances students' understanding of diverse cultures and encourages critical thinking about global issues (Firman, 2020; Irawan et al., 2017).

Glenn Whitman's presentations on brain-based learning and science education are also of immense importance. His understanding of brain-based learning principles provides valuable insights into effective teaching strategies based on educational neuroscience research. With this knowledge, I can optimize my scientific education practices, thereby improving student engagement and learning outcomes.

The diverse expertise of these presenters underscores the complexity of contemporary education. By offering me valuable insights, strategies, and resources for supporting student success and improving educational practices, I can address various aspects of teaching and learning. Participating in webinars as part of my professional development allows me to stay abreast of current trends and best practices, thereby increasing my effectiveness in the classroom and having a positive impact on student learning.



3.4 *Sponsors of the Webinars*

Regarding the sponsorship of webinars, every organization contributes its own distinct priorities and valuable insights to the field of professional development for educators and scholars. Learning Without Tears focuses on improving literacy instruction and handwriting skills, acknowledging their crucial role in early childhood education. Penguin Random House Education adopts a broader perspective by encouraging students to investigate identities through literary works, recognizing the profound effect books can have on learners' development of self-awareness and comprehension of the world.

CFR Education and MindSpark Learning have contrasting focuses in their contributions to teachers' professional development. CFR Education emphasizes offering resources and strategies for effectively teaching and learning intricate global issues, highlighting the increasing significance of global citizenship education in an interconnected world. MindSpark Learning focuses on exploring AI in education and transformative learning experiences, emphasizing the importance of technology integration and innovation in modern educational practices.

Both Solution Tree and CAE are dedicated to promoting crucial skills and professional development among educators despite appearing to have different priorities. Solution Tree focuses on collaboration, professional development, and student-centered literacy education. CAE emphasizes critical thinking, problem-solving, and communication skills essential for addressing 21st-century challenges.

The Modern Classroom Projects and the Center for Transformative Teaching and Learning provide unique but complementary contributions to professional development. The Modern Classroom Projects prioritize promoting student agency, collaboration, and innovation, in line with the trend toward student-centered learning methods. Instead, the Center for Transformative Teaching and Learning connects neuroscience research with classroom practice. This way, teachers can use research-based strategies to help their students learn more.

Although they have distinct characteristics, these organizations come together with a common dedication to enhancing educational methods and student results. By providing teacher educators with resources, strategies, and support, they all contribute to teachers' ongoing professional development (Padillo et al., 2021). This improves their ability to meet the needs of all students and prepares them for success in an educational environment that is always changing (Ulman-Ozolina et al., 2019).

Researching how different sponsors help teachers improve their skills requires looking at the theories that support new ways of teaching, the effects of fast technological change, the significance of welcoming classrooms, and meeting the various needs of students. With its focus on improving literacy instruction and handwriting abilities, Learning Without Tears is consistent with constructivist theories, which highlight the value of active learning and practical experiences in forming students' understanding. The organization promotes innovative teaching methods that empower students to build knowledge through meaningful interactions with text and writing, emphasizing basic literacy skills.

Penguin Random House Education's focus on celebrating identities through literature aligns with critical pedagogy theories, which promote social justice and empowerment through literature. Educators can create learning environments that validate students' identities and experiences while also promoting empathy and understanding of others' perspectives. This method demonstrates a creative teaching practice that encourages inclusive learning and values diversity in the classroom.

CFR Education's emphasis on teaching complex global issues aligns with the goal of global citizenship education, which is to prepare students to actively participate in a globalized world. By helping teachers address global issues, CFR Education fosters critical thinking, empathy, and intercultural competence in students. This method promotes inclusive learning environments that allow students to actively interact with a variety of viewpoints and make valuable contributions to promoting positive social change.

Table 3. Sponsors of the Webinars

No.	Name of the Sponsor	Priority on Professional Development
1.	Learning Without Tears	Enhancing literacy instruction and handwriting skills.



2.	Penguin Random House Education	Empowering exploration of identities through literature.
3.	CFR Education	Providing resources and strategies to teach and learn complex global issues effectively.
4.	MindSpark Learning	Exploring the application of AI in education and transformative learning experiences.
5.	Solution Tree	Fostering collaboration, professional growth, and student-centered approaches to literacy education.
6.	CAE	Promoting development of critical thinking, problem-solving, and communication skills, essential for navigating complex challenges in the 21st century
7.	The Modern Classroom Projects	Fostering student agency, collaboration, and innovation in education.
8.	Center for Transformative Teaching & Learning	Bridging the gap between neuroscience research and classroom practice.
9.	MindSpark Learning	Fostering collaboration, creativity, and problem-solving skills through hands-on, experiential learning
10.	Common Sense Education	Promoting digital literacy, privacy protection, and equity in access to technology.

MindSpark Learning's study of AI in education demonstrates the incorporation of technology into teaching methods influenced by theories of technological pedagogical content knowledge (TPACK). Using AI tools, educators can personalize instruction, encourage active learning, and meet diverse learning needs. This method demonstrates a creative application of technology to promote inclusive learning settings and enhance student learning results.

These sponsors contribute to growth in education by focusing on theoretical frameworks that prioritize innovation, technology integration, inclusive learning, and meeting diverse learner needs. These organizations are essential to improving educational practices and encouraging successful outcomes for all students because they align their goals and methods with these theoretical viewpoints.

3.5 *Lessons Learned*

In my explorations into literacy instruction and reading promotion, I discovered practical strategies for reinforcing foundational literacy skills through handwriting integration that are applicable across all grade levels from pre-K to sixth grade. By combining handwriting, reading, decoding, and encoding skills, I have been able to create a cohesive approach to literacy instruction. I have learned to incorporate diverse texts from various backgrounds and perspectives into the reading program to promote inclusion and resilience. Emphasizing joyful reading experiences and encouraging student leadership has been critical in maintaining student interest and reflection on reading habits, resulting in an engaging and inclusive reading environment for students at all levels.

I have been guided by practical methods to assist English learners at all stages of their language learning and English language development journey. English educators like me have recommended incorporating technological tools, personalized learning, and innovative assessments for self-paced ESL classrooms. Additionally, they have advised on the inclusion of vocabulary practice, scaffolded grammar, and home languages to enhance English learners' confidence. By implementing these strategies, I have been able to create an inclusive and supportive learning environment where English language learners can thrive.

Table 4. Lessons Learned from the Webinars

No.	Theme	Essential Lesson
1.	Literacy Instruction and Reading Promotion	[1] Practical strategies for teachers to integrate handwriting effectively, reinforcing foundational literacy skills from Pre-K through sixth grade, connecting handwriting with reading, and decoding and encoding skills.



		[2] Applicable techniques for teachers, librarians, and school leaders to incorporate a variety of texts representing diverse experiences and cultures, promoting themes of belonging and resilience. [3] Sustaining student interest and reflection on reading habits with joyful reading experiences and encouraging student leadership. Authentic classroom examples illustrate concepts and resources are provided for immediate implementation for K-12 teachers and instructional coaches seeking practical approaches to promote reading.
2.	Language Learning and English Language Development	[1] Strategies for self-paced ESL classrooms, including personalized learning, digital tools, and innovative assessments, are ideal for educators passionate about ESL learning. [2] Practical methods, such as vocabulary practice, scaffolded grammar, and utilizing students' home languages, can support English learners at all levels.
3.	Educational Technology and Digital Citizenship	[1] Insights into the ethical use of AI, emphasizing digital citizenship principles and effective questioning for maximizing AI tools responsibly suitable for teacher-educator teaching practices. [2] Practical applications of Applied AI, emphasizing hands-on techniques and productivity enhancement, fostering collaboration and improvement in education and beyond.
4.	Professional Development and Teaching Strategies	[1] Research-informed techniques to enhance teaching quality and student achievement by applying the Science of Learning effectively, with a focus on brain-based learning principles for both in-person and online engagement. [2] Insights into nurturing essential higher-order skills for academic and career success through professional development, transforming instruction to embed skill measurement, and understanding the importance of these skills for students' futures, with actionable insights from data shared from over 120,000 students.
5.	Current Events and Global Affairs	Practical tips, global trends, and resources to effectively integrate current events into teaching, fostering global understanding and enabling students to analyze complex global issues.

Regarding AI ethics and its practical applications in education for educational technology and digital citizenship, I have learned how to integrate AI tools responsibly by focusing on digital citizenship principles and effective questioning techniques. I have also learned about hands-on techniques and productivity enhancements through applied AI, which promotes collaboration and improvement in education and elsewhere. By implementing these strategies, I have been able to harness the power of technology while instilling responsible digital citizenship values in my students.

In terms of professional development and teaching strategies, I have gained research-based techniques for improving teaching quality and student achievement by efficiently using the science of learning. With a focus on brain-based learning principles for both in-person and online engagement, I have acquired practical strategies for improving student learning and engagement. Additionally, during my career growth, I have learned how to foster higher-order skills that are critical to achieving success in school and at work, emphasizing the value of skill assessment and comprehension for students' futures.

I have received practical tips, global trends, and resources to help me integrate current events into my teaching and foster global understanding in students. By allowing students to analyze complex global issues, I play an essential role in developing informed and globally aware citizens. By incorporating current events into the curriculum, I give students valuable opportunities to engage critically with the world around them, fostering empathy, understanding, and active citizenship.

These themes emphasize the importance of providing educators like me with practical strategies, research-informed techniques, and resources to support student learning and engagement across diverse educational domains. By providing educators with the tools and knowledge they need to incorporate literacy instruction, language learning, educational technology, professional development, and global affairs into their



teaching practices, we can foster a comprehensive approach to education that prepares students for success in an interconnected and rapidly changing world.

3.6 *Reflective Analysis*

I am amazed by the significant impact webinars have had on enhancing my expertise and competencies as a teacher-educator, as revealed by the current study. The research has highlighted the importance of continuous education and development in refining teaching policies and procedures, leading to meaningful growth in my own practice. Effective teacher professional development emphasizes the critical role that continuous learning and reflective practice play in improving pedagogical innovation and ultimately achieving better results for students. This emphasis is crucial, and I am committed to embracing these principles firsthand.

The webinars have covered a wide range of subjects, providing insightful information about various aspects of modern education, including literacy education, educational technology, and global citizenship. This variety reflects the multifaceted nature of teaching and emphasizes the importance of educators being adaptable and responsive to the changing educational landscape. These sessions have equipped me with the tools and strategies needed to create inclusive learning environments that meet the diverse needs of my students.

The presenters' collaborative delivery approach has enhanced my learning experience by involving multiple speakers sharing their perspectives and areas of expertise. This approach has fostered dynamic interactions, discussions, and the exchange of ideas, expanding my understanding of various educational domains, ranging from literacy education to global affairs. Working in a collaborative learning environment significantly expanded my pedagogical repertoire and improved my effectiveness as a teacher-educator.

Moreover, the study has highlighted the significant role that program sponsors play in providing support for teachers' attempts to further their professional development. The numerous organizations responsible for sponsoring these webinars each bring their own distinct priorities and perspectives to the table, contributing to the creation of a professional learning environment that is rich and diverse. Because these sponsors align their goals with theoretical frameworks that emphasize educational innovation, technological integration, and inclusive approaches to education, they play a significant role in determining the path that professional development initiatives will take. Participating in these webinars has provided me with numerous benefits, including resources, support, and expertise from these sponsors, enabling me to further develop my teaching practice and provide a higher level of service to my school's students.

Participating in this learning reflection has strengthened my belief in the transformative power of professional development webinars to enhance the knowledge and capabilities of teacher-educators. I have broadened my pedagogical horizons, deepened my understanding of key educational concepts, and ultimately became a more effective educator as a result of my participation in ongoing education, collaborative learning experiences, and the support of program sponsors. I am committed to embracing new opportunities for learning and growth as I continue on my journey toward professional development, with the ultimate objective of continuously improving my practice and increasing the amount of success my students achieve.

4. **CONCLUSION**

The research conducted sheds light on the advantages and effectiveness of self-directed learning for both educators and students through online professional development webinars. The results highlight the significance of ongoing education, introspection, and the use of digital platforms to promote professional growth and progress. These webinars cover a wide range of topics. When combined with the presenters' specialized knowledge and the support provided by program sponsors, they enhance the overall understanding and proficiency of teacher-educators.

The research suggests several ways to increase the effectiveness of online professional development for educators in the teaching field. Firstly, academic institutions and organizations must place a high value on promoting and creating awareness of online professional development resources. The cultivation of a culture of ongoing education and the promotion of information dissemination among educational communities can yield substantial benefits for teacher-educators.



Moreover, collaborative delivery methods such as webinars with multiple presenters contributing their specializations are exceptionally valuable. This approach promotes interactive engagement and enhances the learning experience for all participants. As such, educators and organizers of professional development programs should proactively seek opportunities for collaboration and integrate diverse viewpoints into their training curricula.

In recognition of the importance that program sponsors place on supporting educators' professional development, institutions should align their objectives and approaches with theoretical frameworks that emphasize inclusive learning, technology integration, and innovation. Sponsors should provide tailored resources, strategies, and assistance to ensure that the webinar content is relevant, applicable, and grounded in research.

Teacher-educators should continue to embrace the self-study of teaching practice (S-STP) methodology as they advance in their professional development. By actively participating in continuous learning, engaging in reflective practice, and applying newly acquired knowledge and skills, teacher-educators can consistently improve student outcomes, foster inclusive learning environments, and enhance their instructional practices.

In summary, online professional development webinars provide a significant opportunity for teacher-educators to augment their expertise, refine their abilities, and stay current with the most effective methodologies in the field of education. By incorporating these suggestions, academic communities can foster an environment that values ongoing education, originality, and pedagogical excellence, which will benefit both instructors and learners alike.

REFERENCES

- Adhikary, S. (2021). Exploring school principle's practices in developing teacher leaders in their school. *Social Sciences and Humanities Open*, 4(1). <https://doi.org/10.1016/j.ssaho.2021.100189>
- Adipat, S., Chotikapanich, R., Laksana, K., Busayanon, K., Piatanom, P., Ausawasowan, A., & Elbasouni, I. (2023). Technological pedagogical content knowledge for professional teacher development. *Academic Journal of Interdisciplinary Studies*, 12(1). <https://doi.org/10.36941/ajis-2023-0015>
- Azam, S., Goodnough, K., Moghaddam, A., Arnold, C., Penney, S., Young, G., & Maich, K. (2021). Becoming inclusive teacher educators: self-study as a professional learning tool. *International Journal for the Scholarship of Teaching and Learning*, 15(2), 1–9. <https://doi.org/10.20429/IJSOTL.2021.150204>
- Barnard, R. W., & Henn, R. H. (2023). Overcoming learning obstacles: Strategies for supporting students with diverse needs. *OALib*, 10(08). <https://doi.org/10.4236/oalib.1110509>
- Bergene, A. C., Wollscheid, S., & Gjerustad, C. (2023). Digital distance learning: A question of flexibility in time and space? *Nordic Journal of Digital Literacy*, 18(2). <https://doi.org/10.18261/njdl.18.2.5>
- Craig, C. J. (2008). Joseph Schwab, self-study of teaching and teacher education practices proponent? A personal perspective. *Teaching and Teacher Education*, 24(8). <https://doi.org/10.1016/j.tate.2008.05.008>
- Hamilton, M. L., & Pinnegar, S. (2014a). Intimate scholarship in research: an example from self-study of teaching and teacher education practices methodology. *LEARNing Landscapes*, 8(1). <https://doi.org/10.36510/learnland.v8i1.680>
- Hamilton, M. L., & Pinnegar, S. (2014b). Self-study of teacher education practices as a pedagogy for teacher educator professional development. *Advances in Research on Teaching*, 22. <https://doi.org/10.1108/S1479-368720140000022010>
- Firman, H. (2020). Trends and Global Issues in Education. *Indonesia University of Education*.
- Irawan, T. A., Rahardjo, S. B., & Sarwanto, S. (2017). Analysis of secondary school students' critical thinking skill in learning energy in living system. *Pancaran Pendidikan*, 6(4). <https://doi.org/10.25037/pancaran.v6i4.79>
- Jiang, Q., Horta, H., & Yuen, M. (2022). Factors related to university teaching that influence academic success of international medical students in China. *F1000Research*, 11. <https://doi.org/10.12688/f1000research.123281.1>



- Jimerson, S. R., & Haddock, A. D. (2015). Understanding the importance of teachers in facilitating student success: Contemporary science, practice, and policy. *School Psychology Quarterly*, 30(4). <https://doi.org/10.1037/spq0000134>
- Jin, X., Li, T., Meirink, J., van der Want, A., & Admiraal, W. (2021). Learning from novice–expert interaction in teachers’ continuing professional development. *Professional Development in Education*, 47(5). <https://doi.org/10.1080/19415257.2019.1651752>
- Kim, I., & Ko, B. (2020). Content knowledge, enacted pedagogical content knowledge, and student performance between teachers with different levels of content expertise. *Journal of Teaching in Physical Education*, 39(1). <https://doi.org/10.1123/jtpe.2018-0292>
- Kim, J.-S., & Jang, E.-S. (2020). Artificial intelligence literacy-based teaching conditions and model for improving primary English language learners’ global digital citizenship. *Association of Global Studies Education*, 12(3). <https://doi.org/10.19037/agse.12.3.06>
- Kong, S. C., & Lai, M. (2023). Effects of a teacher development program on teachers’ knowledge and collaborative engagement, and students’ achievement in computational thinking concepts. *British Journal of Educational Technology*, 54(2). <https://doi.org/10.1111/bjet.13256>
- Ladson-Billings, G. (2011). Is meeting the diverse needs of all students possible? *Kappa Delta Pi Record*, 47(sup1). <https://doi.org/10.1080/00228958.2011.10516716>
- Liebenberg, H., Chetty, Y., & Prinsloo, P. (2012). Student access to and skills in using technology in an open and distance learning context. *International Review of Research in Open and Distance Learning*, 13(4). <https://doi.org/10.19173/irrodl.v13i4.1303>
- McClure, K. K. (2010). Seeking inclusivity in English language learning websites. *Journal of Language, Identity and Education*, 9(4). <https://doi.org/10.1080/15348458.2010.503917>
- McDaniel, T. R., & Samaras, A. P. (2007). Review of self-study of teaching practices. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 81(2). <https://doi.org/10.3200/tchs.81.2.93-94>
- Meyer, A., Kleinknecht, M., & Richter, D. (2023). What makes online professional development effective? The effect of quality characteristics on teachers’ satisfaction and changes in their professional practices. *Computers and Education*, 200. <https://doi.org/10.1016/j.compedu.2023.104805>
- Mim, A. H. (2023). The importance of multilingualism in a globalized world: Understanding multilingualism. *Inverge Journal of Social Sciences*, 2(2).
- Mkhize-Mthembu, N. S. (2022). Finding myself by involving children in self-study research methodology: A gentle reminder to live freely. *South African Journal of Childhood Education*, 12(1), 1–12. <https://doi.org/10.4102/SAJCE.V12I1.1043>
- Nash, B. (2022). “We Felt Like Pioneers”: Exploring the social and emotional dimensions of teachers’ learning during online professional development. *Journal of Online Learning Research*, 8.
- Padillo, G. G., Manguilimotan, R. P., Capuno, R. G., & Espina, R. C. (2021). Professional development activities and teacher performance. *International Journal of Education and Practice*, 9(3). <https://doi.org/10.18488/journal.61.2021.93.497.506>
- Perkasa, A. B., & Surono, S. (2023). Teachers’ attitudes towards webinars in professional development: A case study at secondary school in Indonesia. *Journal of Innovation in Educational and Cultural Research*, 4(2). <https://doi.org/10.46843/jiecr.v4i2.559>
- Pinnegar, S., & Hamilton, M. L. (2009). The self, the other, and practice in self-study of teaching and teacher education practices research. In *Self-study of Practice as a Genre of Qualitative Research*. https://doi.org/10.1007/978-1-4020-9512-2_2
- Tanucan, J. C. M., & Uytico, B. J. (2021). Webinar-based capacity building for teachers: “Lifeblood in facing the new normal of education.” *Pertanika Journal of Social Sciences and Humanities*, 29(2). <https://doi.org/10.47836/pjssh.29.2.16>
- Thahir, M., Komariah, A., Kurniady, D. A., Suharto, N., Kurniatun, T. C., Widiawati, W., & Nurlatifah, S. (2021). Professional development and job satisfaction on teaching performance. *Linguistics and Culture Review*, 5(S4). <https://doi.org/10.21744/lingcure.v5ns4.2046>



- Ulmane-Ozolina, L., Jansone, A., Magazeina, I., & Barute, D. (2019). Technology enhanced learning in teachers' professional development. *Periodicals of Engineering and Natural Sciences*, 7(1). <https://doi.org/10.21533/pen.v7i1.400>
- Voronkova, V., Kyvliuk, O., & Andriukaitiene, R. (2023). The evolution from active responsible citizenship to digital citizenship in the context of critical thinking: The EU experience. *Humanities Studies*, 91(14). <https://doi.org/10.32782/hst-2023-14-91-03>



NO. ISSN 2487-1561

ANALYSIS OF BIOACCUMULATION OF BIOMERCURY (Hg) IN HAIR AND ITS IMPACT ON THE HEALTH OF MINING WORKERS IN MALOMBA VILLAGE, DONDO SUB-DISTRICT, TOLITOLI DISTRICT

Nurhayati^{1*}, Tri Santoso², Sitti Aminah³, Sri Hastuti Virgianti P⁴

^{1,2,3,4}Tadulako University, Indonesia

*Hayatimuhtar17@gmail.com

ABSTRACT

Mercury is a dangerous and toxic material, persistent, bioaccumulates, and harmful to human health. Mercury is used in the gold processing process using the amalgamation method carried out by people in gold mining without permits. Exposure to mercury in gold processing can occur through direct contact with the skin and inhalation of mercury vapor. Mercury exposure in the body can be analyzed using hair. So this study aims to determine the levels of mercury that accumulate in the hair of mine workers and the impact of mercury content in hair on the health problems of gold mine workers in Malomba Village. The hair samples used were destroyed using H₂SO₄ and HNO₃: HCl (1:3) and analyzed using a cold vapor type Atomic Absorption Spectrophotometer (CV-AAS) at a wavelength of 253,7 nm. The results obtained are, the highest mercury level was 9,82 µg/g, the lowest mercury level was -0,10 µg/g and the control sample was 3,91 µg/g. The limit of mercury levels in hair according to the WHO is 1 µg/g, so the mercury level in respondents KL does not exceed the threshold, while the other 9 respondents exceed the provisions of the mercury threshold in hair, and there are 2 respondents who have symptoms of mercury exposure, namely respondent YP showing symptoms of mercury exposure in the form of tremors, frequent tingling, itching, weakness of taste buds, difficulty swallowing, diarrhea, and headaches, while respondents OP showed symptoms of mercury exposure in the form of frequent tingling, itching, easy fatigue, headaches and eye irritation.

Keywords: Mercury (Hg), Hair, Gold mining, Tolitoli.

1. INTRODUCTION

Mercury or quicksilver is a dangerous and toxic material, in the form of a heavy metal that is liquid, silver white, odorless and easily evaporates at normal/room temperature where it usually takes the form of organic and inorganic compounds that are persistent, bioaccumulate and dangerous to health. humans such as disorders of fetal development, nervous system, digestive and immune systems, lungs, kidneys, skin and eyes and the environment (Permenkes RI, 2016). Currently, mercury (Hg) is still widely used in gold mining without permits, in the amalgamation process which uses mercury as amalgam. The amalgamation process is a mixing process between gold and mercury.

The amalgamation technique is carried out by mixing rocks containing gold and mercury using a drum (Komalig, 2011). The amalgamation process carried out in the gold processing process can cause toxicity for miners and residents around mining. The effects of mercury pollutants on human health in general can include illness (acute and chronic), disruption of physiological functions (nerves, lungs, sensory abilities), sensory irritation and accumulation of dangerous substances in the body (Mukono in Erdanang, 2016). The high risk of mercury exposure in traditional gold processing is during the filtering and annealing processes. In the filtration process, mercury which is still in inorganic form will be absorbed and enter the body through the skin because in the filtration process mercury is mixed, while in the incandescence process the processor will be exposed to mercury vapor through inhalation because the gold ore that has been bound with mercury will be heated to a temperature very high and mercury evaporation will occur (Ministry of Health in Erdanang, 2016). Continuous direct contact with heavy metals can cause an increase in chemical elements in the body caused by the bioaccumulation system (Masruddin & Mulasari, 2021).

Bioaccumulation is a progressive increase in the concentration of a type of compound in an organism caused by the rate of uptake of the compound being greater than its release (Anderson & Fisher, 2002).



Determining mercury exposure in the body can be done by measuring levels in body tissues, such as blood, urine, hair and nails, which are known as biomarkers (Grandjean et al., 2005).

Hair is one of the indicators used to assess the extent of mercury contamination, because the concentration of mercury in hair is persistent enough that it does not disappear even when washing with shampoo or dyeing the hair, but can decrease by 30-50% when the hair is straightened or curled. This is because hair straighteners contain thyoglycolic acid which has the effect of reducing MeHg in hair (Chamid et al., 2010). Hair is mainly composed of a protein called keratin. This protein includes large amounts of the sulfur-containing amino acid cysteine. Many of these cysteines are involved in disulfide bonds, which bind each keratin and provide strength to the hair. Mercury has a great affinity for sulfur and bonds strongly with it. When hair is actively growing in the hair follicle, mercury in the blood can diffuse into the tissue and bind to the growing hair strands (Faial et al., 2014).

One of the gold mines that uses mercury in the processing process is in Malomba Village, Dondo District, Tolitoli Regency. This gold mining activity started in 2010. The location of the mining activity is only 500 meters from the residential area of Malomba village. In the gold processing process, miners use mercury to bind the gold (Rosita, 2022). This allows mining workers in Malomba Village to be contaminated with mercury as a result of mining activities. Thus, it is necessary to carry out research to determine the levels of mercury that accumulate in miners' hair and its impact on health problems for mine workers in Malomba Village, Dondo Sub-District, Tolitoli District.

2. METHODS

This study is a type of experimental research conducted in the laboratory to determine the level of mercury accumulated in the hair of mine workers and using a questionnaire to determine the impact of mercury content in hair on health problems of gold mine workers in Malomba Village, Dondo Sub-District, Tolitoli District. The sample used in this study is the hair of mine workers who are still actively processing gold. The samples used totaled 10, with 9 samples taken from three points of the miner's location. and 1 control sample taken from respondents who are not mine workers and have never been to the mining site. The sampling technique used is accidental sampling, where sampling is carried out on respondents who happen to be at the research location (Ariawan, 1998).

2.1 Tools and Materials

The tools used in this research were scissors, hot plate, analytical balance, 50 mL measuring flask, dropper pipette, measuring cup, beaker, stir bar, 100 mL Erlenmeyer, watch glass, funnel, plastic sample, filter paper and a set of absorption spectrophotometer tools. atom. The materials used were hair samples, standard Hg 1000 ppb solution, nitric acid (HNO_3), hydrochloric acid (HCl), sulfuric acid (H_2SO_4), acetone, liquid soap and distilled water.

2.2 Hair Sampling

Gold miners' hair samples were taken by cutting the hair in areas near the scalp randomly, with a size of around 3 cm in the amount of 0.2 - 1 gram and putting it in a labeled plastic clip (Rosmiati & Silvia, 2021). Each respondent who provided a hair sample filled out a questionnaire to determine the impact of mercury on miners' health problems. This procedure was carried out for all samples.

2.3 Sample Preparation

The hair samples obtained were washed with liquid soap and clean water, then dried. After that, continue with washing using 10 mL of acetone solution for 15 minutes and stirring using a glass stirrer. Next, the hair samples were rinsed 3 times using distilled water, then dried at room temperature and stored in a vacuum desiccator. After that, the hair is cut finely with scissors (Faial, et al. 2014). Hair samples that had been dried and finely cut were weighed and put into a 100 mL Erlenmeyer flask. In an Erlenmeyer flask, 5 mL of H_2SO_4 and 10 mL of $\text{HNO}_3 : \text{HCl}$ (1:3) are added for 1 gram of hair sample. The Erlenmeyer is heated on a hotplate until the



NO. ISSN 2487-1561

yellow solution is clear and white smoke comes out. After that, the sample was cooled, then filtered and the filtered solution was adjusted using distilled water in a 50 mL volumetric flask to the limit mark (Rosmiati & Silvia, 2021). Next, the mercury (Hg) concentration in the sample was measured using a cold vapor atomic absorption spectrophotometer at the Analytical Chemistry Laboratory, FMIPA ITB.

2.4 Preparation of Standard Solutions

The 1000 ppb standard solution for mercury metal is made into a series of standard solutions of 10 ppb, 50 ppb, 100 ppb, 150 ppb, 200 ppb and 250 ppb. Then, the absorption of the solution was measured at a wavelength of 253.7 nm. The standard solution absorption data obtained was used to create a calibration curve.

2.5 Sample Measurement

Determination of mercury metal in hair samples was determined by measuring its absorption using an Atomic Absorption Spectrophotometer (SSA) instrument with a wavelength of 253.7 nm (Rosmiati & Silvia, 2021). The sample absorption data obtained was analyzed to obtain the concentration of mercury metal in the mine workers' hair using a calibration curve.

2.6 Data Analysis Technique

Data obtained from the Atomic Absorption Spectrophotometer (SSA) test were then analyzed using a calibration curve. In addition, health data on mining workers obtained using questionnaires was tabulated, then described to determine the impact of mercury content in respondents' hair on health problems.

3. RESULTS & DISCUSSION

3.1 Preparation of Standard Solutions and Calibration Curves

Hg analysis in miners' hair samples was carried out using a standard calibration method. In this method, standard Hg solutions with various concentrations are prepared. Data from absorbance measurements of standard solutions with varying concentrations can be seen in Table 1.

Table 1. Results of Absorbance Measurements of Standard Hg Solutions.

Name	Concentration (ppb)	Absorbance
Standard 1	10	0,0182
Standard 2	50	0,0591
Standard 3	100	0,1053
Standard 4	150	0,1486
Standard 5	200	0,1964
Standard 6	250	0,2414

Data on the absorbance results of the standard Hg solution in Table 1 were then analyzed and a calibration curve was created, where the increase in concentration was directly proportional to the increase in absorbance. The calibration curve between concentration and absorbance can be seen in Figure 1.

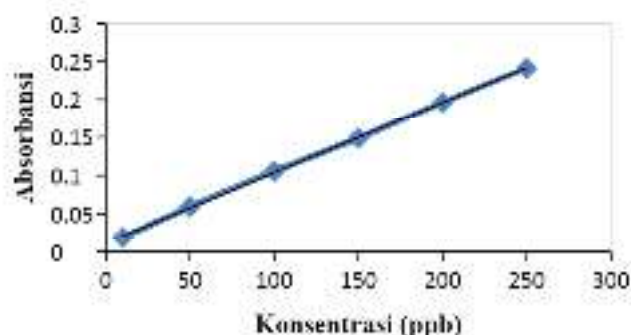


Figure 1. A Linear Relationship between Concentration and Absorbance.

Based on the calibration curve of the Hg standard solution in Figure 1, it shows that there is a linear relationship between concentration and absorbance. The greater the concentration of the standard solution, the greater the absorbance obtained. The linear relationship between concentration and absorbance has a regression equation $y = 0.0009x + 0.0112$ and $r = 0.9996$.

3.2 *Mercury Levels in Mine Workers' Hair*

Mercury levels in the hair of mine workers and control samples were obtained from calculations using a calibration curve. Data on mercury levels in hair samples obtained from the analysis results can be seen in Table 2.

Table 2. Mercury Metal Levels in the Hair of Mine Workers and Control Samples.

No	Location	Code Sample	Absorbance	Mercury levels (Hg) (µg/g)	Average level mercury (Hg)
1.	Location 1	SAK	0,0474	9,82	6,91
		HW	0,0568	8,24	
		AR	0,0604	2,67	
2.	Location 2	RK	0,0496	3,20	2,95
		OP	0,0346	2,88	
		RM	0,0388	2,77	
3.	Location 3	SJ	0,0486	2,57	1,27
		YP	0,0267	1,33	
		KL	0,0103	-0,10	
4.	-	AM	0,0632	3,91	-

The results of research conducted using an atomic absorption spectrophotometer with standard calibration methods showed that mercury levels in mine workers' hair ranged from -0.10-9.82 µg/g and control samples were 3.91 µg/g. Limits for mercury levels in hair according to World Health Organization (WHO), namely 1 µg/g, so that the mercury level in the KL sample code does not exceed the threshold limit, while the other 9 samples exceed the threshold limit for mercury in hair. The results of this research are in line with research by Nasir et al (2021), regarding the analysis of mercury levels in the hair of gold miners in Alue Baro Village, Meukek District using atomic absorption spectrophotometry, with the results of their research showing that the Hg levels in miners' hair were 1.01 – 2.08 mg /kg and the sample used as a comparison was 0.64 ppm. The results of this study indicate that the concentration of Hg in gold miners' hair has exceeded the tolerance limit set by WHO, namely 1 mg/kg.

The comparison of mercury levels between location 1, location 2 and location 3 can be seen in Figure 2, where location 1 has a higher average mercury level compared to the average mercury level at location 2 and location 3.

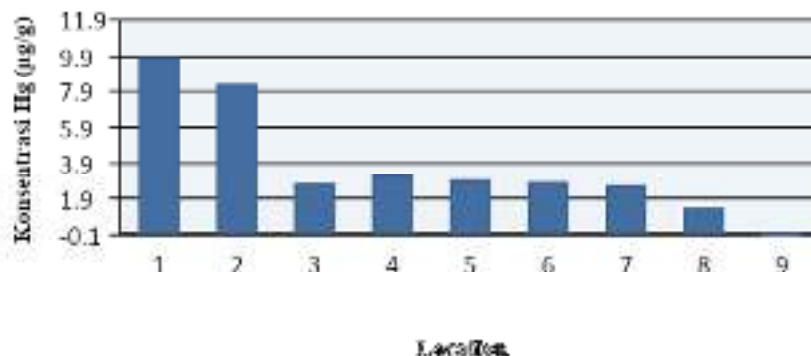


Figure 2. Mercury Levels by Location.

Based on the location of the miners, the average level of mercury in the hair of respondents who work at location 1 is higher than that of respondents who work at location 2 and location 3. This is because miners who work at location 1 use quite a lot of mercury to form gold metal grains. Location 2 has moderate mercury levels because when processing gold, miners use less mercury metal than at location 1, where when forming gold grains, miners sometimes get gold grains that have fused with mercury metal. Location 3 has low mercury levels because when processing gold the miners do not use mercury metal due to seepage of mercury metal from location 2 so that the gold obtained has formed grains that have been mixed with mercury metal.

Mercury contamination in gold miners is probably caused because in general, miners carry out the gold processing process without using personal protective equipment such as gloves and masks, so they can come into direct contact with mercury when mixing mercury with gold. Mixing mercury with gold will form an amalgam which is then burned to obtain pure gold and the mercury will evaporate into the air. In the gold processing process, mercury metal will enter the human body in several ways, namely through inhalation which can occur if the metal is in the form of vapor, so it will enter the body through the lungs. Metals in the skin will be absorbed through the pores, then passed to the bloodstream and distributed throughout the body (Mahmud et al., 2018).

Control samples with mercury concentrations exceeding the threshold indicate that both mining workers and people living around mining sites can be contaminated by mercury. The high levels of mercury in the control sample were probably caused by, based on the results of interviews conducted with respondents who said that, there had been a gold buyer who lived in the respondent's house for approximately 1 year, and at that time there were still lots of miners so that the respondent's house was the place where this was done. amalgam burning. This is because in the process of annealing or burning amalgam, gold ore that has been bound with mercury will be heated at a very high temperature and the mercury will evaporate, resulting in an inhalation process or the process of mercury entering the body, especially through the lungs in the form of vapor (Sonata et al., 2021).

3.3 Mining Workers' Health Conditions

The health condition of mine workers is known from the results of direct interviews using a questionnaire, with 10 questions using the Guttman scale. The questionnaire consists of 2 answer choices, namely Yes and No. Score 1 for a Yes answer and 0 for a No answer. The total results of mining workers' answer choices can be seen in Table 3.

Table 3. Total Results of Mine Workers' Answer Choices.

Respondent	Results of Answer Choices	
	Yes	No
SAK	4	SAK
HW	0	HW
AR	4	AR
RK	1	RK

OP	5	OP
RM	3	RM
SJ	4	SJ
YP	7	YP
KL	1	KL
-AM	0	-AM

The total data resulting from the mine workers' answer choices in Table 3 was then analyzed using the Guttman scale. From the Guttman scale analysis, there are 2 categories, namely mercury impact if the score is $\geq 50\%$ and no mercury impact if $< 50\%$. The percentage results using the Guttman scale can be seen in Table 4.

Table 4. The Percentage Results Use the Guttman Scale.

Respondent	Results Percentage Answer Yes (%)	Category
SAK	40	No impact
HW	0	No impact
AR	40	No impact
RK	10	No impact
OP	50	Impactful
RM	30	No impact
SJ	40	No impact
YP	70	Impactful
KL	10	No impact
-AM	0	No impact

Waste from gold processing which is carried out using the dangerous chemical mercury (Hg) has the potential to cause a decrease in environmental quality and risk health problems for miners. people living around mining sites. Based on the results of interviews using a questionnaire regarding the health conditions of mine workers, it shows that 2 respondents with sample codes YP and OP are included in the mercury impact category, while the other 8 respondents are included in the no mercury impact category. Based on direct interviews using a questionnaire, several symptoms were identified that could indicate the toxic effects of mercury. Respondents with sample code YP showed symptoms of mercury exposure in the form of tremors, frequent tingling, itching, weakness of the sense of taste, difficulty swallowing, diarrhea and headaches, while respondents with sample code OP showed symptoms of mercury exposure in the form of frequent tingling, itching, easy fatigue, headaches and eye irritation. This is in line with the statement of Priyambodo et al (2020), stating that if someone is poisoned with mercury, they will experience symptoms in the form of tremors, headaches, difficulty swallowing, decreased hearing, blurred vision, thick legs and arms, diarrhea, a blocked mouth, and swollen gums. Apart from that, some research stated that one of the early symptoms of chronic poisoning is a tingling sensation.

Respondents with sample codes YP and OP are included in the category above productive age, namely > 40 years, making it possible for respondents to easily experience symptoms of mercury exposure. This is in line with the statement of Bagia et al. (2023), which states that age can affect endurance or physical ability to respond to exposure to mercury entering the body. Age is one of the factors that can influence the emergence of symptoms due to exposure to mercury if miners are over the age of productive age (>40 years) because there has been physical decline, so physical abilities have been limited, and the body's endurance has decreased. Age affects a person's health, body mass fraction, decreased liver and kidney function, increased fat tissue, and decreased blood flow velocity, thus prolonging the presence of toxins in the body. In addition, Prihantini & Hutagalung (2018), also stated that the factors that determine whether health effects occur and their severity include the type of mercury in question, dose, age, duration of exposure, and route of exposure (inhalation, swallowing or skin contact).



NO. ISSN 2487-1561

Mercury is one of the most toxic metal elements in the environment and is very dangerous for human health and the ecosystem. Organic mercury compounds are generally more toxic than inorganic compounds. Methylmercury (MeHg) is the species that has received the most attention because of its bioaccumulation ability, affinity for macromolecules, and slow metabolism. Methylmercury (MeHg) is the most toxic mercury compound and is formed when inorganic mercury in the environment is methylated by microorganisms in soil, sediment, air or water (Hong et al., 2012). Complex biogeochemical processes that occur in an environment can change the element mercury into Methylmercury (CH_3Hg^+). This change process requires at least two chemical reaction steps, namely the oxidation process of Hg^0 becomes Hg^{2+} , then a chemical reaction occurs which changes the form of Hg^{2+} become CH_3Hg^+ . Chemical reactions that can change the form of Hg^{2+} become CH_3Hg^+ is called methylation. The chemical reactions that occur in the methylation process are controlled by sulfate reducing bacteria and microbes (Alpers & Hunerlach In Sumarjono, 2020). In severe cases, MeHg can cause neurological damage, memory loss, vision and hearing problems, and motor coordination problems. Long-term exposure to methylmercury can increase the risk of cancer and heart disease (Hong et al. 2012).

The emergence of health problems among illegal gold miners is due to the pollution that occurs during the mining process. In the gold processing process, miners use mercury (Hg) to bind the gold. The use of mercury when processing gold should be done with the correct procedures and knowledge, however in this illegal gold mining the miners process gold using mercury without using personal protective equipment so that the miners come into direct contact with the mercury used. Gold processing using mercury is carried out repeatedly by miners, allowing the accumulation of mercury metal in the miners' bodies which results in health problems (Masruddin & Mulasari, 2021).

4. CONCLUSION

Based on the results of the research that has been carried out, the following conclusions can be drawn. First, mercury levels accumulated in the hair of gold mining workers in Malomba Village, Dondo District, Tolitoli Regency with the highest level being $9.82 \mu\text{g/g}$, the lowest level being $-0.10 \mu\text{g/g}$ and the control sample being $3.91 \mu\text{g/g}$. The limit for mercury levels in hair according to the World Health Organization (WHO) is $1 \mu\text{g/g}$, so the mercury level in the KL sample code does not exceed the threshold limit, while the other 9 samples exceed the threshold limit for mercury in hair.

Second, of the nine miners who were used as research samples, 2 respondents with sample codes YP and OP were included in the mercury impact category, while the other 7 respondents were included in the no mercury impact category, with the symptoms felt by respondent YP indicating symptoms of exposure mercury in the form of tremors, frequent tingling, itching, weakness of the sense of taste, difficulty swallowing, diarrhea and headaches, while respondents with sample code OP showed symptoms of mercury exposure in the form of frequent tingling, itching, fatigue, headaches and eye irritation.

5. ACKNOWLEDGMENT

The author thanks the Chemistry Education Study Program, Faculty of Teacher Training and Education, Tadulako University.

REFERENCES

- Anderson, D. L., & Fisher, K. M. (2002). Biology concept cartoons: A constructivist tool for dealing with alternative conceptions. In an annual meeting of the National Science Teachers Association, San Diego, CA.
- Ariawan, I. (1998). Sample Size and Methods in Health Research. Depok: Faculty of Public Health, University of Indonesia.
- Bagia, M., Setiani, O., Raharjo, M., Joko, T., & Darundiati, YH (2023). The relationship between mercury exposure and neurological symptoms in traditional gold miners in Mantikulore district, Palu city. *Indonesian Journal of Environmental Health*, 22(2), 142–151.



NO. ISSN 2487-1564

- Chamid, C., Yulianita, N., & Renosori, P. (2010). Study of mercury (Hg) concentration levels in the hair of the people of Bandung city. *Proceedings of SNaPP2010 Exact Edition*, 107–131.
- Erdanang, E. (2016). The relationship between mercury (Hg) levels in the body and decreased cognitive function in workers Wumbubangka village gold mine subdistrict. North Rarowati district. Bombana. Thesis, Halu Oleo University. Kendari. Published.
- Faial, K., Deus, R., Deus, S., Neves, R., Jesus, I., Santos, E., Alves, C.N., & Brasil, D. (2014). Mercury levels assessment in hair of riverside inhabitants of the Tapajos River, Para State, Amazon, Brazil: Fish consumption as a possible route of exposure. *Journal of Trace Elements in Medicine and Biology*, 30, 1–11.
- Grandjean, P., Budtz-Jorgensen, E., Jorgensen, P. J., & Weihe, P. (2005). Umbilical cord mercury concentration as biomarker of prenatal exposure to methylmercury. *Environmental Health Perspectives*, 113(7), 905–908.
- Hong, Y.S., Kim, Y.M., & Lee, K.E. (2012). Methylmercury exposure and health effects. *Journal of Prevention Medicine and Public Health*, 45(6), 353–363. <https://doi.org/10.3961/jpmph.2012.45.6.353>
- Komalig, M.R. (2011). Potential for mercury contamination in the aquatic environment and humans in the Talawaan river [Unpublished Master's Thesis], Sam Ratulangi University, Manado.
- Mahmud, M., Lihawa, F., Banteng, B., Desei, F., & Saleh, Y. (2018). Mercury concentration in scalp hair and public health at the Buladu traditional gold mining location, North Gorontalo district. *Journal of Natural Resources and Environmental Management*, 8(2), 235–240.
- Masruddin & Mulasari, S.A. (2021). Health problems due to mercury (Hg) pollution in mining illegal gold. *Integrated Health Journal*, 12(1), 8–15.
- Nasir, M., Rahmah, W., Khaldun, I., Hasan, M., & Rusman. (2021). Analysis of mercury levels in hair gold miners in Alue Baro village, Meukek subdistrict using atomic absorption spectrophotometry. *Journal of Science & Science Learning*, 5(4), 269–278.
- Republic of Indonesia Minister of Health Regulation No. 57 of 2016. Concerning the national action plan for impact control health due to mercury exposure in 2016–2020.
- Prihantini, N.N. & Hutagalung, P. (2018). Mercury exposure in workers in the cosmetics industry is linked with health problems. *Widya Scientific Journal*, 4(3), 331–336.
- Priyambodo, S., Rahmat, B., Wira Buanayudha, G., Eka Widiastuti, IA, & Nurbaiti, L. (2020). Training reducing the impact of mercury on the community of small-scale gold mining areas in Sekotong village, West Lombok regency. *UNDIKMA Community Service Journal*, 1(2), 144–148. <https://doi.org/10.33394/jpu.v1i2.3097>
- Rosita, M. (2022). Analysis of mercury metal (Hg) in Janja river water in the Malomba village mining area, Dondo sub-district, Tolitoli district [Unpublished Thesis], Tadulako University. Hammer.
- Rosmiati, K., & Silvia, D. (2021). Analysis of mercury (Hg) levels in the hair of mine workers in mining gold without a permit (chest) in Kuansing district. *Initial Saelmakers Health Journal*, 4(2).
- Sonata MS, H., Thressia, M., & Shinta, D.Y. (2021). Mercury (Hg) toxicity in gold miners in Nagari Koto Tuo Sijunjung West Sumatra. *SEHATI: Health Journal*, 1(1), 33–38.
- Sumarjono, E. (2020). The complexity of mercury problems in gold ore processing based on perspective technical human environment and the future. *Curvatek*, 5(1), 113–122. <https://doi.org/10.33579/krvtk.v5i1.1833>
- World Health Organization. (2008). Guidance for Identifying Populations at Risk from Mercury Exposure. UNEP Chemicals and Department of Food Safety, Zoonoses and Foodborne Diseases. Geneva, Switzerland.



DEVELOPMENT ANDROID LEARNING MEDIA FOR ARABIC LANGUAGE LEARNING IN GRADE VII ISLAMIC STATE JUNIOR HIGH SCHOOL 25 JAKARTA

Muhammad Syamsuri Siddiq¹, Ahmad Marzuq², Andri Ilham³

^{1,2,3}Universitas Negeri Jakarta, Indonesia

*muhammad_9916822010@mhs.unj.ac.id

ABSTRACT

Synchronous and asynchronous learning has become very important after the Covid-19 era. The emphasis on learning with the asynchronous method is important because teachers and students can learn from anywhere and anytime. Educational institutions that have been using direct communication in learning have switched to learning using online media (mediated communication), one of which using the android application. These studies aim to develop android learning media for Arabic les-sons for grade VII students at Islamic State Junior High School 25 Jakarta.

This research method uses joint Research and Development (R&D) research, with the ADDIE (Analyze, Design, Development, Implementation and Evaluation) development model. Researcher have carried out all the stages in this study, namely by analyzing students' needs for android learning media, creating android learning media design, developing products based on the advice of media experts and material experts, implementing android learning media products to grade VII students online, as well as, evaluating android learning media based on student responses. The data collection techniques used in this study are online observations and questionnaires. Based on the conclusions, researchers obtained data that this medium is very feasible (88%) for students. Therefore, instructional media for teaching Arabic android is otherwise very viable for use in helping the Arab language learning activities for class VII Islamic State Junior High School 25 Jakarta.

Keywords: Arabic Language, Learning Media, Android

1. INTRODUCTION

In the world of modern education, online learning methods are divided into two main approaches: synchronous and asynchronous (Lewis & Clarke, 2009). Synchronous learning demands direct interaction between instructors and students in real time, such as through webinars, video conferences, or online chat. Meanwhile, asynchronous learning allows students to access learning materials and participate in learning activities without having to be present simultaneously, for example through discussion forums, recorded materials, or independent assignments. The development of information and communication technology has expanded the opportunities of these two learning methods (Fahmi, 2020).

The decision to use asynchronous methods in modern education is based on the need for flexibility, accessibility, and the development of student independence. With this approach, students have the freedom to determine their own learning schedule, according to their individual personal preferences and availability. It allows the participation of students who have tight schedules or time constraints without tying them to a specific time. In addition, the asynchronous method allows access to learning materials from multiple locations, overcomes geographical barriers, and facilitates student participation from different time zones. Thus, this approach encourages inclusivity in education by providing wider opportunities for students from diverse backgrounds and situations (Rindaningsih et al., 2021).

The use of asynchronous methods also aims to encourage independent learning and develop problem-solving skills. By working independently through learning materials, students have the opportunity to hone their skills of research, analysis, and information synthesis. They can tailor the learning process according to individual learning styles, complete tasks at their own pace, and actively explore topics that interest them. This not only increases understanding of concepts, but also establishes academic independence that is essential for students' development as lifelong learners (Lewis & Clarke, 2009).

Therefore, the asynchronous approach offers a customizable and inclusive approach to learning, meeting the needs and preferences of diverse students. According to a survey by the Indonesian Child Protection Commission, around 79% of children used smartphones during the pandemic, and many used them to study, watch YouTube, or play online games (Salam, 2019). Based on this point of view, the use of smartphones in learning can



be beneficial for teachers and students. The use of smartphones as educational aids also provides effectiveness and efficiency in achieving learning objectives. Using these media can overcome boredom and boredom when learning lessons, especially in Arabic language learning.

Studies of online learning and satisfaction with learning outcomes make it clear that there is dissatisfaction with results. This is influenced by various factors, including: quality of learning, time and learning media (Aji, 2020). Arabic lessons are materials that aim to encourage, guide, develop and improve abilities and promote a positive attitude towards the Arabic language, whether wise or productive (Yendra, 2016).

The main factor that determines the success of online learning is the readiness of educators and students for mastery of media and technology in combination with the material taught. Arabic educational media has a function, usefulness and a very important role in the learning process and the achievement of learning outcomes. With the use of educational media and the learning process you will become more active, emotional and creative. The classroom atmosphere will avoid boredom. The ability of teachers to use different forms and boredom is also decisive, because it is not monotonous with educational learning facilities (Mahmudah, 2022).

2. METHODS

This research uses research and development methods or often called R&D. Research and development is a research method to develop and test products in the world of education (Sugiyono, 2016). In addition to developing and testing research products, this research is used to find new knowledge about basic phenomena, as well as teaching practices. Basic phenomena are found through basic research, then to find teaching practices, applied research is applied (Sharon et al., 2011).

According to Gall et al., (1996), the R&D model is intended as "a process used to develop and validate teaching products" while development research is an effort to develop and verify products used in the learning process. The method used by researchers is a research model based on the ADDIE development model (analysis, design, development, implementation and evaluation). The ADDIE model began in the 1990s, developed by Dick and Carey. Addie is used to guide development in building effective training programs and infrastructure. It is used for a 5-stage model, namely the stages of analysis, design, development, implementation, and evaluation (Friedman & Schneider, 2018). In determining the value of the evaluation results, researchers use question instruments with the Likert scale as the basis for calculation (Emzir, 2010). The Likert scale is an instrument that uses a scale of 1 -5, all answers from instruments that use the Likert scale have a gradation from negative to very positive.

$$\text{Percentage (\%)} = \frac{\text{Total Score}}{\text{Maximal Score}} \times 100\%$$

Explanation:

Total score = total value obtained from the respondent's responses

Maximum score = number of statements x number of respondents x 5

The results of these calculations are then matched to the following table criteria from the Likert scale:

Table 1. Percentage of Assessment.

No	Percentage of Achievement	Interpretation
1.	0% - 19%	Very poor
2.	20% - 39%	Poor
3.	40% - 59%	Enough
4.	60% - 79%	Good
5.	80% - 100%	Very good



3. RESULTS & DISCUSSION

The result of this research is an android application called *Latih Faham* which can be used as a learning medium for learning Arabic in Class VII of SMP Islam Negeri 25 Jakarta. Android educational media development is Arabic language teaching following the ADDIE development model, which consists of five stages, namely needs analysis, product design, product development, product implementation, and product evaluation. The creation data is as follows:

3.1 *Product Analysis*

At this stage, the researcher analyzes the educational goals to be achieved through the "Learning Experience Plan" created before the learning process. Then researchers interviewed Arabic teachers about how the teaching process of learning Arabic at MTs Negeri 25 Jakarta regarding student responses during the learning process, as well as problems that occur during the learning process both from the side of a teacher and students or facilities, especially in distance learning. Then researchers distributed questionnaires to grade VII MTs Negeri 25 Jakarta students to find out students' needs for learning media to be used during distance learning (PJJ).

3.2 *Product Design*

At this stage researchers use teaching materials used for two semesters in Arabic lessons at MTs Negeri 25 Jakarta with reference to the latest book published by the Director of Curriculum, Facilities, Institutions and Students (KSKK Madrasah), Ministry of Religious Affairs. The chapters that the researcher uses in this book consist of 3 topics: acquaintances, school facilities, school equipment. Then the researcher creates a StoryBoard that will be used as a reference for making Train Understanding. At this stage it is a continuation of the results of product analysis that has been delivered by students, teachers and media experts as a basis for making designs from research products, namely Train Understanding.

3.3 *Product Development*

The next step, researchers carry out Android learning application production activities tailored to storyboards designed and evaluated by experts. This activity is carried out using a tool in the form of a questionnaire that aims to get advice and respond to the feasibility of implementing Android before testing it in the field. The development process of android learning media consists of three stages, namely pre-production, production, and post-production. Pre-production begins with preparing all the tools needed to create learning media, both hardware and software. The hardware component consists of a computer and mouse, while the software consists of applications that are used as needed, including: Unity 3D, Github and Microsoft Visual Studio.

Then the production stage is the application creation stage, as already illustrated with StoryBoard at the product design stage. The production stage is divided into two phases: the beginning, the end and the essence of the material. The initial stage of creating Android learning media is to create a script adapted from Github using Microsoft Visual Studio. The final stage of creating an application is the unification of all quoted text in the application rendered with Unity 3D.

3.5 *Product Implementation*

The next step is for the students to have the product created, developed and validated by material and media experts. This implementation involves grade VII students of MTs Negeri 25 Jakarta using this Android Arabic learning media during the distance learning process. This stage aims to see the clarity of product content, product attractiveness, ability to motivate students and their activities, and ease of use of the Application during the learning process.

3.6 *Product Evaluation*

The last step is to measure or evaluate Android learning media products developed and tested to Grade 7 MTs Negeri 25 Jakarta students in the learning process. This step is carried out to find out the response of



students and to find out the level of feasibility of the products that have been developed. At this stage, researchers use a questionnaire evaluation tool containing 10 questions distributed via google form at the end of learning. In addition, researchers also provide questionnaires to material experts and media experts as evaluation material for this application. In addition to answering questionnaires, material experts and media experts also provide advice related to the development of this application so that it is more widely accessible to grade VII school children, namely by entering it into *the Google Play Store* to make it easier to download. The following is an evaluation table given to students, material experts and media experts in the product evaluation stage:

Table 2. Evaluation Results

Evaluator	Percentage	Category
Material Expert	81,8%	Very Good
Media Expert	92,2%	Very Good
Student	87,8%	Very Good
Average	87,2%	

4. CONCLUSION

After completing the above research stages, researchers have several conclusions including: the need for diverse educational media to be the basis for analysis of the use of Android applications as learning media is appropriate to be applied to facilitate Arabic learning for students. In addition, the creation of this application is also sourced from teaching materials, namely books published by the Director of Curriculum, Facilities, Institutions and Students (KSKK Madrasah), Ministry of Religious Affairs so that it greatly helps the learning process of students outside the classroom.

This Android learning media will be a creative and innovative way to improve the quality of education in accordance with the times, especially during distance learning. In addition, researchers also found that the importance of collaboration between application developers, namely IT experts and Arabic language teachers in order to create better and more useful learning applications in the future.

5. ACKNOWLEDGMENTS

On this occasion I would like to give a special acknowledgement to the Supervisor who has helped me in completing this paper. Their guidance and assistance and direction not only encouraged me to complete this research but also helped until this research could be completed on time and could be used properly. I hope that the results of this paper can be a reference and the application that has been developed can be used, especially for grade VII MTs 25 Jakarta students.

REFERENCES

- Aji, R. H. S. (2020). Dampak Covid-19 pada pendidikan di Indonesia: Sekolah, keterampilan, dan proses pembelajaran. *Jurnal Sosial & Budaya Syar-i*, 7(5), 395–402.
- Emzir. (2010). Metodologi penelitian pendidikan kuantitatif & kualitatif. *Metodologi Penelitian Pendidikan Kuantitatif & Kualitatif*. <https://doi.org/10.1017/CBO9781107415324.004>
- Fahmi, M. H. (2020). Komunikasi synchronous dan asynchronous dalam e-learning pada masa pandemic Covid-19. *Jurnal Nomosleca*, 6(2).
- Friedman, A., & Schneider, E. (2018). Developing a visualization education curriculum in the age of big data using the dick and carey model. *Visual Communication Quarterly*, 25(4), 250–256.
- Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction*. Longman Publishing.
- Lewis, J., & Clarke, A. (2009). Synchronous learning and web-based communication with Adobe Acrobat. *Multimedia Information & Technology*, 35(4), 8–9.



- Mahmudah, U. (2022). *Pengembangan bahan ajar bahasa Arab berbasis multimedia interaktif (ispring suite 10) kelas V SD Muhammadiyah Kadisoka*. digilib.uin-suka.ac.id. <https://digilib.uin-suka.ac.id/id/eprint/56566>
- Rindaningsih, I., Findawati, Y., Hastuti, W. D., & Fahyuni, E. F. (2021). Synchronous and asynchronous with flipped learning environment in primary school. *PrimaryEdu-Journal of Primary Education*, 5(1), 33–44.
- Salam, M. Y. (2019). Pengembangan materi ajar bahasa Arab terpadu berbasis tema di MTs Thawalib Padang Panjang. *Lughawiyah: Journal of Arabic Education*. <https://ojs.iainbatusangkar.ac.id/ojs/index.php/lughawiyah/article/view/1577>
- Sharon. E. Smaldino. (2011). Instructional technology & media for learning: Teknologi pembelajaran dan media untuk belajar. <https://doi.org/10.1017/CBO9781107415324.004>
- Sugiyono. (2016). Metode Penelitian dan Pengembangan (Research and Development/R&D). In *Bandung: Alfabeta*. <https://doi.org/10.1016/j.drudis.2010.11.005>
- Yendra, S. S. (2016). Mengenal Ilmu Bahasa (Linguistik). Deepublish.



ANALYSIS OF THE NEED FOR VIRTUAL REALITY LEARNING MEDIA IN ANIMAL DEVELOPMENTAL STRUCTURE COURSES

Zulkifli Ahmad^{1*}, Hamsu Abd. Gani², Abdul Haling³
^{1,2,3}Makassar State University, Indonesia
*zul_bio@unkhair.ac.id

ABSTRACT

Biology learning on the Animal Development Structure-2 (SPH 2) course, mostly contains material of an abstract nature, and is difficult for students to understand. The difficulties of understanding the concept are supposed to be a contributing factor in the low graduation rate of students, so it requires a 3D visualization media instrument to make learning more active and meaningful. The study aims to reveal the needs of lecturers and students towards the use of virtual reality learning media in SPH-2 subject. The research data was collected using a questionnaire to analyze the percentages, while the qualitative data describe the responses of lecturers and students. The Questionnaires are distributed openly using google form, then the data cleansing process is carried out. The research instrument was developed utilizing five indicators; teaching preparedness, respondent knowledge, respondent experience, media advantages and shortcomings, and general user responses. The research results based on indicators show that (1) lecturers' teaching readiness is categorized as high ($\geq 70\%$); (2) lecturers' knowledge of virtual reality was 92.9% and students' knowledge was 86.8%; (3) the experience of respondents as many as 71.43% of lecturers and 39.47% of students who have used VR; (4) the main obstacle in creating and using VR is expensive costs (36.54%); (5) the topics chosen by respondents were Gametogenesis (36.49%) and Fertilization (28.38%). A total of 95% of respondents felt happy and assisted when learning using virtual reality, and 86.8% of students stated that virtual reality learning media can be applied to SPH-2 subjects. The results of this study can be used as a preliminary test at the stage of development of virtual reality learning media for the students.

Keywords: needs analysis, learning media, animal development structure, virtual reality

1. INTRODUCTION

Currently, echoes of the industrial revolution are being echoed by the Ministry of Education, Culture, Research and Technology. It cannot be avoided that the digitalization phenomenon has spread to various sectors, including education. Therefore, the curriculum and educational methods must be adjusted. The signifier of this phenomenon is the application of online technology and the rise of digital platforms in various industrial sectors so that the demands of the current era are speed and accuracy (Thammasaeng et al., 2016).

Student-centered learning can be mediated by providing interactive learning media, and student learning outcomes can be measured by providing interactive forms of assessment as well. Students generally consider science subjects as abstract material, so they require in-depth understanding and visualization skills (Gilbert, 2004). Students who have difficulty understanding concepts well can give rise to misconceptions. According to Larkin (2012), misconceptions among students must be considered because they can interfere with students' learning of scientific principles and concepts. Thus, choosing learning media is an important factor in minimizing student misconceptions (Heinich et al., 2002; Larkin, 2012).

The use of virtual reality in scientific learning procedures is believed to improve student learning outcomes. This is because science learning has many complicated procedures and intuitive processes that are difficult to imagine and understand in the correct way. Therefore, science learning with the addition of technological tools in the form of virtual reality is needed to extract intuitive and abstract learning content so that it can be understood well by students (Gopalan et al., 2017). Virtual media can be used to present abstract or complex concepts in a visual form (Liyuan, 2020), that is easier for students to understand. In addition, virtual media also allows students to experience situations or environments that may be difficult or dangerous in real life, such as airplane flights, space exploration, animal surgery or medical simulations. Virtual reality can provide an immersive experience for students (Beck, 2019), and can provide real sensations to increase retention and understanding of learning material (Arini, 2023).



Learning the structure and development of animals-2 has many topics that are abstract and difficult for students to understand. The limited availability of teaching materials and less varied learning media further increase problems for students in learning. Research on student responses to the use of augmented reality learning media among SMA Negeri 5 Ternate City students also provides an overview of the phenomenon of using technology-based media (Ahmad et al., 2022). This research is material for consideration in developing virtual media for several topics in the animal structure and development course-2. One of the basic considerations in developing learning media is determining the topic and initial responses from users (lecturers and students), so that the learning media developed is in accordance with the needs and characteristics of students.

2. METHODS

This research uses a quantitative descriptive approach, with data collection techniques carried out through open Google Form questionnaires, interviews and documentation. The questionnaire instrument has five indicators, namely lecturer readiness in teaching, respondent's knowledge about VR, respondent's experience of VR, obstacles in using VR, and selection of course topics. The questions in the questionnaire instrument use a Likert scale and Guttman scale, and are analyzed using a percentage formula. Presentation of data in tabular and graphical form. To determine the category level of the lecturer's teaching readiness indicator, a categorization auxiliary table with interval ranges and percentage values is used as follows:

Table 1. Categorization of Lecturers' Readiness Levels.

Category	Interval	%	Max score	Ideal score
High	21-30	≥ 70	30	30
Middle	11-20	34-69		
Low	0-10	≤ 33		

3. RESULTS & DISCUSSION

After clearing and analyzing the data, 52 respondents were determined, consisting of 14 respondents who work as lecturers and 38 students. All respondents (lecturers and students) came from 3 universities in North Maluku province. The research results can be detailed as follows:

3.1 Lecturer Preparation in Teaching

Lecturer readiness in teaching includes readiness of learning tools with sub-indicators; syllabus readiness, Lecture Event Unit (SAP) readiness, readiness to make LKM, learning media readiness, observation sheet readiness, and Evaluation readiness). The results of the analysis show that lecturers' readiness in teaching is categorized as high ($>70\%$) with a score frequency of 12, and in the medium category (34-69% interval) with a score frequency of 2. In this indicator, there are no lecturers who are not ready to prepare. learning tools. Generally, lecturers have prepared Syllabus, SAP, Learning Media, LKM, Observation Sheets and Evaluation. Of the 6 sub-indicators measured, there were 5 lecturers who were still low in 3 sub-indicators, namely the Syllabus sub-indicator (1 person answered that they rarely prepare), readiness to make LKM (1 person answered that they rarely prepare), and readiness to make Evaluations (3 people answered rarely prepare).

According to Maryani et al. (2020) lecturers in the normal era need to prepare strategies and variations of models in learning. Apart from that, the learning equipment which is an administrative requirement for higher education Tri-Dharma needs to be prepared by the lecturer before carrying out lectures. Meanwhile, according to the research results of Dina, (2018), lecturers must be able to prepare learning tools well, including formulating learning objectives accurately and clearly. Planning learning tools is a preventive action to prevent deviations from learning objectives and/or teaching materials.



3.2 Respondents Knowledge about Virtual Reality

There were 13 lecturers who knew about VR (92.9%), while 1 person (7.1%) stated that they did not know about VR, while 33 students (86.8%) said they did not know about VR. (0.13%) stated that they did not know about VR.

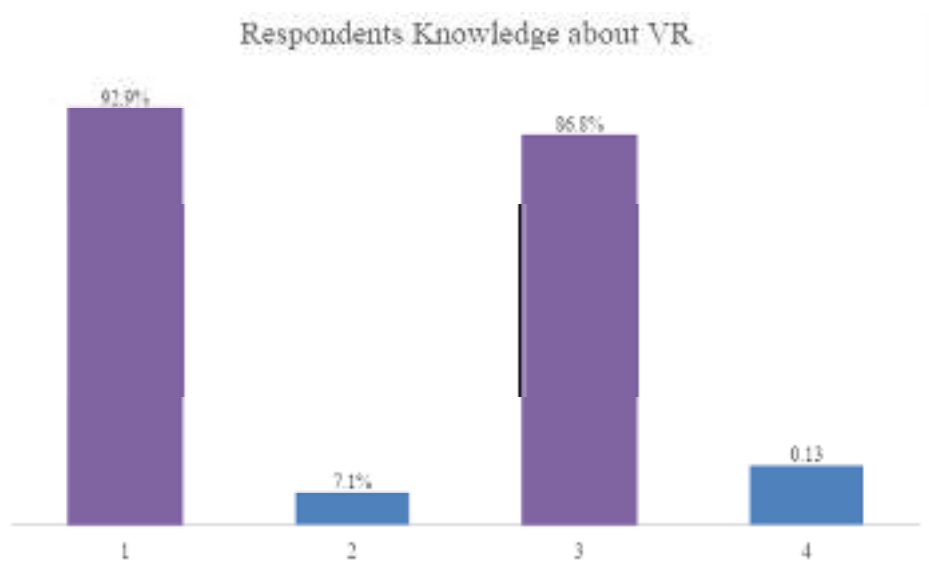


Figure 1. Respondents' Knowledge about Virtual Reality.

Based on Figure 1, it shows that the majority of lecturers (92.9%) and students (86.8%) already know about virtual reality. Information about VR is obtained from various internet sources and social media which is increasingly popular in the 4.0 era. For lecturers who don't know about VR (7.1%), this is due to a lack of information about the term virtual reality, while for students who don't know about VR (0.13%) it is due to not having a smartphone and rarely accessing the internet.

3.3 Respondents' Experiences

The results of data analysis show that 71.43% of respondents (lecturers) stated that they had used virtual reality, and 28.57% had never used VR. Meanwhile, for students, 39.47% said they had used VR and 60.53% said they had never used VR.

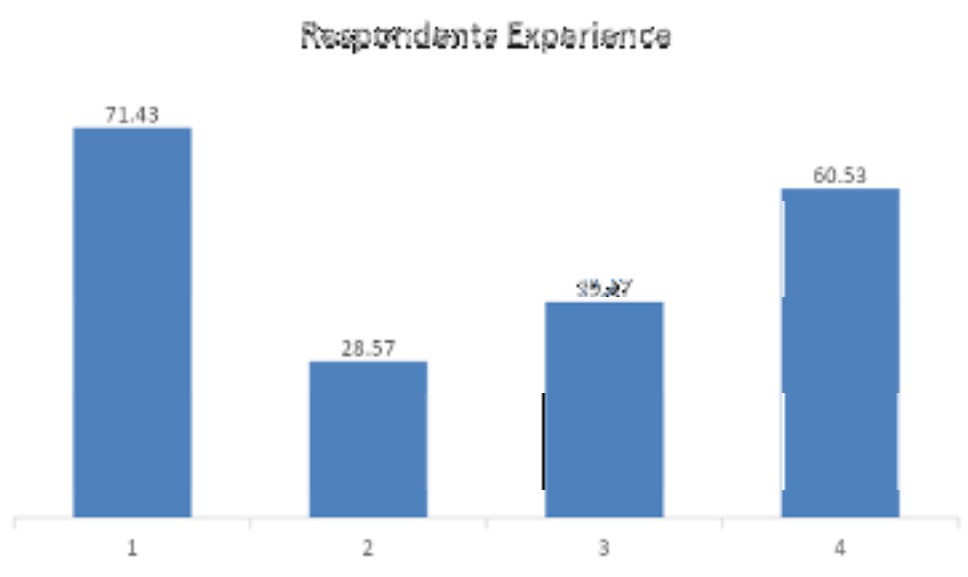


Figure 2. Respondents' Experience about Virtual Reality.

Based on Figure 2, it shows that there are lecturers and students who already know about virtual reality, but have never used it. As many as 71.43% of lecturers have used VR, and 28.97% have never used VR. Meanwhile, among students, 39.47% said they had used virtual reality, and 60.53% had never used VR. The relationship between knowledge and use of virtual reality can be clustered as follows:

Table 2. Level Categories Between Knowledge and Use of VR among Respondents.

Cluster	%	Category
Individuals who know VR, and have used VR	48,08	Middle
Individuals who know VR, but have never used VR	40,38	Middle
Individuals who are not familiar with VR, but have used VR	0,00	No data
Individuals who are not familiar with VR, and have never used VR	11,54	Low

Based on Table 2, it shows that someone is said to have knowledge about an object, but may not necessarily have used the object that they already know. A person's knowledge is still at the epistemological level, so it needs to be proven through empirical facts. Interestingly, there were 11.54% of respondents who did not know about VR and had never used it. In this cluster, there is 1 lecturer and 5 students.

3.3 Respondents Facing Problems

This indicator provides information about respondents' opinions regarding the obstacles faced in creating and using virtual reality learning media. According to respondents, the main obstacles in creating and using VR are expensive costs (36.54%), technical aspects of creating VR media (in terms of time, learning style, syntax) amounting to 21.15%, internet and network constraints amounting to 15.38 %, who answered there were no obstacles was 13.46%, support for facilities and infrastructure was 9.62%, and teacher and lecturer readiness was 3.85%.

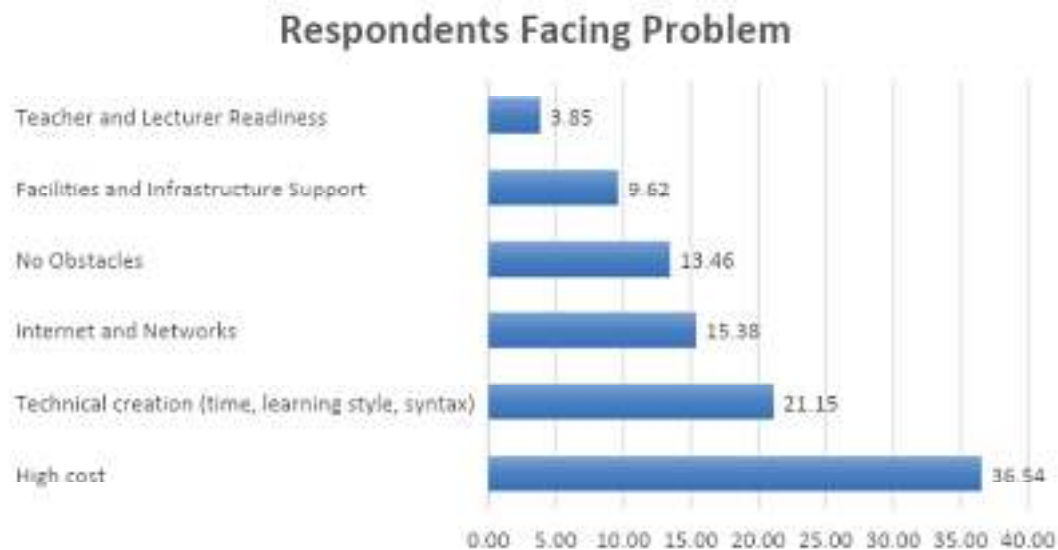


Figure 3. Respondents Facing Problems.

Based on Figure 3, it shows that the problem in learning using virtual learning is the high costs, including the procurement of VRBox headsets and controllers. The high cost of procuring VR equipment is positively correlated with the hardware and software specifications produced by the development company (Farra et al., 2019). The higher the specifications, the price offered is quite high. Apart from that, technical manufacturing factors are also educators' biggest complaints. Respondents stated that they had a strong desire to apply virtual reality learning media in their learning topics, but had difficulty in the process of creating it. The third biggest problem is the unstable internet and network, making it difficult for lecturers and students to apply it in class.

3.4 Topic Selection

Most of the topics in the SPH-2 course are abstract and difficult to explain conventionally. Of the several topic choices in the SPH-2 course, as many as 27 respondents (36.49%) chose the topic Gametogenesis, as many as 21 respondents (28.38%) chose the topic Fertilization, 12 respondents (16.22%) chose the topic organogenesis and embryonic membrane formation, 8 respondents (10.81%) chose the topic of Blastula and Neurulation, 4 respondents (5.41%) chose the topic of regeneration, and 2 respondents (2.7%) chose the topic of metamorphosis.



Figure 4. Topic Selection.

The selection of topics by respondents can provide researchers with an idea of the topics needed to be developed in virtual reality learning media. Most of the topics in studying Animal Development Structure-2 can



be taught using virtual reality learning media, but researchers need to choose the main topic based on considerations from users (lecturers and students). Selection of learning topics is the initial product development stage in development research procedures adapted from Borg & Gall 1983 in (Richey & Klein, 2014; Setyosari, 2016).

4. CONCLUSION

A total of 95% of respondents felt happy and assisted when learning using virtual reality, and 86.8% of students stated that virtual reality learning media can be applied to SPH-2 subjects. According to the respondents' opinion, the material topics in the animal development structure course-2, which are needed for the application of virtual reality learning media, are the topics of Gametogenesis (36.49%) and Fertilization (28.38%).

5. ACKNOWLEDGMENTS

The authors would like to thank the lecturers and students from various universities in North Maluku province, who were willing to act as respondents and have taken the time to fill out this research questionnaire. Thank you also to the honorable Prof. Dr. Hamsu Abd. Gani, M.Pd. and Abdul Haling, Ph.D. for corrections and willingness to review our writing.

REFERENCES

- Ahmad, Z., Ahmad, H., & Rahman, Z. (2022). Penggunaan media pembelajaran augmented reality berbantuan Assemblr Edu untuk meningkatkan hasil belajar siswa SMA Negeri 5 Kota Ternate. *Jurnal Ilmiah Wahana Pendidikan*, 8(23), 514–521. <https://doi.org/10.5281/zenodo.7421774>
- Arini, R. E. (2023). Merangkul teknologi: Mengintegrasikan realitas virtual dalam pengalaman pembelajaran. *Jurnal Pendidikan West Science*, 1(06), 350–356.
- Beck, D. (2019). Special Issue: Augmented and virtual reality in education: Immersive learning research. *Journal of Educational Computing Research*, 57(7), 1619–1625. <https://doi.org/10.1177/0735633119854035>
- Dina, N. S. (2018). Kesiapan dosen program studi pendidikan sejarah dalam pelaksanaan pembelajaran di Universitas PGRI Palembang. *Kalpataru: Jurnal Sejarah Dan Pembelajaran Sejarah*, 2(1), 30. <https://doi.org/10.31851/kalpataru.v2i1.1314>
- Farra, S. L., Gneuchs, M., Hodgson, E., Kawosa, B., Miller, E. T., Simon, A., Timm, N., & Hausfeld, J. (2019). Comparative cost of virtual reality training and live exercises for training hospital workers for evacuation. *Computers, Informatics, Nursing: CIN*, 37(9), 446–454. <https://doi.org/10.1097/CIN.0000000000000540>
- Gilbert, J. K. (2004). Models and modelling: Routes to more authentic science education. *International Journal of Science and Mathematics Education*, 2, 115–130.
- Gopalan, V., Bakar, J. A. A., & Zulkifli, A. N. (2017). A brief review of augmented reality science learning. *AIP Conference Proceedings*, 1891(October). <https://doi.org/10.1063/1.5005377>
- Heinich, R., M, M., R.D., J., & S.E., S. (2002). Instructional media and technologies for learning. In *Upper Saddle River: New Jersey*.
- Larkin, D. (2012). Misconceptions about “misconceptions”: Preservice secondary science teachers’ views on the value and role of student ideas. *Science Education*, 96(5), 927–959.
- Liyuan, L. (2020). The application of virtual reality and augmented reality technology in the field of education. *Journal of Physics: Conference Series*, 1684(1). <https://doi.org/10.1088/1742-6596/1684/1/012109>
- Maryani, H., Sintara, D., & Halim, A. (2020). Kesiapan dosen dalam meningkatkan mutu pendidikan di era normal. *Seminar Hasil Penelitian*, 100–107.
- Richey, R. C., & Klein, J. D. (2014). Design and development research. In *Handbook of Research on Educational Communications and Technology*. Springer.
- Setyosari, H. P. (2016). *Metode Penelitian Pendidikan & Pengembangan*. Prenada Media.
- Thammasaeng, P., Pupat, P., & Petchaboon, S. (2016). Needs assessment of information and communication technology literacy (ICT literacy) of students in secondary educational service area. *International Journal*



of Emerging Technologies in Learning, 11(12), 9–13. <https://doi.org/10.3991/ijet.v11i12.5798>



HOW LEARNERS PERCEIVE THE KAMPUNG INGGRIS LC INSTAGRAM ACCOUNT FOR ONLINE ENGLISH LEARNING

Kukuh Handi Handoko¹, Rahmatun Nisa², Siti Safura^{3*}
^{1,2,3}University of Muhammadiyah Aceh, Indonesia
*sitisafura11@gmail.com

ABSTRACT

The objective of this study was to assess the way in which learners perceive the Kampung Inggris LC Instagram account as a tool for online English language learning. The research utilized a quantitative approach and employed purposive sampling. A questionnaire, featuring a Likert scale, was distributed to 36 respondents in order to collect data on learners' perceptions of the Kampung Inggris LC Instagram account. Descriptive analysis techniques, such as creating frequency tables, were used to analyze the data and present detailed results. The study provided a comprehensive overview of learners' perceptions regarding the effectiveness of the Kampung Inggris LC Instagram account in facilitating online English language learning. The final results indicated that the use of the Kampung Inggris LC Instagram account had a significantly positive impact on learners' English language skills, with an average positive percentage of 83.8% (strongly agree). These findings are valuable for the improvement of English language learning strategies through online platforms.

Keywords: *Learners' Perception, Kampung Inggris LC, Instagram.*

1. INTRODUCTION

As a global language, English is widely studied for professional or academic purposes and for the ability to interact with individuals from diverse cultural backgrounds. Acquiring proficiency in English enhances communication skills in the language and contributes to cognitive and socio-personal development, benefiting students in academic pursuits and personal endeavours (Blazquez, 2018). Consequently, English ranks as the most prevalent language worldwide following Mandarin Chinese. It serves as both the primary and secondary language in numerous countries, such as Malaysia, India, Singapore, and Pakistan.

There are many parts of English that should be understood and used as the foundation for learning the language. Speaking, writing, reading, and listening are a few of them. Students can gain insight into the English language through printed books found in school or in public libraries. With the development of Internet network technology, communication and information gathering are no longer constrained by place and time. Internet users have unrestricted access to the information they need at any time and from any location (Adri, 2007). Learning English is advantageous for individuals, and in this digital age, students can also pursue online education through the internet, which offers greater accessibility and flexibility in terms of timing and location.

According to Kemp (2022), there were 204.7 million internet users in Indonesia in January 2022 and there were 191.4 million social media users in Indonesia in January 2022. This report shows that the level of internet users in Indonesia is very high, followed by the level of use of social media which is also very high. With the use of social media, students can actively study by locating sources of information, particularly in English. Students are more independent in search of new knowledge from a variety of available media, including the social media platform, such as Instagram. Indonesia has 99.15 million users of Instagram as of early 2022 (Kemp, 2022). There are several Instagram accounts that produce content for learning English with the aim of making it simpler for students to learn the language through uploaded content. Prihatiningsih (2017) stated that Instagram is a social media that is able to fulfil one's needs, namely cognitive, affective, personal integration and social integration needs. According to Rahman (2021), Instagram can be used as an alternative social media platform for learning English, where there are a lot of highly interesting photo postings to convey information about the English language. Furthermore, Instagram can also improve the quality of student learning because it can be coupled with an instructional approach.

Salehuddin et al. (2020) stated that learning assisted by Instagram social media is the most suitable learning model and to achieve knowledge among users of Instagram, creative learning assisted by Instagram social



media is the most suitable one. Min & Hashim (2022), Instagram is one of the social media to increase learning motivation to improve English. Teachers can combine conventional learning methods with current learning methods, because nowadays learners prefer visually attractive items over reading books and Instagram can be one of the social media used to learn creatively and innovatively. With the addition of a few Instagram accounts dedicated to learning English, Instagram has transformed into a social media platform that enhances student proficiency in using English through its caption, video, and photo features (Putri, 2022).

There are numerous accounts on Instagram that give English instructional videos. Due to the large number of accounts in the Instagram application, the researcher chooses Kampung Inggris LC. LC is an abbreviation for Language Center, which is a course institution at Kampung Inggris in Pare. Kampung Inggris LC is one of the most favourite places for English courses, because they provide easy access to learn English through the content provided on their social media accounts anytime and anywhere (Khairunisa, 2020). Kampung Inggris LC is one of the Instagram accounts that has content for learning English and is readily accessible online at any time and from any location.

On Instagram, Kampung Inggris LC usually upload content about English vocabulary, and English slangs that are related to Indonesian terminology, common mistakes, and some advice to help users improve their speaking skills. By July 2023, Kampung Inggris LC had uploaded eight thousand four hundred and thirty posts about learning English and had 1.6 million followers on Instagram. Kampung Inggris LC uploaded and created unique and interesting language learning content so that followers have no difficulty understanding it (Pramesti, 2023).

According to Munawaroh (2022), there are some benefits to learning English through Kampung Inggris LC Instagram account: (1) Improve English skills by uploading various English material content that can increase the knowledge of its followers on Instagram. various kinds of English materials uploaded by them on Instagram; (2) Free access anytime and anywhere via the user's mobile device; (3) Various content materials about learning English uploaded in the form of photos and videos. Not only interesting content, the delivery of material which is very clear also makes Kampung Inggris LC widely followed by Instagram users to improve their English skills.

From the explanation above, the internet is the most likely medium to be chosen or utilized as a source of learning by individuals with independent learning (Juwandi & Widyiana, 2019). This can be concluded that technological developments really help the learning process for students independently and Instagram application is an example of technological developments that present a variety of accounts that make content to learn English. Thus, this research was conducted to see learners' perception regarding:

1. Does Kampung Inggris LC Instagram account help learners to improve proficiency in English?
2. How does Kampung Inggris LC Instagram account help learners to increase English mastery?

2. METHODS

The research uses a quantitative approach with a descriptive method. According to Sugiyono (2012), descriptive research is a study that is undertaken to discover the value of the variable, either one or more variables without drawing comparisons or connecting with other variables. This research was to find out learners' perception towards Kampung Inggris LC instagram accounts to increase their English mastery through online learning, regarding whether Kampung Inggris LC can improve students' English mastery and how Kampung Inggris LC can improve students' English mastery.

The population of this research were all English department students at University of Muhammadiyah Aceh and the students of UIN Ar-Ranniry. The sample were 36 students who have followed or often accessed the Kampung Inggris LC account on Instagram, that sample was determined by using purposive sampling, in which purposive sampling is based on certain considerations such as characteristics that have been known previously (Notoatmodjo, 2010). The researchers use purposive sampling to determine the sample of study that requires specific criteria so that the sample taken is in accordance with the research objectives.

The instrument used in this research was questionnaire. Questionnaire is a data collection technique that is carried out by providing a collection of questions or written statements to respondents to answer (Sugiyono, 2012). The questionnaire was adapted from several studies that had variables that were close in this research. The



questionnaire consists of some statements that were distributed through Google Form. The researcher uses Likert Scale starting from Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree.

Data analysis in this research was carried out after data from all respondents was collected. The data analysis technique of this research uses descriptive analysis. According to Sugiyono (2012), Descriptive analysis is a method that is used to analyze data by describing the data that has been collected as it is without intending to make general conclusions.

3. RESULTS & DISCUSSION

This section contains a description of the data obtained based on characteristics of quantitative research. The data presented from the result of quantitative data analysis in the form of frequency table. The process of data collection was carried out by distributing questionnaires indirectly to respondents. Indirect distribution is carried out online using Google Form through the WhatsApp application. The data was obtained through 36 respondents from University of Muhammadiyah Aceh and UIN Ar-Raniry. The data was obtained from questionnaire as follows :

Table 1. The Result of Data Analysis.

No.	Question	Frequency	Percentage	Answer
1.	Kampung Inggris LC Instagram account helps me in improving my understanding in English	158	87,7%	SA
2.	I feel Kampung Inggris LC Instagram account is effective in helping me learn English	150	83,3%	SA
3.	I feel Kampung Inggris LC instagram account motivates me to practice learning English	154	85,5%	SA
4.	I feel Kampung Inggris LC instagram account encouraged me to participate in learning English activities	152	84,4%	SA
5.	I feel material presented on the Kampung Inggris LC instagram account improves my ability in English	152	84,4%	SA
6.	I often participate in English quizzes or challenges on the Kampung Inggris LC instagram account	127	70,5%	A
7.	I often access English learning materials on the Kampung Inggris LC instagram account	138	76,6%	A
8.	I can easily understand the English learning material on the Kampung Inggris LC instagram account	157	87,2%	SA
9.	I can easily access English learning materials on the Kampung Inggris LC instagram account	149	82,7%	SA



10.	I feel material presented on the Kampung Inggris LC instagram account is useful for me in learning English	153	85%	SA
11.	I feel teacher on Kampung Inggris LC instagram account explains in detail the discussion material being taught	149	82,7%	SA
12.	I feel material presented on Kampung Inggris LC instagram account improve my vocabulary skills in English	149	82,7%	SA
13.	I feel my speaking skills have improved by learning through Kampung Inggris LC instagram account	145	80,5%	SA
14.	I feel my listening skills have improved by learning through Kampung Inggris LC instagram account	147	81,6%	SA
15.	I feel my grammar skills have improved by learning through Kampung Inggris LC instagram account	149	82,7%	SA
Average		148,6	83,8%	SA

Based on the results of 36 respondents' responses to questions related to learning through the Kampung Inggris LC Instagram account, some general conclusions can be drawn. The result indicated that the majority of respondents responded positively to the presented learning materials on the account, stating that the material was beneficial and effective to enhancing their proficiency in English. The results also showed that most respondents considered learning through Kampung Inggris LC instagram account have a positive impact on their speaking, listening, grammar, and vocabulary skills as seen in questionnaire number 1, 2 5, 10, 12, 13, 14 and 15 that displayed the majority of the respondents expressing strongly agreed and agreed stance on improving of their English mastery and abilities.

The accessibility of the learning materials was also rated highly, most respondents finding it easy to access the learning material. The detailed and comprehensive teaching provided by the instructors on the Kampung Inggris LC instagram account also received a positive response from the majority of respondents. The detailed explanation of the materials makes it easier for learners to understand the content being taught. Furthermore, the quizzes or challenges frequently organized by the instructors on Kampung Inggris LC instagram account also contribute positively to the improvement of learners' English language proficiency. This is evident in questionnaires number 6,7, 8, and 9 and 11 which showed positive results regarding the impact of detailed material explanations on the improvement of English proficiency among learners. Additionally, the Instagram account was seen to provide motivation for learners to learn and use English.

In summary, the analysis findings suggest that utilizing the Kampung Inggris LC Instagram account as a learning tool has effectively improved learners' English proficiency and skills. This is evident from the substantial agreement, with 83.8% of respondents strongly agreeing, as indicated in the survey. These findings align with the research conducted by Husna (2022) entitled "My Body is Not Delicious: Learning English Expressions Through Instagram," which highlighted positive feedback from followers of the Kampung Inggris LC Instagram account



regarding the materials provided for enhancing their English proficiency. Moreover, the results of the previous study indicate that the materials offered on the Kampung Inggris LC Instagram account have indeed contributed to enhancing learners' English language proficiency.

4. CONCLUSION

Based on the findings, Kampung Inggris LC Instagram account was proven to help improve learners' English language proficiency through the English material content presented on the Kampung Inggris LC. Learners have positive perception towards Kampung Inggris LC Instagram account as an online platform and support the view that the Kampung Inggris LC Instagram account positively contributed to enhancing learners' English proficiency. The findings also proved that Kampung Inggris LC Instagram account helped learners in increasing their English mastery through the provision of valuable and accessible learning materials. Additionally, the detailed explanation of the English material and making it easily understandable for learners were highlighted as crucial factors in helping learners improve their English mastery. Thus, it can be concluded that the Kampung Inggris LC Instagram account played a significant role in helping learners improve their English proficiency through online learning.

5. ACKNOWLEDGMENTS

The authors would like to thank lecturers who assisted to finish this research. Also, the authors thanks to students who had time to fill out the distributed questionnaire.

REFERENCES

- Adri, M. (2007). *Pemanfaatan internet sebagai sumber pembelajaran*. <http://muhammadadri.wordpress.com>.
- Blazquez, D. (2018). The benefits of learning English as a second language. *Publicaniones Didakticas*, 7(1), 556-630.
- Husna, D. F. (2023). "My Body Is Not Delicious": Learned English expressions through Instagram. *In Proceedings of International Conference on Education: Teacher Training & Education Faculty*, 1(1).
- Juwandi, J., & Widyana, R. (2019). Pengaruh kemandirian belajar terhadap pemanfaatan internet sebagai sumber belajar. *Jurnal Spirits*, 10(1), 49–64. <https://doi.org/10.30738/spirits.v10i1.6536>
- Kemp, S. (2022). *DIGITAL 2022 Indonesia: The Essential Guide to The Latest Connected Behaviors*. <https://wearesocial.com/cn/wp-content/uploads/sites/8/2022/01/DataReportal-GDR00220220126-Digital-2022-Global-Overview-Report-Essentials-v02.pdf>
- Khairunnisa, R. (2020). An analysis of code switching used by English tutor in video teaching tutorial (teatu) Kampung Inggris LC. English Education Study Program Tarbiyah and Teacher Training Faculty: State University Raden Intan Lampung. <http://repository.radenintan.ac.id/10791/1/a%20thesis%202.pdf>
- Min, T. S., & Hashim, H. (2022). Boosting students' motivation in learning descriptive writing through Instagram. *Creative Education*, 13(03), 913–928. doi: 10.4236/ce.2022.133060.
- Munawaroh, I. M. (2022). *The effectiveness of @Kampunginggrislc Instagram account to improve students' vocabulary mastery through autonomous learning (pre-experimental study at the 3rd semester of English education department students of IAIN Salatiga)*. <http://e-repository.perpus.uinsalatiga.ac.id/id/eprint/15237>
- Notoatmodjo. (2010). *Metodologi Penelitian Kesehatan*. Jakarta: Rineka Cipta.
- Pramesti, S.H.S. (2023). *An analysis of English vocabulary teaching methods*. Universitas Islam Negeri Raden Mas Said Surakarta. <http://eprint.iain-surakarta.ac.id>
- Prihatiningsih, W. (2017). Motif penggunaan media sosial instagram di kalangan remaja. *Communication*, 8(1), 51-65. DOI: <https://dx.doi.org/10.36080/comm.v8i1.651>
- Putri, E. (2022). An impact of the use of Instagram application towards students vocabulary. *Pustakailmu.id*, 2(2), 1–10.



- Putri, R. D. F., Hadi, M. S., & Mutiarani, M. (2021). The efficacy of Instagram @Gurukumrd as the media in improving students' reading skills. *Journal of Languages and Language Teaching*, 9(3), 350-355. DOI: <https://doi.org/10.33394/joltt.v9i3.3795>
- Rahman, M. S. (2021). Analysis regression and path model: The influence of both Instagram and TikTok in improving students' vocabulary. *Sketch Journal: Journal of English Teaching, Literature, and Linguistics*, 1(1), 10-22.
- Salehuddin, M., Sarimin, S., Harvie, R., Yunus, M., & Safiah, I. (2020). Using Instagram to support creative learning and project-based learning. *International Journal of Advanced Science and Technology*. 29(5). 4866-4876. <http://sersc.org/journals/index.php/IJAST/article/view/13880>
- Sugiyono. (2012). *Metode Penelitian Kuantitatif Kualitatif*. Bandung: Penerbit Alfabeta.



INPUT EVALUATION IN THE IMPLEMENTATION OF THE IN-SERVICE TEACHER PROFESSIONAL EDUCATION CURRICULUM

Risa Zakiatul Hasanah¹

¹Universitas Pendidikan Indonesia, Indonesia

*rzakiatul@gmail.com

ABSTRACT

One of the important processes in curriculum development is curriculum evaluation. Besides measuring the achievement of objectives, curriculum evaluation also aims to provide considerations and recommendations on whether a program should be improved, replaced, reduced, or added to. The purpose of this study is to determine the quality of inputs in the implementation of the In-Service Teacher Professional Education curriculum, particularly in the field of primary education at Indonesia University of Education located in West Java Province. This research is a qualitative evaluative study and employs the Stufflebeam evaluation model. The research primarily focuses on the input aspect, which is one of the components of the Stufflebeam evaluation framework (Context, Input, Process, and Product). Data collection methods used included interviews and observations. The input components examined include students and lecturers. Based on the conducted research, it can be concluded that the input aspect in the implementation of the In-Service Teacher Professional Education curriculum at Indonesia University of Education is aligned with the established criteria, but there are some recommendations to improve the deficiencies.

Keywords: *input evaluation, curriculum, in-service teacher professional education.*

1. INTRODUCTION

Teachers play a significant role in determining the quality of education in Indonesia. This role is associated with competence, professionalism, and understanding of the curriculum and content or material. The government employs various methods to improve the quality of teachers in Indonesia. This is as stated in the Teachers and Lecturers Law, which declares that teachers can be formally recognized as professional personnel if they have: four teaching competencies, a minimum academic qualification level of Bachelor's degree or equivalent, participate in the Teacher Professional Education (PPG) program to enhance teaching quality, and this is evidenced by an educator certificate.

The educator certificate is one formal proof that teachers are recognized as professional personnel by both the government and the social community environment. The educator certificate is awarded to teachers after meeting requirements, including the condition of undergoing education. The process of granting an educator certificate to teachers after participating in education and learning stages is called the certification process (Minister of Education and Culture Regulation No. 37 of 2017). Certification itself has been implemented since 2007 through a series of mechanisms to obtain it. It was only from 2018 to the present that certification is carried out through the In-Service Teacher Professional Education (PPG) program.

The learning process in the In-Service Teacher Professional Education (PPG) program differs from learning in formal education, such as a Bachelor's degree or equivalent, because this program is specifically designed to achieve the standard graduate competencies of the teaching profession (Guidelines for the Implementation of PPG In-Service, 2020). The government's expectations for teachers upon completing the In-Service PPG program include mastering the material comprehensively and in-depth; mastering educational science, development, and guiding students; mastering the learning of subject areas, learning and evaluation, planning, and learning media; possessing integrity of personality; and having the ability to establish good social relationships both directly and through media.

To determine whether a program has been effective, it is necessary to evaluate the curriculum and the program itself. Previous research conducted by Triwinarni (2017) showed that there are still many components that are not maximized in the implementation of the Teacher Professional Education (PPG) program. However, that study did not touch on the components of lecturers and students, hence there is a need for an input evaluation related to lecturers and students of the In-Service teacher professional education program. Furthermore, this study



is also necessary to complement the previous study conducted by Wahyudin (2016). The previous study evaluated the readiness of UPI (Indonesia University of Education) in terms of managerial aspects and the role of leadership in the implementation of the In-Service Teacher Professional Education (PPG) program, while the aspects of lecturers and students were not further discussed. Therefore, to bring novelty in the field of curriculum evaluation, especially the input aspects (lecturers and teachers), this study needs to be carried out.

Another reason this research needs to be conducted is to assess the extent to which the curriculum of the in-service teacher professional education program aligns with standards. This involves evaluating whether the current curriculum is effective in preparing teachers with the necessary teaching competencies. Additionally, in the input evaluation, this study is also necessary to assess the qualifications and effectiveness of lecturers and the readiness of students to participate in the program. This relates to the resources available for the program. Addressing these issues through comprehensive evaluation can help in identifying areas for improvement, and ensure that the PPG program, specifically in terms of input components, has been effective and efficient and contributes to the professional development of teachers.

2. METHODS

The approach utilized in this research is qualitative with a descriptive evaluative method. Evaluative research is applied not to answer a question but to determine the effectiveness of implementing a program. The evaluation model employed is the CIPP (Context, Input, Process, Product) evaluation model, first proposed by Stufflebeam. According to Stufflebeam (1960) in Stufflebeam and Zahang (2017), there are four components that can be evaluated in a program: context, input, process, and product. In this study, the research focus is more on the input aspect. Qualitative research is more open and continuously evolves according to field conditions. Studies conducted measure more in-depth rather than breadth of the subject. The results are presented in the form of descriptions or words rather than numbers.

Data collection is done using interview and observation techniques. One of the characteristics of evaluative research is the existence of criteria or standards used to measure program achievement (Hasan, 2014). Criteria serve as guidelines in evaluation to measure the level of achievement (Arikunto & Jabar, 2008). Criteria can also serve as standards in evaluation to avoid subjectivity. There are specific approaches in using evaluation criteria including Pre-ordinate, fidelity, and mutual adaptive (Hasan, 2014). In this research, fidelity is used. In the fidelity approach, criteria or standards originate from the development of the curriculum's characteristics itself.

Table 1. The Research Instrument Framework

Aspect	Component	Sub-Component	Criteria	Data Source
Input (Input)	Lecturer	a. Number of in-service teacher education program (PPG) instructors at UPI	Pedoman penyelenggaraan PPG Dalam Jabatan (2020)	The leader of PPG, PGSD Study Field Coordinator
		b. Procedure for the recruitment of PPG instructors		
		c. Criteria for becoming an in-service teacher education (PPG) instructor		



Students	a. Number of student quotas	a. Permendikbud No. 38 tahun 2020 tentang Tata cara memperoleh sertifikat pendidik	The leader of PPG, PGSD Study Field Coordinator, Lecturer
	b. Students' educational backgrounds	b. Pedoman penyelenggaraan PPG Dalam Jabatan (2020)	
	c. Student selection criteria		

The data obtained is then analyzed using data reduction techniques. Data is reduced by selection, focus, simplification, abstraction, and transcription from audio to text form (Miles & Huberman in Sugiyono, 2017). The data reduction technique aims to focus the research data on relevant matters and eliminate irrelevant aspects in this study. After data reduction, the data is presented and organized into descriptive form so that the information is easily understood by the readers. In the final stage, the researcher draws conclusions. This is done to follow up on the results of the input evaluation that has been completed.

3. RESULTS & DISCUSSION

3.1 Results

Based on the study conducted, it is known that there are 27 in-service elementary school teacher education lecturers at Indonesia University of Education (UPI), including lecturers at regional campuses. Out of this total, 10 lecturers teach subject matter deepening courses, 3 lecturers teach instructional material development courses, and 3 lecturers are assigned to field experience practice (PPL) courses. These lecturers can also take on additional tasks according to their expertise. Regarding the distribution of lecturer duties, some lecturers in one cohort teach two courses, while others teach all three. However, some lecturers only teach one course. This is determined based on the schedule and the lecturer's capability. Based on interview results, it is known that there have been no scheduling conflicts among lecturers during the in-service PPG program. This indicates that the schedule prepared by the PPG educational staff is adequate and accommodates all PPG lecturer activities. Additionally, UPI has never faced a shortage of lecturers for the in-service PPG program due to having sufficient resources.

The procedure for hiring lecturers at Indonesia University of Education (UPI) is closed, meaning recruitment is only conducted by the campus and is aimed at lecturers teaching within the UPI environment, not open to the public. PPG lecturers at UPI are selected from existing lecturers, and the programs and courses they teach are tailored to the fields of study offered in the In-Service Teacher Training Program. The Elementary School Teacher Education (PGSD) field of study not only accepts lecturers with a PGSD educational background but also from other fields such as Mathematics Education, Indonesian Language, Natural Sciences, Social Sciences, Civic Education, Guidance Counseling, or Psychology. This is because these fields are also taught to in-service Elementary School Teacher Training Program students.

“Yes, the recruitment of PPG lecturers is not open to the public. They utilize lecturers from the relevant departments, including all departments. However, for Elementary School Teacher Education, because there are subjects beyond that such as Indonesian Language and Civic Education, they may request lecturers from outside the department but still within the campus scope.” (Respondent 1, interview: April 1, 2022).

Because the subjects in the Elementary School Teacher Education Program are not exclusively from the Elementary School Teacher Education department, the lecturers teaching these subjects are not necessarily from the PGSD department either. In such cases, the PPG Program will recruit lecturers from across faculties. The procedure involves coordinating with other departments needed to teach in the PPG Program. The relevant lecturers are designated by the study field coordinator and the head of the PPG program. According to Respondent 2, among the many criteria or requirements to become an in-service PPG lecturer, the most important



criterion is having a lecturer certificate. Additionally, PPG lecturers must have reached a certain functional position, have teaching experience, and have supervised field experience practices (PPL).

"There are official regulations issued by the Teacher and Education Personnel Certification (GTK) regarding the requirements to become an in-service PPG instructor, and we adhere to them. So, the first requirement that must be fulfilled is the educator certificate." (Respondent 2, interview: January 26, 2022).

This is further reinforced by the opinion of Respondent 1, who stated that a crucial requirement to become a PPG lecturer is to have an educator certificate. As for teaching experience in elementary schools, it is not heavily considered for PPG lecturers because they focus more on theoretical exposition while practical teaching is conducted by supervising teachers. Based on interviews and field observations, it is known that there are not many in-service PPG lecturers at Indonesia University of Education who have previously taught in schools.

To determine the student quota at UPI, the head of the PPG program will first consider the number of lecturers and the number of study groups to be provided. Once determined, UPI will report this information to the Directorate of Teachers and Educational Personnel (Dirjen GTK). Based on this, GTK establishes the student admission quota at each LPTK (Institute of Education and Teacher Training) and aggregates them on a national scale. In UPI, each study group consists of 30-35 students, and there are 2 classes offered in the PGSD field of study. However, since UPI has 5 branch campuses or regional campuses, the total number of study groups available is 12, allowing UPI to accommodate a total of 630 students specializing in the PGSD field of study in one intake.

There are differences in opinion between Respondent 2 and 4 regarding the educational background of students in the In-Service Primary Teacher Education Program (PPG SD). Respondent 2 stated that at UPI, there have been students from non-Education majors.

"There are (non-education majors), because the initial selection from GTK deemed them equivalent, so they were allowed to participate in the In-Service PPG SD. So, in one class, there are definitely non-Education majors." (Respondent 2, interview: January 26, 2022).

On the other hand, Respondent 4 stated that they have never encountered non-Education majors at UPI.

"So far, what I have found are mostly graduates from Education majors, whether by coincidence or not, in all classes and batches, almost all those in-service are indeed from Education majors." (Respondent 4, interview: April 20, 2022).

To verify this, a study was conducted on one batch of the In-Service PPG SD in 2022, and the results showed all students were from Education majors. Regarding this matter, according to government regulations, students from non-Education majors are allowed to enroll in the In-Service PPG SD Program. The condition where all students have an Education background makes it easier for lecturers to deliver teaching materials, and the likelihood of encountering problems related to students' understanding is small because all students already have specific competencies based on the same educational background.

Furthermore, the government also regulates the placement system for In-Service PPG students, so students cannot choose the campus where they will carry out the PPG. This means the placement of In-Service PPG students is random. Regarding this matter, there is no policy clearly stated, and respondents do not know the exact policy.

"Actually, I don't really know the exact policy; what's clear is that there's no prioritization based on the student's region of origin." (Respondent 1, interview: April 1, 2022).

Therefore, every teacher from any region has the same opportunity for PPG as a government effort to equalize the quality of teachers in Indonesia. Related to this, there are still many debates. As stated by Respondent 2, they disagreed if the placement system for In-Service PPG students is random and should prioritize students from the local area due to factors of effectiveness and efficiency. Meanwhile, Respondent 1 agrees that the placement of PPG students should utilize a random system, in order to avoid practices of injustice and to prevent the emergence of new, regionally-based problems. Additionally, the zoning system cannot standardize the graduation criteria for teachers because the conditions of teachers and the Institutions (LPTK) vary across different areas. For example, teachers in DKI Jakarta are generally accustomed to using technological devices,



while those in other regions may not be, resulting in higher acceptance standards for students in DKI Jakarta compared to other areas. Therefore, according to Respondent 1, to equalize the standard of teacher competencies and apply the principle of fairness, what the government is implementing is appropriate.

3.2 Discussion

The government has regulated and set standards for individuals to qualify as PPG lecturers. In the Guidelines for the Implementation of In-Service PPG (2020, p. 57), it is explained that the requirements to become a PPG lecturer include having a minimum qualification of a master's degree, having an educational background relevant to the field of study being taught, possessing an educator certificate, being assigned by the university leader, and preferably having teaching experience in schools. Based on these criteria, it can be determined that there is no discrepancy between the government's regulations and the conditions in the field. The PPG lecturers at UPI already have educator certificates, and other requirements are also fulfilled.

In the Guidelines for the Professional Teacher Education Program (2020, p. 58), it is clearly stated that one of the requirements to become an in-service PPG lecturer is that priority is given to those who have teaching experience in schools, and this point is separate from the point about lecturer certification. Meanwhile, according to Law Number 14 of 2005 concerning Teachers and Lecturers, Article 47 paragraph 1 states that an educator certificate for lecturers is granted when they meet the requirement of having at least 2 years of work experience as an educator at a Higher Education Institution.

In this case, there is a discrepancy between the respondent's understanding and the regulations outlined in the Guidelines for the Implementation of In-Service PPG (2020). The teaching experience specified in the lecturer certification refers to teaching experience at Higher Education Institutions and not teaching experience in schools. However, the teaching experience for lecturers mentioned in the guidelines for the implementation of in-service PPG refers to teaching experience in schools, which serves as an additional point for in-service PPG lecturers if they have it. It is important to differentiate between teaching experience as a requirement for lecturer certification and teaching experience mentioned in the guidelines for the implementation of in-service PPG. Therefore, teaching experience in schools should also be considered as an additional point during the recruitment of in-service PPG lecturers.

Teaching experience in schools is one of the crucial criteria that must be possessed by in-service Elementary School Teacher Education (PPG SD Dalam Jabatan) lecturers because lecturers need to comprehend not only the theoretical aspects but also the practical aspects in the field. It is not just supervising teachers who must master the practical aspects in schools but also lecturers. This ensures that what is conveyed can be more applicable because lecturers themselves have experienced teaching in elementary schools. Supervising teachers provide reinforcement and assist in accompanying lecturers to provide deeper practical experiences, especially in Field Experience Practice (PPL) courses.

Table 2. The Comparison of Findings and Criteria of Lecturers

Lecturers				
Sub-Components	Findings	Criteria	Conformity	
Number of in-service teacher education program (PPG) instructors at Indonesia University of Education	UPI has 27 certified lecturers	The management of PPG at the Teacher Training and Education Institution (LPTK) must have a minimum of 6 lecturers, comprising 2 lecturers with a minimum qualification of a doctoral degree (S3) and 4 lecturers with a master's degree qualification.	The finding is in accordance with the criteria.	
Procedure for the recruitment of PPG instructors	Lecturers recruitment is only conducted by the campus and is aimed at lecturers teaching	Got an assignment from the college leader to be the manager of the PPG study field.	The finding is in accordance with the criteria.	



	within the UPI environment		
Criteria for becoming an in-service teacher education instructor (PPG)	All criteria are met, but without considering teaching experience in schools.	Preference is given to lecturers who have experience teaching in schools	The finding is in accordance with the criteria, but there is specific notes.

An in-service teacher, according to the Indonesian Ministry of Education and Culture Regulation Number 38 of 2020, is a civil servant teacher or a non-civil servant teacher who has been teaching in educational units organized by the central government, regional government, or educational organizing communities that have an agreement or joint work agreement. The recruitment of in-service PPG (Teacher Professional Education Program) students is conducted directly by the central government. The criteria that must be met to qualify as an in-service PPG student include: holding a Bachelor's degree or equivalent, being an in-service teacher appointed up until December 2015, being registered in the primary education data, having a NUPTK (Unique Number for Teachers and Education Personnel), and having completed the required documents.

The acceptance of new in-service PPG (Teacher Professional Education Program) students at UPI does not reveal any discrepancies with government regulations, because the selection and admission of in-service PPG students are fully entrusted to the central government. UPI simply receives the list of names of students who will study there.

In the Indonesian Ministry of Research, Technology, and Higher Education Regulation No. 55 of 2017 concerning Teacher Education Standards, Article 24 paragraph 5, it is mentioned that a PPG (Teacher Professional Education Program) class should consist of no more than 20 participants. Meanwhile, in the guidelines for the implementation of the In-Service PPG (2020, p. 26), it is stated that a PPG in-service class group can consist of up to 35 individuals. Based on interviews with respondents in the field, UPI is capable of accommodating 30-35 students in one learning group. This indicates that UPI has implemented the in-service PPG program in accordance with government regulations and no discrepancies have been found.

However, the issue arises from the government's policy regulations being inconsistent with one another. The standard education policy for teachers is used as a reference in the guidelines for the implementation of the In-Service PPG (Teacher Professional Education Program), yet their contents do not align. Ideally, one policy should reinforce and be coherent with others, preventing the emergence of new perceptions in the field. The government must exercise greater wisdom in formulating policies to ensure that no discrepancies arise between them.

The government has declared that several majors aligned with Elementary School Teacher Education (PGSD) include Islamic Elementary Teacher Education (PGMI), Civic Education (PKn), Mathematics Education, Indonesian Language Education, Indonesian Education and Literature, Indonesian Language and Regional Education, Science (IPA) / Social Studies (IPS) Education, Indonesian Language Teaching (Tadris Bahasa Indonesia), Science (IPA) / Social Studies (IPS) Teaching (Tadris IPA/IPS), and Mathematics Teaching (Tadris Matematika). Consequently, in-service PPG (Teacher Professional Education Program) students for elementary education are not limited to those from the PGSD major alone but also include those from other related majors. This policy has sparked considerable debate among academics, with both supporters and opponents expressing their views.

Respondents 1 and 2 agree in their disagreement with the government's decision to allow majors other than Elementary School Teacher Education (PGSD) to be accepted into the in-service PPG (Teacher Professional Education Program). Their reasoning is that PGSD graduates are specifically prepared to become teachers, with their Bachelor's education aligning closely with this goal. This contrasts with other majors, which are prepared to teach specific subjects at the secondary school level. However, the government has determined that other majors can enroll in the in-service PPG for elementary education because these fields of study are still related to subjects taught in elementary schools. Additionally, there are significant obstacles in various regions in appointing teachers with a Bachelor's degree in PGSD due to their limited number, leading the government to recruit teachers from other majors rather than hiring those who fall below the standards set by the UUGD.



Meanwhile, the government's implementation of a random placement system for students, directly managed by the central government, is considered appropriate due to several considerations. First, there is no specific affirmation for students originating from the zones of the Teacher Education and Training Institutions (LPTKs) hosting the program. Second, the zoning system in the in-service Teacher Professional Education Program (PPG) would lead to unfair practices and spark new regional issues, while the examination uses the same graduation standards. Third, it could encourage dishonest practices in regions. If there are still vacancies, students who were not accepted might lobby local governments for approval, potentially leading to fraudulent practices. Fourth, the zoning system does not equalize graduation standards due to varying conditions of teachers in different areas. Fifth, it eliminates national teacher standards because it is based on regional implementation. Sixth, it creates competition between regions and division.

Table 3. The Comparison of Findings and Criteria of Students

Students			
Sub-Components	Findings	Criteria	Conformity
Number of student quotas	30-35 students in one class.	Permenristekdikti No. 55 of 2017 on Teacher Education Standards, Article 24 paragraph 5, states: a Teacher Professional Education Program (PPG) class should consist of no more than 20 participants. The 2020 guidelines for the Teacher Professional Education Program (PPG) state that one learning group can have a maximum of 35 people.	The finding is in accordance with the criteria, but there are specific notes.
Students' educational backgrounds	On average, they come from the Elementary School Teacher Education program (PGSD), and no students from other majors have been found.	The government allows students from other majors to enroll in the in-service Elementary School Teacher Professional Education Program (PPG SD).	The finding is in accordance with the criteria, but there are specific recommendations.
Student selection criteria	Some agree with the government's policy, while others do not.	The government has established a rule for placing in-service Elementary School Teacher Professional Education Program (PPG SD) students randomly.	The finding is in accordance with the criteria, but it is still debatable.

4. CONCLUSION

The evaluation of inputs conducted on two components, namely lecturers and students, indicates conformity with standards or criteria. Three subcomponents for lecturers, which are the number of lecturers, the procedure for lecturer recruitment, and the criteria for becoming an in-service PPG (Teacher Professional Education) lecturer, are already in accordance with the criteria. However, there is a special note for the subcomponent of the PPG lecturer criteria, which is the additional points for in-service lecturers who have previously taught in schools. As for the three student subcomponents, which are the number of students, educational background, and student placement, they are already in line with the standards. However, there is a special note regarding the educational background of in-service PPG students, which ideally should come from Primary School Teacher Education (PGSD), and the issue that still provokes debate is the random placement of students.

5. ACKNOWLEDGMENTS

We would like to express our deepest appreciation to all those who provided us the possibility to complete this research. A special gratitude we give to our project advisor, Prof. Dr. H. Said Hamid Hasan, M.A (alm), who



contributed in stimulating suggestions and encouragement, helped us to coordinate our project especially in writing this paper. Furthermore, we would also like to acknowledge the invaluable support and guidance provided by Dr. H. Zainal Arifin, M.Pd, from Indonesia University of Education, whose insights and expertise significantly enhanced the quality of our work. Lastly, we would like to show our gratitude to the Indonesia University of Education for providing the necessary facilities and resources for our research. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

REFERENCES

- Arikunto & Jabar. (2008). *Evaluasi Program Pendidikan: Pedoman Teoretis Praktis bagi Mahasiswa dan Praktisi Pendidikan*. Jakarta: Bumi Aksara
- Direktorat Jenderal Guru dan Tenaga Kependidikan. (2020). *Pedoman Program Pendidikan Profesi Guru Dalam Jabatan*. Sekretariat Negara: Jakarta
- Direktorat Jenderal Pembelajaran dan Kemahasiswaan. (2018). *Pedoman Penyelenggaraan Program Pendidikan Profesi Guru*. Sekretariat Negara: Jakarta.
- Hasan, S.H. (2014). *Evaluasi Kurikulum*. Bandung: Remaja Rosdakarya.
- Indonesian government. (2007). Regulation of the Minister of National Education of the Republic of Indonesia Number 16 of 2007 concerning Academic Qualification Standards and Teacher Competencies. State Secretariat: Jakarta.
- Indonesian Government. (2008). Regulation of the Minister of National Education of the Republic of Indonesia Number 18 of 2007 concerning Certification for In-Service Teachers. State Secretariat: Jakarta.
- Indonesian Government. (2009). Regulation of the Minister of National Education of the Republic of Indonesia Number 19 of 2009 concerning Certification for In-Service Teachers. State Secretariat: Jakarta.
- Indonesian Government. (2010). Regulation of the Minister of National Education of the Republic of Indonesia Number 9 of 2010 concerning Professional Teacher Education Programs for In-Service Teachers. State Secretariat: Jakarta.
- Indonesian Government. (2011). Regulation of the Minister of National Education of the Republic of Indonesia Number 11 of 2011 concerning Certification for In-Service Teachers. State Secretariat: Jakarta.
- Indonesian Government. (2017). Minister of Research, Technology and Higher Education Regulation Number 55 of 2017 concerning Teacher Education Standards. State Secretariat: Jakarta.
- Indonesian government. (2017). Government Regulation Number 19 of 2017 concerning Amendments to Government Regulation Number 74 of 2008 concerning Teachers. State Secretariat: Jakarta.
- Stufflebeam & Zhang. (2017). *The CIPP Evaluation Model: How to Evaluate for Improvement and Accountability*. New York: The Guilford Press.
- Sugiyono. (2017). *Metode Penelitian Kualitatif : Untuk Penelitian yang Bersifat Eksploratif, enterpretif, interaktif, dan konstruktif*. Bandung: Penerbit Alfabeta.
- Triwinarni, E. (2017). Evaluasi program Pendidikan Profesi Guru (PPG) Pendidikan Agama Islam di UIN Sunan Kalijaga Yogyakarta. In *Prosiding Interdisciplinary Postgraduate Student Conference* (pp. 219-223).
- Wahyudin, D. (2016). Manajemen kurikulum dalam pendidikan profesi guru (Studi kasus di Universitas Pendidikan Indonesia). *Jurnal Kependidikan: Penelitian Inovasi Pembelajaran*, 46(2), 259-270.



THE DEVELOPMENT OF THE MATHEMATICAL LOGIC INTELLIGENCE ASSESSMENT INSTRUMENT

Siti Sarah¹, Latief Al Alhmasi², Dian Aswita³, Maulidar⁴

^{1,2}UIN Saizu Purwokerto

^{1,2}Universitas Serambi Mekkah

*sitisarah@uinsaizu.ac.id

ABSTRACT

Mathematical logic intelligence leads to the ability to think systematically, logically, and scientifically. This intelligence supports learning outcomes not only in the realm of mathematics but also in other fields such as physics, chemistry, statistics, and so on. So far, there has yet to be a valid and reliable mathematical logic intelligence assessment instrument for students in elementary schools or Madrasah Ibtidaiyah. This study aims to develop a valid and reliable mathematical logic intelligence assessment instrument for Madrasah Ibtidaiyah students. The research method is research and development with nine steps: (1) determining the purpose of preparing the instrument, (2) looking for relevant theories or material coverage, (3) preparing indicator items, (4) preparing instrument items, (5) validating the content, (6) revision based on validator input, (7) conducting trials on appropriate respondents to obtain participant response data, and (8) conducting analysis, and (9) assembling the instrument. The research instruments used tests and validation sheets. Instrument validation in the form of content validation and construct validation by three experts in mathematics learning at the Madrasah Ibtidaiyah. The test was conducted on grade V students doing the limited experiment. The study's results produced a test to measure mathematical logic intelligence in as many as nine items, which were valid and reliable items with a coefficient of 0.793. The mathematical logic intelligence assessment instrument consists of five indicators, namely: logical thinking with the ability to organize ideas systematically, abstract thinking with the ability to understand complex mathematical concepts, deductive thinking with the ability to conclude from given premises, inductive thinking with the ability to collect data, and analytical thinking using the ability to analyze and solve mathematical problems.

Keywords: *Mathematical logic intelligence, valid, reliable*

1. INTRODUCTION

Mathematics education is beneficial in everyday life. Mathematics has become essential for understanding and modeling complex natural, technological, and social phenomena. Mathematics is often applied in various disciplines such as science, technology, economics, and others as an instrument.

The importance of mathematics is inversely proportional to the level of students' understanding of mathematics, especially at the Basic Education Level, which still needs to be higher. Many students struggle to learn mathematics (Kholil & Zulfiani, 2020). Delivery of uninteresting material, students' lack of interest in the lesson, or the concepts presented by the teacher are not understood by students (Tyas, 2016). PISA (International Program of Science Assessment) data also states that Indonesian students' mathematical literacy is still low compared to other OECD participating countries, as seen in Table 1.

Table 1. Indonesian Mathematical Literacy 2000-2018 (Hewi & Shaleh, 2020).

Year	Score	OECD Score Average	Indonesia's Ranking	OECD Member Countries
2000	367	500	39	41
2003	360	500	38	40
2006	396	500	50	56
2009	371	500	61	65
2012	375	500	64	65
2015	386	500	63	69
2018	379	500	73	79



Understanding of mathematics must continue to be pursued, considering the position of mathematics as a basic science in the development of other sciences. One of them is looking for various factors that cause elementary school students' low interest and understanding in studying mathematics, which have yet to be explored even though they have relevant relationships (Devlin, 2000).

Mathematical-logical intelligence is a person's ability to think inductively and deductively, think logically, analyze number patterns, and solve problems using abstract and analytical thinking skills (Armstrong, 2003). Individuals with high logical intelligence can analyze situations well, find patterns in information, and make decisions based on facts and logic. Logical intelligence is also related to solving problems and developing effective strategies to achieve specific goals. People with high mathematical-logical intelligence can usually understand mathematical concepts quickly, make connections between these concepts, and solve mathematical problems logically and structured (Pietono, 2015). This intelligence can be measured using indicators, namely, logical thinking with the ability to organize ideas systematically, abstract thinking with the ability to understand complex mathematical concepts, deductive thinking with the ability to conclude from given premises, inductive thinking with the ability to collect data, and analytical thinking with the ability to describe and solve math problems. The research results (Rusmana & Wulandari, 2020) state a positive and significant relationship between mathematical logic intelligence and students' mathematics learning achievement.

There has been a lot of research related to mathematical logic intelligence at the elementary school level, along with the development of instruments for mathematical logic abilities. However, this research only targeted lower-class elementary schools as per research results (Magdalena et al., 2023; Manggena et al., 2017; Putra et al., 2017). So far, no research has been found related to this in students in the upper classes with increasingly complex characteristics of questions and student abilities. Therefore, this research intends to examine mathematical logic intelligence in upper elementary schools, starting with developing an instrument to measure mathematical logic intelligence. This research is essential not only to measure the logical intelligence of elementary school students at the upper level, but also to complement previous research at the elementary school level. In this way, studies related to the logical intelligence of elementary school students become comprehensive.

2. METHODS

This is research and development (R & D). The R & D model was developed by (Retnawati, 2017) with 9 stages. The research steps are: (1) determining the purpose of preparing the instrument, (2) looking for relevant theories or material coverage, (3) compiling indicators for question items, (4) compiling instrument items, (5) validating content, (6) revising based on validator input, (7) conducting trials on appropriate respondents to obtain participant response data, (8) conducting analysis, and (9) assembling the instrument.

This research included three mathematics education experts at the elementary school level or Madrasah Ibtidaiyah (MI) and 28 grade V elementary school students at one MI in Purbalingga Regency, Central Java, Indonesia.

The data was collected through test sheets. The questions consist of 10 items from the description of 5 indicators of mathematical logic intelligence. The test questions are in the form of descriptions, with each item having a maximum score of 5.

Data analyzed through expert judgment. Data analysis resulting from expert assessment was analyzed using the V Aiken formula.

$$V = \frac{\sum s}{n(c - 1)}$$

Description:

- S : The sum of the scores given by experts– the lowest validity assessment score
- V : Item validity index
- $\sum s$: The sum of S
- n : The sum of expert
- c : The highest validity assessment score



The results of the Aiken V calculation were then analyzed using the Aiken V criteria guidelines (Table 2).

Table 2. Interval Criteria of V Aiken.

Interval	Criteria
$0,80 < V \leq 1,00$	Very high
$0,60 < V \leq 0,80$	High
$0,40 < V \leq 0,60$	Enough
$0,20 < V \leq 0,40$	Low
$0,00 < V \leq 0,20$	Very low

Questionnaire items that passed expert assessment were then tested on fifth-grade students to determine the fulfillment of empirical validation and instrument reliability using SPSS.

3. RESULT & DISCUSSION

The mathematical logic intelligence test instrument is prepared through instrument development stages with nine stages, namely: (1) determining the purpose of preparing the instrument (2) looking for relevant theories or material coverage, (3) compiling question item indicators, (4) compiling instrument items, (5) content validation, (6) revision based on validator input, (7) conducting trials on appropriate respondents to obtain participant response data, and (8) conducting analysis, and (9) assembling the instrument. The following is a detailed description of the steps.

Step 1. Determining the purpose of preparing the instrument

The purpose of preparing the instrument is to measure mathematical logic intelligence, an assessment in the cognitive domain. Therefore, the instrument prepared is in the form of a test.

Step 2. Looking for relevant theory or coverage of the material

Logical intelligence is the ability to think logically and systematically. Individuals with high logical intelligence can analyze situations well, find patterns in information, and make decisions based on facts and logic (Armstrong, 2003). Logical-intelligence is also related to solving problems and developing effective strategies to achieve specific goals.

Mathematical-logical intelligence is understanding and using mathematical principles logically and systematically. People with high mathematical-logical intelligence can usually understand mathematical concepts quickly, make connections between these concepts, and solve mathematical problems logically and structured (Pietono, 2015). Mathematical-logical intelligence uses numbers effectively and precisely, as a tax accountant, mathematician, or statistician does. This intelligence includes the ability to recognize logical patterns, relationships, statements, and propositions, as well as various other types of functions and related abstractions. The processes involved in mathematical-logical intelligence include categorization, classification, inference, generalization, calculation, and hypothesis testing.

Indicators of mathematical-logic intelligence include several five things, namely being able to organize ideas systematically and understand cause-and-effect relationships, being able to describe and solve mathematical problems, being able to understand complex mathematical concepts and generalize these concepts to different situations, being able to conclude from the premises given, being able to collect data and make generalizations based on patterns. Based on various studies, mathematical-logic intelligence is thinking logically and systematically in managing and using numbers and mathematical principles. Children who have logical-mathematical intelligence show the ability to think logically, analytically, abstractly, deductively, and inductively, which involves logic and is abstract (Widiastuti, 2015).



Step 3. Arranging indicators for the question items

Mathematical logic intelligence in this research includes five indicators, namely, logical thinking ability, analytical ability, abstract thinking ability, deductive thinking ability, and inductive thinking ability. Each indicator is translated into question item indicators, as shown in Table 3.

Table 3. The Framework of Mathematical Logic Intelligence.

Indicator of Mathematical Logic Intelligence	Question Item Indicators	Total Item
Logical thinking ability	Able to organize ideas systematically	2
Analytical abilities	Able to analyze and solve the mathematics problems	2
Abstract thinking ability	Able to understand the complex mathematical concepts	2
Deductive thinking ability	Able to draw conclusions from the premises given	2
Inductive thinking ability	Able to collect data	2

Step four. Arranging the instrument items

Table 3 is then realized as question items that raise mathematics material in class V, starting with fractions. This can be seen in Table 4.

Table 4. Question Items Based on the Framework of Mathematical Logic Intelligence.

Indicator	The Question Indicator Item	Item	Item number
Logical thinking ability	Able to organize ideas systematically.	Andi bought $2\frac{1}{4}$ liters of cow's milk. A total of $\frac{7}{8}$ liters was given to Nana, $1\frac{1}{7}$ liters were used to make yogurt, and the rest was drunk. How much milk is left to drink?	1
Logical thinking ability	Able to organize ideas systematically.	A bookstore has shelves filled with books. The first shelf contains $\frac{2}{4}$ of the total books, the second shelf includes $\frac{2}{5}$ of the total books, and the rest is for the third shelf. If the total number of books in the shop is 80, how many books are on the 3rd shelf?	6
Analytical abilities	Able to describe and solve mathematical problems.	Sisi bought $3\frac{1}{4}$ liters of cooking oil. The $1\frac{1}{2}$ liter of oil used to fry mendoan. While walking, I accidentally spilled 0.6 liters of oil. Then, the side buys another 0.75 liter. How many liters of Sisi cooking oil are left?	2
Analytical abilities	Able to describe and solve mathematical problems.	Tia has a 30-meter-long ribbon. She will make a flower from the ribbon. Tia will make small, medium, and large flowers. She needs $1\frac{3}{8}$ meter ribbon and $3\frac{5}{6}$ meter large flowers to make tiny flowers. Suppose Tia makes four small flowers and two large flowers. How long is the ribbon Tia needs? Count the rest of the ribbon.	7
Abstract thinking ability	Able to understand complex mathematical concepts.	Rara has 40,000 IDR. $\frac{3}{8}$ of the money was used to buy meatballs, pay 20% in cash, 0.3 part to save, and the rest for snacks. How much of Rara's remaining money is used for snacks?	3
Abstract thinking ability	Able to understand complex mathematical concepts.	Dad bought 24 kg of wheat flour. The wheat flour will be sold at retail by wrapping it in plastic bags weighing $\frac{1}{8}$ kg each. How many plastic bags are needed to package all the wheat flour?	8



Indicator	The Question Indicator Item	Item	Item number
Deductive thinking ability	Able to conclude from the premises given.	Mother has a supply of $4\frac{2}{3}$ kg of sugar. Mother took $1\frac{1}{4}$ kg to make cakes and $\frac{5}{6}$ kg to make pudding. As supplies, Mother bought another $4\frac{7}{8}$ kg. How many kilograms of sugar do you have now?	4
Deductive thinking ability	Able to conclude from the premises given.	Mother has a stock of $5\frac{2}{3}$ kg biscuits. Every day, the mother consumes $\frac{3}{4}$ kg of biscuits. For one week, how many kilograms of biscuits do you have now?	9
Inductive thinking ability	Able to collect data	Order the following fractions from smallest to largest: $\frac{2}{5}, \frac{3}{10}, \frac{1}{2}$, and $\frac{5}{6}$. Include steps in ordering the fractions.	5
Inductive thinking ability	Able to collect data	Raisa wants to make four cakes. To make a Raisa cake, you need $\frac{1}{2}$ kg eggs, $1\frac{1}{4}$ kg flour, and $\frac{1}{4}$ kg granulated sugar. Raisa only has 1kg of flour and $\frac{1}{4}$ kg of eggs at home. How many eggs, flour, and sugar does Raisa need?	10

Determination of student answer scores follows the following provisions.

Score 0 if there is no solution at all or the writing does not match at all.

Score 1: if the student writes down the question criteria or only knows or is asked or uses a particular procedure, the answers and conclusions are all wrong.

Score 2: if the student uses a specific procedure correctly but the answer is wrong, and the conclusion is terrible, or one of them uses aspects, and one of them is correct.

Score 3: if specific procedures are used correctly, the answers and conclusions are incorrect.

Score 4: if you present the correct sequence of completion steps, accurate answers, and conclusions.

Step five. Content validation

The instrument examination was carried out by three experts, namely lecturers with expertise in mathematics education. Each question item is analyzed from 4 assessment aspects, namely the relevance of the question item to the framework, suitability of question items to indicators, use of language, and clarity of question items. Each assessment aspect uses a range of 1 to 4; the closer to 4, the better.

The results of the instrument assessment by experts were then analyzed using the Aiken V test. The results are in Table 5.

Tabel 5. The Result of V Aiken.

The Item Number	Validator's score			S1	S2	S3	Σ	V	Criteria
	A	B	C						
1	4	3,5	3,5	3	2,5	2,5	8	0,89	Very high
2	3,5	3,5	3,75	2,5	2,5	2,75	7,75	0,86	Very high
3	3,5	3,5	3,5	2,5	2,5	2,5	7,5	0,83	Very high



4	3,25	4	3,75	2,25	3	2,75	8	0,89	Very high
5	4	4	3,5	3	3	2,5	8,5	0,94	Very high
6	4	3,5	3,5	3	2,5	2,5	8	0,89	Very high
7	3,5	4	3,5	2,5	3	2,5	8	0,89	Very high
8	4	4	3,25	3	3	2,25	8,25	0,91	Very high
9	4	3,5	3,75	3	2,5	2,75	8,25	0,91	Very high
10	4	4	3,5	3	3	2,5	8,5	0,94	Very high

Table 5 shows that all question items meet the expert validation test with high criteria. This means that experts have validated all items.

Step six. Revision based on the validator input

This step is only carried out on question items that experts for revision refer to. Based on Table 5, it is known that the V Aiken test results show that all items meet the very high criteria. Therefore, no revisions were made to the test instruments used.

Step seven. Conduct trials on appropriate respondents to obtain participant response data

The eighth step is conducting trials to meet empirical validity and reliability. The test subjects were 28 class V students at one of the Madrasah Ibtidaiyah in Purbalingga Regency, Central Java. The results of instrument testing were then analyzed using SPSS version 25 software.

Table 6. Result of Empiric Validation.

	The Item Number									
	1	2	3	4	5	6	7	8	9	10
Significance	0,000	0,001	0,000	0,013	0,003	0,000	0,085	0,000	0,001	0,001
Criteria	valid	valid	valid	valid	valid	valid	invalid	valid	valid	valid

Based on Table 6, it is known that item 7 does not meet the empirical validation test. Therefore, item 7 was dropped and not included in the subsequent analysis. The next step was to carry out reliability tests on all items that have met empirical validity. The results of the reliability test using SPSS version 25 software on 9 test items show an instrument reliability coefficient value of 0.795. Thus, a total of 9 test items met the reliability aspect.

Step nine. Assembling the instrument.

After completing the empirical trials, Table 6 contained the final mathematical logic intelligence test consisting of 9 items.

Table 7. The Final Test of Mathematical Logic Intelligence.

The Questions	Item Number
---------------	-------------



The Questions	Item Number
Andi bought $2\frac{1}{4}$ liters of cow's milk. A total of $\frac{7}{8}$ liters was given to Nana, $1\frac{1}{7}$ liters were used to make yogurt, and the rest was drunk. How much milk is left to drink?	1
Sisi bought $3\frac{1}{4}$ liters of cooking oil. The $1\frac{1}{2}$ liter of oil used to fry mendoan. While walking, I accidentally spilled 0.6 liters of oil. Then, the side buys another 0.75 liter. How many liters of Sisi cooking oil are left?	2
Rara has 40,000 IDR. $\frac{3}{8}$ of the money was used to buy meatballs, pay 20% in cash, 0.3 part to save, and the rest for snacks. How much of Rara's remaining money is used for snacks?	3
Mother has a supply of $4\frac{2}{3}$ kg of sugar. Mother took $1\frac{1}{4}$ kg to make cakes and $\frac{5}{6}$ kg to make pudding. As supplies, Mother bought another $4\frac{7}{8}$ kg. How many kilograms of sugar do you have now?	4
Order the following fractions from smallest to largest: $\frac{2}{5}, \frac{3}{10}, \frac{1}{2}$, and $\frac{5}{6}$. Include steps in ordering the fractions.	5
A bookstore has shelves filled with books. The first shelf contains $\frac{2}{4}$ of the total books, the second shelf includes $\frac{2}{5}$ of the total books, and the rest is for the third shelf. If the total number of books in the shop is 80, how many books are on the 3rd shelf?	6
Dad bought 24 kg of wheat flour. The wheat flour will be sold at retail by wrapping it in plastic bags weighing $\frac{1}{8}$ kg each. How many plastic bags are needed to package all the wheat flour?	7
Mother has a stock of $5\frac{2}{3}$ kg biscuits. Every day, the mother consumes $\frac{3}{4}$ kg of biscuits. For one week, how many kilograms of biscuits do you have now?	8
Raisa wants to make four cakes. To make a Raisa cake, you need $\frac{1}{2}$ kg eggs, $1\frac{1}{4}$ kg flour, and $\frac{1}{4}$ kg granulated sugar. Raisa only has 1kg of flour and $\frac{1}{4}$ kg of eggs at home. How many eggs, flour, and sugar does Raisa need?	9

The research results show that an instrument has been produced to measure mathematical logic intelligence for fifth-grade elementary school students with nine valid and reliable items on fractions. All question items are composed of 5 indicators, namely logical thinking ability, analytical ability, abstract thinking ability, deductive thinking ability, and inductive thinking ability. All mathematical logic intelligence test instruments were produced from a series of instrument tests by experts and instrument trials on respondents, as shown in Table 8.

Table 8. The Series of Instruments from the Beginning of Preparation to the Results of Instrument Testing.

No	Indicator	Total of Item		
		Initial Design	Result of Expert Judgement	Result of Empirical Research
1	Logical thinking ability	2	2	2
2	Analytical abilities	2	2	1
3	Abstract thinking ability	2	2	2
4	Deductive thinking ability	2	2	2
5	Inductive thinking ability	2	2	2
	Total	10	10	9

Mathematical logic intelligence instruments are nothing new. Many instrument formats measure the same thing. However, there are several differences. This research develops an instrument for the mathematical logic intelligence of fifth-grade elementary school students. Meanwhile, previous research has discussed chiefly the mathematical logic intelligence of early childhood (Afandi, 2018; Kristiana, 2018; Siagian, 2021). Other research aims at the elementary school level but in the classroom low, namely class 1 until class three (Firdaus & Nisa, 2020; Magdalena et al., 2023; Putri, 2017). Research at the elementary school level, especially the upper class,



already exists, but only focuses on class IV (Fasha et al., 2019). Other upper classes have not been widely researched.

Regarding indicators of mathematical logic intelligence at the early childhood education level, (Indriati, 2016) includes three dimensions: a person's ability to process numbers well, think logically, and solve problems. At the lower grade basic education level, indicators of mathematical logic intelligence include processing numbers well, thinking logically, and solving problems related to mathematical operations (Magdalena et al., 2023). As for the indicators of mathematical logic intelligence at the upper grade basic education level, (Fasha et al., 2019) states: can do number calculations, problem solving activities, mathematical games or other strategy games, and the existence of cause and effect relationships, and various activities related to statistical data including estimating, rounding, and interpreting. Based on some of the research results above, this research is complementary with more complete indicators of logical intelligence, including logical thinking, abstract thinking, deductive thinking, inductive thinking, and analytical thinking using problem-solving abilities.

4. CONCLUSION

The outcome shows that the pupils must prepare to use digital technology for learning and teaching. Additionally, they stated that while digital technologies were standard, they were not yet at the manufacturing stage. To assess and improve their competencies, they must put their theoretical knowledge into practice while receiving feedback. In order to better equip them to educate students who are digital natives, in-service teachers and course instructors also provide feedback. It is necessary to conduct additional research to determine how well prepared pre-service teachers are to apply their digital literacy knowledge in actual teaching environments. Subsequent studies may also make use of observations of real-world usage or activities where participants are given a challenge to address with digital tools. This might offer a more thorough understanding of the individuals involved.

REFERENCES

- Afandi, A. (2018). Permainan balok untuk meningkatkan kecerdasan logika matematika anak usia 5-6 tahun. *JECIE: Journal of Early Childhood and Inclusive*, 1(1).
- Armstrong, T. (2003). Multiple intelligences in the classroom 3rd edition. *Education*, 124(1).
- Devlin. (2000). The language of mathematics: making the invisible visible. *Choice Reviews Online*, 36(09). <https://doi.org/10.5860/choice.36-5133>
- Fasha, E. F., Khiyarusoleh, U., & Akhyar, M. K. (2019). Konsep kecerdasan logika matematika berbasis bahan ajar pada kurikulum 2013 untuk siswa sekolah dasar. *Jurnal Dinamika Pendidikan*, 12(2). <https://doi.org/10.33541/jdp.v12i2.1082>
- Firdaus, F. M., & Nisa, K. (2020). Pengaruh metode bermain berbantuan alat peraga papan stik terhadap kecerdasan logika matematika siswa sekolah dasar. *JPIN: Jurnal Pendidik Indonesia*, 1(2). <https://doi.org/10.47165/jpin.v1i2.28>
- Hewi L. & Shaleh M. (2020). Refleksi hasil PISA (The programme for international student assessment): Upaya perbaikan bertumpu pada pendidikan anak usia dini. *Jurnal Golden Age*, 4(01). <https://doi.org/10.29408/jga.v4i01.2018>
- Retnawati, H. (2017). *Validitas Reliabilitas & Karakteristik Butir (Panduan untuk Peneliti, Mahasiswa, dan Psikometrian)*. Parama Publishing.
- Rusmana, I.M. & Wulandari, D.S. (2020). Pengaruh gaya belajar dan kecerdasan logika matematika terhadap prestasi belajar matematika. *Jurnal Lebesgue: Jurnal Ilmiah Pendidikan Matematika, Matematika Dan Statistika*, 1(2). <https://doi.org/10.46306/lb.v1i2.18>
- Indriati, N. U. D. (2016). Instrumen tes kecerdasan logika matematika untuk anak usia dini. *JPUD - Jurnal Pendidikan Usia Dini*, 10(1). <https://doi.org/10.21009/jpud.101.10>



- Kholil, M., & Zulfiani, S. (2020). Faktor-faktor kesulitan belajar matematika siswa madrasah ibtidaiyah Da'watul Falah kecamatan Tegaldlimo kabupaten Banyuwangi. *EDUCARE: Journal of Primary Education*, 1(2). <https://doi.org/10.35719/educare.v1i2.14>
- Kristiana, D. (2018). Implementasi media “bosang” untuk mengasah kecerdasan logika matematika anak usia dini. *JURNAL SILOGISME: Kajian Ilmu Matematika dan Pembelajarannya*, 3(1). <https://doi.org/10.24269/js.v3i1.982>
- Magdalena, I., Sari, N. P., Hasanah, N., Putri, R., Nurfitriah, R., & Syaputri, S. R. (2023). Pengembangan instrumen tes kecerdasan logika matematika untuk anak sekolah dasar di kelas rendah. *MASALIQ*, 3(1). <https://doi.org/10.58578/masaliq.v3i1.791>
- Manggena, T. F., Putra, K. P., & Elingsetyo Sanubari, T. P. (2017). Pengaruh intensitas bermain game terhadap tingkat kognitif (kecerdasan logika-matematika) usia 8-9 tahun. *Satya Widya*, 33(2). <https://doi.org/10.24246/j.sw.2017.v33.i2.p146-153>
- Pietono. (2015). *Anakku Bisa Brilliant Sukses Belajar Menuju Brilliant*. Bumi Aksara.
- Putra, K. P., Pratiwi, T., & Sanubari, E. (2017). Pengaruh intensitas bermain game terhadap tingkat kognitif (kecerdasan logika matematika) usia 8 - 9 tahun. *Satya Widya*, 33(2).
- Putri, L. U. (2017). Pengaruh permainan dakon terhadap kecerdasan logika matematika. In *skripsi*.
- Siagian, E. R. (2021). Analisis kegiatan orang tua di rumah dalam mengembangkan kecerdasan logika matematika anak usia 5-6 tahun di RA Hamdaniyah tahun ajaran 2021/2022. *Jurnal Usia Dini*, 7(2). <https://doi.org/10.24114/jud.v7i2.31989>
- Tyas, N. M. (2016). Analisis faktor penyebab kesulitan belajar matematika kelas IV sekolah dasar negeri di kecamatan Ungaran Barat kabupaten Semarang. In *Digital Repository IAIN Purwokerto*.
- Widiastuti, S. (2015). Pembelajaran proyek berbasis budaya lokal untuk menstimulasi kecerdasan majemuk anak usia dini. *Jurnal Pendidikan Anak*, 1(1). <https://doi.org/10.21831/jpa.v1i1.2907>



ZERO WASTE REVOLUTION: TRANSFORMING SCHOOLS TOWARDS SUSTAINABLE ENVIRONMENTAL LITERACY

Anisa O. S Pratama^{1*}, Ella Hayati², Akbar Handoko³, Dzulhi Maulana Yusup⁴,
Nukhbatul Bidayati Haka⁵, Meita Dwi Solviana⁶
^{1,2,3,5,6}UIN Raden Intan Lampung, Indonesia
⁴Insitut Tekhnologi Sumatera, Indonesia
*Anisaoktinasaripratama@radenintan.ac.id

ABSTRACT

This research aims to evaluate the implementation of the Zero Waste program and environmental literacy among secondary school students in West Lampung. The research method used is a mixed method with data collection techniques through observation, interviews, multiple choice test questions, questionnaire tests, and documentation. The research results show that the Zero Waste program in schools applies the 5R principle (Refuse, Reduce, Reuse, Recycle and Rot). The implementation of this zero waste program has a positive impact on environmental literacy and on students' lives. Students' environmental knowledge and cognitive skills are in the medium category, while students' attitudes and behavior towards the environment are in the high category. The average student environmental literacy in the medium category. Thus, this research shows that the Zero Waste program has a positive impact on students' environmental literacy.

Keywords: Environmental Literacy, implementation, zero waste, 5R.

1. INTRODUCTION

Environmental education has urgency in awareness and sustainable behavior in the younger generation. Schools are an ideal place to introduce and implement environmentally friendly practices and skills in learning, including the Zero Waste concept (Gutberlet & Baeder, 2008; Pratama & Natalia, 2023; Rahmawati et al., 2024; Zaman, 2022). Zero Waste is a holistic approach that aims to reduce, recycle and minimize the waste produced, thereby reducing negative impacts on the environment (Islam et al., 2023; Zaman, 2022). Introducing the Zero Waste concept in schools not only helps reduce the amount of waste that ends up in landfills, but also increases students' awareness and understanding of the importance of resource conservation and environmental protection. Thus, implementing the Zero Waste program in schools has the potential to form a generation that is more concerned and responsible for the environment (Gutberlet & Baeder, 2008; Kowasch, 2022; Zaman, 2022). This is one of the programs at the Adiwiyata school.

The Adiwiyata School Program is a means of promoting sustainable practices and environmental awareness among students and the entire school community (Afrianda et al., 2019; Desfandi et al., 2017). Adiwiyata School is a national program that aims to encourage schools in Indonesia to care more about the environment. Activities carried out include managing the school environment, efficient use of energy and water, as well as reducing, sorting and managing waste better (Zero Waste) (Afrianda et al., 2019; Choi et al., 2022). The zero waste concept is a real sustainable concept that can be applied in schools. Zero waste programs in schools teach students to develop and practice knowledge about the concept of sustainable systems by reducing waste production (Choi et al., 2022; Nekouei, 2020; Uska et al., 2021).

Although the Zero Waste concept has received increasing attention in Indonesia, there is a lack of empirical data covering the implementation of Zero Waste programs at various levels, including in schools. Previous research tends to focus on policy analysis or literature observations, while empirical research proving the effectiveness of implementing the Zero Waste program at the school level is still limited. In addition, little research has looked at the impact of Zero Waste programs on students' environmental literacy, including their knowledge, skills, attitudes and behavior towards the environment. Therefore, further research is needed that comprehensively explores the implementation of the Zero Waste program in schools and its impact on students' environmental literacy in Indonesia. This kind of research will provide valuable insights for stakeholders in developing more effective strategies in supporting the Zero Waste movement in the educational environment. Based on the introduction of the problems that have been discussed, it is clear how important it is to implement the Zero Waste concept in maintaining the ecosystem and the welfare of society in Indonesia. Concrete steps in



reducing, recycling and minimizing waste are a must to withstand today's environmental challenges. With joint efforts from the government, civil society and the private sector, as well as increased awareness and active participation from all elements of society, we can move towards creating a cleaner, healthier and more sustainable environment for future generations. Therefore, Zero Waste is not just a concept, but also a vision that can be realized through the cooperation and commitment of all parties.

2. METHODS

This research uses mixed methods, where this research uses a research approach that combines qualitative and quantitative elements. In this strategy, researchers collect data from both approaches simultaneously, then integrate the data to provide a more comprehensive understanding. In this research, a qualitative approach was used to understand the implementation of the Zero Waste program in schools, while a quantitative approach was used to collect data on students' environmental literacy levels. The population in this study was the academic community of MTsN 1 Lampung Barat, with a sample consisting of two classes to collect data on students' environmental literacy levels. Apart from that, data regarding the implementation of the Zero Waste program was obtained through interviews with the Adiwiyata coordinator, the coordinator of one of the Zero Waste program working groups, canteen traders, and school security guards. By combining these two types of data, researchers can provide a more complete picture of the implementation of the Zero Waste program and its impact on students' environmental literacy.

3. RESULTS & DISCUSSION

The results of this research review the implementation of Zero Waste and the application of zero waste to students' environmental literacy abilities.

3.1 *Implementation of the Zero Waste Program*

The Adiwiyata Program, which has been implemented since MTsN 1 Lampung Barat, received status as an Adiwiyata school in 2021 and has continued to be developed since then. Active participation of all school members, especially students, is very important in carrying out this program to create a school environment that is conducive and comfortable for learning activities. To ensure the smooth running of the program, a working group (pokja) was formed consisting of teachers and administration staff, involving members from various grade levels, starting from grade 7 to grade 9. Each working group has a coordinator whose job is to coordinate program activities. This step aims to ensure that all school members understand and comply with the policies that have been set, so that the program can run as expected. As a first step, minimum participants It is hoped that they will be aware of the policies issued by the school principal, as well as comply with and not violate policies related to the implementation of environmental activities at school.

To support the implementation of the Zero Waste program, providing environmentally friendly facilities and infrastructure is very important. At MTsN 1 Lampung Barat, the school land has been utilized optimally by providing various facilities that support learning and handling environmental problems. Based on observations, several facilities are available to support the implementation of the Zero Waste program, including healthy canteens, separate organic and non-organic waste bins, waste banks, composters, and liquid waste disposal channels such as septic tanks. With adequate facilities and infrastructure, it is hoped that it can provide optimal support in efforts to create a clean, healthy and sustainable school environment through the implementation of the Zero Waste program (Chu et al., 2023). This is also in line with research conducted by (Afrianda et al., 2019) in his research on the Adiwiyata program on environmental literacy.

The activities carried out at MTsN 1 Lampung Barat in support of the Zero Waste program include the Adiwiyata picket which is carried out every day, where students scheduled for the Adiwiyata picket are on duty. Apart from that, there are also Healthy and Clean Friday activities, which are held once a week on Fridays involving residents from all schools. Waste recycling activities are also part of this effort, which are coordinated by the waste recycling creation working group. One of the results of this activity is the creation of ecobricks, where non-organic waste such as plastic is recycled into ecological bricks. Apart from that, activities for making



liquid fertilizer and compost (eco-enzyme) are also carried out, usually carried out at the end of every semester. These activities are also in line with previous research to reduce waste and zero emissions (Rustam et al., 2023; Nasir et al., 2023; Yadav et al., 2023).

Apart from that, the school community is also trying to utilize the school canteen by not selling food wrapped in plastic, and replacing it with packaging that is easily decomposed such as banana leaves. However, it is realized that reducing activities that can generate waste is not easy, considering that humans are basically consumer creatures who will always produce waste in the surrounding environment. Based on observations, activities are still found in the school environment that produce waste. Therefore, the school continues to socialize and educate all school members to care more about the surrounding environment, especially regarding the problem of plastic waste.

Table 1. List of Zero Waste Activities at MTs N 1 Lampung Barat

No.	Activity	Schedule	Implementation
1.	Adiwiyata Picket	Everyday	Students who are scheduled to attend the Adiwiyata picket
2.	Healthy and Clean in Friday	Friday	The entire MTs N 1 Lampung Barat
3.	Innovation and Creation/ Recycling Rubbish	Tentative	Waste Recycling Creation Working Group
4.	POC (liquid organic fertilizer) and Compost		Compost Working Group and Waste Bank
	Eco enzyme		

The school community, especially the teachers and the entire Adiwiyata team, always strives to reduce the waste produced in the school environment. However, there is still organic and non-organic waste in the school environment. Therefore, the school is trying to manage this waste in order to reduce the amount of waste that goes to final disposal. Through the results of research in the form of interviews and observations, it is known that the waste disposal or processing system at MTsN 1 Lampung Barat is the same as in general, namely by providing organic and non-organic waste bins. Non-organic waste, especially plastic, is sorted before ending up in final disposal, then recycled into products that have useful value, such as ecobricks, stationery storage, and so on. Meanwhile, organic waste is used as fertilizer and liquid compost (eco-enzyme).

However, the results of interviews and observations show that the waste bank at MTs N 1 West Lampung is not optimal in separating organic and non-organic waste. One of the contributing factors is the location of the waste bank which is close to residential areas, making it possible for people to throw household waste into the waste bank. However, the school always tries and sensitizes the school community to reduce waste production as much as possible in the school environment. This is in line with research conducted (Ap. Moreira & Wanda Rutkoski, 2021; Chu et al., 2023; Federico, 2021; Yüzüak & Erten, 2022) which explains zero waste in education.

3.2 Implementation of the Zero Waste Program on Students' Environmental Literacy

In conveying the impact of implementing the Zero Waste program on students' environmental literacy at MTsN 1 Lampung Barat, a comprehensive analysis of various aspects of environmental literacy is needed. This analysis includes an assessment of environmental knowledge, cognitive skills, attitudes towards the environment, and behavior towards the environment. By paying attention to these aspects as a whole, we can gain a deeper understanding of the impact of the Zero Waste program on students' environmental understanding and awareness, as well as their ability to take sustainable action in protecting the environment. The results of implementing



environmental literacy can be seen in Figure 1.

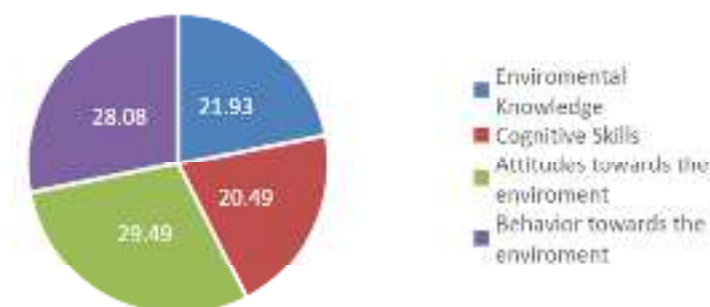


Figure 1. Results of Environmental Literacy Percentage

Based on the results of the presentation above, it can be seen that there are four domains of environmental literacy, namely; Environmental Knowledge: Students' knowledge of environmental issues, including their understanding of Zero Waste principles, waste management processes, and the importance of sustainable practices in everyday life. Cognitive Skills: Evaluation of students' cognitive skills in applying Zero Waste concepts and principles in daily activities, such as sorting waste, using environmentally friendly goods, and participating in waste management activities at school. This skill gets the lowest results, this is because students have not really implemented the zero waste concept in life. Attitudes towards the Environment: It is necessary to assess students' attitudes towards the environment, including whether they have a positive attitude towards Zero Waste practices, awareness of the importance of protecting the environment, and a desire to contribute to environmental conservation efforts. In terms of environmental literacy results, the highest results were obtained, this is because students have given a positive response to the zero waste program implemented. Behavior towards the environment: Analysis of student behavior towards the environment, including practices carried out in daily life that reflect the application of the Zero Waste concept, such as reducing the use of plastic, sorting waste, and participating in environmental activities.

Environmental literacy is important because it helps individuals understand the importance of maintaining environmental sustainability for the well-being of humans and the planet. By increasing environmental literacy, individuals can become agents of change who contribute to global efforts to protect the environment and create a sustainable future (Afrianda et al., 2019; Pratama et al., 2018; Safrizal et al., 2020; Septiani et al., 2019). By analyzing these four aspects before and after implementing the Zero Waste program, we can identify the real impact of the program on students' environmental literacy at MTsN 1.

Students' environmental literacy can be obtained because schools implement Adiwiyata components, one of which is implementing a zero waste program in schools. Therefore, implementing environmentally based programs such as the zero waste program which is part of the Adiwiyata program can shape students' environmental literacy, especially in attitudes and behavior towards the environment. This was also researched by (Hendinata et al., 2022) who stated that literacy is an important part of the environment, especially in Indonesia. Apart from that, the implementation of the Zero Waste program also has a positive impact on students' attitudes and behavior towards the environment. They become more aware of the importance of protecting the environment, develop a caring attitude towards sustainability, and actively engage in practices that support the environment, such as reducing waste, recycling, and using environmentally friendly products.

4. CONCLUSION

In conclusion, implementing the Zero Waste program can make a significant contribution to increasing environmental literacy in students. By adopting a Zero Waste approach, the Zero Waste program in schools applies the 5R principle (Refuse, Reduce, Reuse, Recycle and Rot). The implementation of this zero waste



program has a positive impact on environmental literacy and students' lives. Students' environmental knowledge and cognitive skills are in the medium category, while students' attitudes and behavior towards the environment are in the high category. Through this program, they not only gain practical knowledge about how to manage waste, but also develop the cognitive skills to analyze and assess the environmental impact of their daily actions. Thus, through the Zero Waste program, students not only gain knowledge about environmental issues, but also internalize the pro-environmental values and attitudes needed to become responsible citizens who care about the future of the earth. By continuing to encourage the implementation of the Zero Waste program and increasing environmental literacy among students, we can create a society that is more environmentally aware and committed to preserving the environmental ecosystem for future generations.

5. ACKNOWLEDGMENTS

To all parties involved in this research, I would like to express my deepest thanks. Without the support and contribution of all parties, research on zero waste would not be possible. Thank you to the research team who worked hard to collect and analyze data, and produced valuable findings. Thank you also to respondents and participants who were willing to share information and experiences. We hope that the results of this research can make a significant contribution to environmental protection efforts and encourage sustainable practices in the future. Thank you for the dedication and cooperation of all parties.

REFERENCES

- Afrianda, R., Yolida, B., & Marpaung, R. R. T. (2019). Pengaruh program adiwiyata terhadap literasi lingkungan dan sikap peduli lingkungan. *Jurnal Bioterdidik*, 7(1).
- Ap. Moreira, G., & Wanda Rutkoski, E. (2021). Zero waste strategy for a green campus. *Journal of Sustainability Perspectives*, 1. <https://doi.org/10.14710/jsp.2021.12027>
- Choi, E. H., Lee, H., Kang, M. J., Nam, I., Moon, H. K., Sung, J. W., Eu, J. Y., & Lee, H. Bin. (2022). Factors affecting zero-waste behaviours of college students. *International Journal of Environmental Research and Public Health*, 19(15). <https://doi.org/10.3390/ijerph19159697>
- Chu, Z., Li, Q., Zhou, A., Zhang, W., Huang, W. chiao, & Wang, J. (2023). Strategy formulation path towards zero-waste of municipal solid waste: A case study from Shanghai. *Journal of Cleaner Production*, 418. <https://doi.org/10.1016/j.jclepro.2023.138091>
- Desfandi, M., Maryani, E., & Disman. (2017). Building ecoliteracy through Adiwiyata program (Study at Adiwiyata school in Banda Aceh). *Indonesian Journal of Geography*, 49(1). <https://doi.org/10.22146/ijg.11230>
- Federico, V. (2021). Circular economy and zero waste for environmental education. *Semestrare Di Studi e Ricerche Di Geografia*.
- Gutberlet, J., & Baeder, A. M. (2008). Informal recycling and occupational health in Santo André, Brazil. *International Journal of Environmental Health Research*, 18(1), 1–15. <https://doi.org/10.1080/09603120701844258>
- Hendinata, L. K., Ardiwinata, T., & Pratama, F. K. T. (2022). The role of energy literacy in supporting energy conservation: Perspective from Indonesian citizens. *Indonesian Journal of Energy*. <https://ije-ppc.org/index.php/IJE/article/view/113>
- Islam, M. S., Liu, G., Xu, D., Chen, Y., Li, H., & Chen, C. (2023). University-campus-based zero-carbon action plans for accelerating the zero-carbon city transition. In *Sustainability (Switzerland)* (Vol. 15, Issue 18). <https://doi.org/10.3390/su151813504>
- Kowasch, M. (2022). Circular economy, cradle to cradle and zero waste frameworks in teacher education for sustainability. *International Journal of Sustainability in Higher Education*, 23(6). <https://doi.org/10.1108/IJSHE-10-2021-0428>
- Nasir, T. M., Hasbiyallah, H., Pebriansyah, I. A., & Dedih, U. (2023). Zero waste program (Through Kang Pisman school) as an implementation of environmental love education at Insan Madani islamic boarding school. *AS-SABIQUN*, 5(3). <https://doi.org/10.36088/assabiqun.v5i3.3275>



- Nekouei, S. R. (2020). *A zero-waste approach in valorization of recycled waste printed circuit boards (WPCBs)*. <https://doi.org/10.26190/UNSWORKS/22099>
- Pratama, A. O. S., Abdurrahman, A., & Jalmo, T. (2018). The effect of science-technology-society approach-based worksheets on improving Indonesian students' scientific literacy. *Asia-Pacific Forum on Science Learning and Teaching*, 19(2).
- Pratama, A. O. S., & Natalia, V. E. D. (2023). Meta analisis: Science technology society terhadap hasil belajar sains. *Jurnal Basicedu*, 7(4). <https://doi.org/10.31004/basicedu.v7i4.5739>
- Rahmawati, I., Oktina Sari Pratama, A., & Hidayanti, V. (2024). Analysis of scientific literacy in disaster mitigation at SMAN 1 Kotaagung: Sustainability measure. *E3S Web of Conferences*, 482, 04013. <https://doi.org/10.1051/e3sconf/202448204013>
- Rustam, I., Sabilla, K. R., & Syaiful Anam. (2023). Climate change adaptation assistance to a number of environmental communities in Mataram city in supporting NTB's commitment to net zero emission. *Prospect: Jurnal Pemberdayaan Masyarakat*, 2(1). <https://doi.org/10.55381/jpm.v2i1.88>
- Safrizal, S., Zaroha, L., & Yulia, R. (2020). Kemampuan literasi sains siswa sekolah dasar di sekolah Adiwiyata (Studi deskriptif di SD Adiwiyata X Kota Padang). *Journal of Natural Science and Integration*, 3(2). <https://doi.org/10.24014/jnsi.v3i2.9987>
- Septiani, D., & Widiyawati, Y. (2019). Pengembangan instrumen tes literasi sains berbasis PISA pada aspek menjelaskan fenomena ilmiah untuk siswa kelas VII. *Science Education*. <http://www.jurnalpendidikan.unisla.ac.id/index.php/SEAJ/article/view/144>
- Uska, M. Z., Wirasmita, R. H., Arianti, B. D. D., Kholisho, Y. N., Djamaluddin, M., & Jamaluddin, J. (2021). Android-based waste education app: An information media on zero-waste programs. *Elinvo (Electronics, Informatics, and Vocational Education)*, 6(1). <https://doi.org/10.21831/elinvo.v6i1.41104>
- Yadav, S., Samadhiya, A., Kumar, A., Majumdar, A., Garza-Reyes, J. A., & Luthra, S. (2023). Achieving the sustainable development goals through net zero emissions: Innovation-driven strategies for transitioning from incremental to radical lean, green and digital technologies. *Resources, Conservation and Recycling*, 197, 107094. <https://doi.org/https://doi.org/10.1016/j.resconrec.2023.107094>
- Yüzüak, A. V., & Erten, S. (2022). Teachers' views about Turkey's zero waste project (TZWP). *Journal of Turkish Science Education*, 19(1). <https://doi.org/10.36681/tused.2022.110>
- Zaman, A. (2022). Zero-waste: A new sustainability paradigm for addressing the global waste problem. In *The Vision Zero Handbook* (pp. 1–24). Springer International Publishing. https://doi.org/10.1007/978-3-030-23176-7_46-1



ENHANCING STUDENTS' ENGLISH PRONUNCIATION THROUGH PHONETIC METHODOLOGY AT MTSN 3 BANDA ACEH

Lina Farsia^{1*}, Sarair², Fadhlullah Romi³, Siti Al-Mukarrama⁴, Septhia Irnanda⁵

^{1,2,4}Universitas Muhammadiyah Aceh, Indonesia

³SMAN 1 Ingin Jaya

⁴Universitas Serambi Mekkah

lina.farsia@unmuha.ac.id

ABSTRACT

This study investigates how well first-grade students at MTsN 3 Banda Aceh can pronounce English words correctly while using a phonetic approach. The study uses tests, questionnaires, and experimental instruction sessions to investigate the efficacy of the phonetic technique using a pre-experimental research design. All first-grade children at MTsN 3 Banda Aceh make up the target population, and 30 students were chosen as a sample size for the research. The data is analyzed using statistical techniques such as t-tests, percentage computations and SPSS 21. Based on the difference between pretest and posttest scores, the results show that students' pronunciation skills significantly improved after using the phonetic approach. Furthermore, both the quantitative and qualitative results show that students had positive attitudes regarding the phonetic technique.

Keywords: Challenges, Strategies, TOEFL Preparation.

1. INTRODUCTION

A common mistake made by many students studying English as a second language is not paying adequate attention to English pronunciation. This underestimation of the importance of pronunciation is mainly because students tend to think mistakenly that pronunciation is less important compared to other aspects of the English language such as grammar, lexicology and vocabulary.

Pronunciation is an essential element in language proficiency, contributing significantly to the overall communicative competence of language learners (Gilakjani, 2012). Smith (2019) defined pronunciation as a collection of habits that are developed through the repetition and correction of sound production. Poor pronunciation can hinder comprehension, impede effective communication, and lead to misinterpretations. Recognizing the importance of addressing this challenge, educators and researchers have increasingly turned their attention to methods and interventions aimed at improving students' pronunciation skills.

Pronunciation is vital to proper communication because the incorrect use of pronunciation inevitably leads to the message being misunderstood by the recipient. Pronunciation of the letter sounds in words as well as syllable emphasis on parts of words will more often than not change the words meaning and context drastically thereby irreversibly altering the meaning of the sentence being communicated. A good example of this is the word present. If one were to say, "I am present" with an emphasis on the first syllable of the word, one is referring to one's presence at a particular place or time. On the other hand, if one were to say, "I wish to present....". Then one refers to a statement or article one wishes to announce.

Effective communication in a second language encompasses various aspects, with pronunciation playing a pivotal role in conveying meaning and fostering successful interaction. In language learning contexts, pronunciation is often a challenging skill for students to master, leading to potential communication barriers and reduced linguistic confidence. This study aims to explore and implement strategies to enhance students' pronunciation, recognizing the significance of clear and accurate spoken language in effective communication.

Several studies had been conducted to identify the difficulties faced by students in English pronouncing and how to overcome them. A study by Umantari (2016) suggested that Indonesian students often have difficulties in understanding the differences between English and Indonesian phonological systems, especially consonants. Moreover, Komariah (2018), in her research, compared English sounds and students' pronunciation, finding out the consonant, vowel and diphthong mispronouncing by the students. The study suggested that students face difficulties in pronouncing the English sounds, finding the students' problems in pronouncing English sounds and



3 drawing a conclusion. Both of the studies found that Indonesian students, in the investigated areas, experienced errors in their pronunciation.

Therefore, teachers must become more innovative and creative in choosing an effective approach in teaching pronunciation. One alternative approach to teaching pronunciation, as suggested by many researchers, is the phonetic methodology. Phonetic methodology is an alternative approach to teaching pronunciation that focuses on the explicit teaching of phonetic symbols and their corresponding sounds. This method emphasizes the connection between written symbols and spoken sounds, helping learners develop accurate pronunciation and communication skills (Jaske, 1987). This study is aimed to analyze the effectiveness of using the phonetic methodology in improving students' pronunciation ability.

2. METHODS

2.1 Research Design

This study used a pre- experimental methodology. Pre- test first conducted before the treatment. After treatment, a post-test was also conducted to measure if the treatment was effective. After the test was conducted the qualitative research method was used to support the finding with the deeper information. Moser & Korstjens (2017) defines Qualitative research as a type of research that explores and provides deeper insights into real-world problems. Qualitative research uses several techniques including interviews, questionnaires, focus groups, and observation (Cleland, 2017).

2.2 Source of Data

The writers conducted this research in MTsN 3 Banda Aceh. The Population of this Study is the students of MTsN 3 Banda Aceh (311 students). The stratified Sampling is used to select the sample for the study. The Sample of this study is students of Class IX.1 that consists of 40 students.

2.3 Data Collection

In collecting data, this research applied a pre-experimental design (one group pretest and posttest). The pre-experimental design includes one or more than one experimental group to be observed against certain treatments (Thyer 2012). This design involved one group that is pre-test (O1), exposed to treatment (X) and post-test (O2). It aims to know whether there is significant development before and after using Phonetic Methodology and to know whether by using Phonetic Methodology can improve students' pronunciation. A preliminary test administered to determine a student's baseline knowledge or preparedness for an educational experience or course of study. At this point I will give a text of the conversation to the students, and ask the students to read the text without giving a correct reading record of the text, to see how well the students pronounce it before implementing this method.

Moreover, another test was given to students after completion of an instructional program or segment and often used in conjunction with a pre-test to measure their achievement and the effectiveness of the program. A text of the conversation is provided for the students, followed by a requirement to listen to a recording of a text conversation that has been shared. After listening, the students were asked to read back the text of the conversation they have been listening to, to see if the student's pronunciation would be better after they listen to the pronunciation first before reading it themselves.

Next, a set of questionnaires was provided for the students to obtain qualitative insights into the thoughts and feelings of the students regarding the application of Phonetic Methodology in learning pronunciation. In order to gauge participation, enjoyment, and the perceived efficacy of the Phonetic Methodology, the writers considered several closed-answered and open-answered questions. Students were invited to share their ideas, which produced insightful qualitative data for a more comprehensive understanding.



3. RESULTS & DISCUSSION

The data were collected through tests and questionnaires. The result of the teaching experiment shows that there is a significant improvement of the students' pronunciation by phonetic method. At the first meeting, the writer gave a pre-test, and at the last meeting, the writers gave a post-test. The lowest score of pre- test is 60 and the highest is 80. Moreover, the score of the post-test is 70 for the lowest and the highest is 85. From the result of the pre-test and post-test this proves that the post-test value is higher than the pre-test so that it can be concluded that from the result of the pre-test and post-test phonetic method is considered. The score of this t count is higher than t table 2.021. This shows that H_0 is rejected and H_a is accepted. It means phonetic methods can improve students' pronunciation.

The purpose of the linear regression analysis is to test one of the independent variables on the dependent variable. Whether or not there is influence between one independent variable on the dependent variable. The output of the first part (coefficient) is known to be a constant value (a) of 7.000. While the phonetic method (b/regression coefficient) is 0.818. From the result of the regression equation, it can be translated that the constant is 7.000 means that the consistent value of the pronunciation variable is 7.000. Secondly, the independent variable (X) regression coefficient is 0.818 states that for each addition of 1 % phonetic method, the pronunciation value increases by 0,818. The regression coefficient is positive, so it can be said that the direction of influence of the variable X on Y is positive. Furthermore, decision making in a simple regression test. Based on the significance value of the coefficient table obtained a significance value of 0.000 smaller than the probability of 0.05 ($0.000 < 0.05$) so that it can be concluded that the variable X affects the variable Y. In addition, decision-making based on t value is called t test. Known t value is 6.618 greater that t table 2.021 ($6.618 > 2.021$) so it can be concluded that the phonetic method variable (X) affects the pronunciation variable (Y).

The second part output (model summary) explains the value of the correlation or relationship (R) that is equal to 0.732 so that it can be said there is a relationship between the independent variable (X) against the dependent variable (Y) the total relationship is equal to 0.732. Then, from the output obtained the determination coefficient (R square) of 0.535 which implies that the effect of the independent variable (phonetic method) on the dependent variable (pronunciation) is 53.5 %. The students give positive responses toward the application of phonetic methods in improving their English pronunciation. The results of questionnaires proved the students felt more confident when they used phonetic method strategy, and they felt this method made them easier to understand the English text. Many students are happy and like learning by using the phonetic method and make them motivated and also want to try reading a text. They are also easy to understand how to correct pronunciation. After the data were analyzed the result indicated that the students' ability in pronouncing words increases. Thus, learning English by using the phonetic method makes the students motivated to read the English text.

The researcher chose phonetic methodology to be applied in the classroom because of some reason. Phonetic method is necessary to be learned because by using phonetic method, students can test themselves whether their pronunciation is correct or not. If their pronunciation is not correct, it can be corrected after they hear the pronunciation first from a recording or other app to listen. From the result of the questionnaire, it can be concluded that learning to improve the students' pronunciation by using the phonetic method is effective.

To investigate the students' improvement in pronunciation, the writer gave the students 10 questions. To make the reader easy to comprehend the explanation, the writer present the result of questionnaires by using the table below:

$$P = F/N \times 100$$

Where :

P = Percentage (%)

F = Frequency

N = Total Number of Population



Table 1. The Students Like Learning English by Using the Phonetic Method Strategy.

Question Number	Option	F	Percentage
1	Strongly Agree	18	45 %
	Agree	22	55 %
	Disagree	-	-
	Strongly Disagree	-	-
Total		40	100 %

From the table above, of the total 40 correspondents, there are 22 students (55 %) who agree that they like learning English by using the phonetic strategy, and 18 students (45%) strongly agree. No one disagrees or strongly disagrees. Hence, most of the students like learning English by using the phonetic strategy. To sum up, the students like learning by using phonetic method strategy.

Table 3. The Students Prefer Learning English by Using the Phonetic Method Strategy to Discussion Technique.

Question Number	Option	F	Percentage
2	Strongly Agree	9	22.5 %
	Agree	26	65 %
	Disagree	5	12.5 %
	Strongly Disagree	-	-
Total		40	100 %

The table above discusses that there are 26 students (65 %) who agree, 9 students (22.5 %) strongly agree, 5 students (12.5 %) disagree and no one strongly disagrees with the statement. Thus, most of the students prefer learning English text by using phonetic method to learning using discussion technique.

Table 4. Learning by Using the Phonetic Strategy Makes the Students Motivated to Read English Text.

Question Number	Option	F	Percentage
3	Strongly Agree	20	50 %
	Agree	20	50 %
	Disagree	-	-
	Strongly Disagree	-	-
Total		40	100 %

The table above shows that 20 students (50%) agree that learning by using the phonetic method strategy makes them feel motivated to read English text. Twenty students (50%) strongly agree, and no one disagrees and strongly disagrees with the statement. Most of the students learning by using phonetic method strategy make the students motivated to read the English text. It means that the students are motivated to learn by using the phonetics method strategy.

Table 5. The Students More Easily Understand and Know Correct Pronunciation in English

Question Number	Option	F	Percentage
4	Strongly Agree	18	45 %
	Agree	20	50 %
	Disagree	1	2.5 %
	Strongly Disagree	1	2.5 %
Total		40	100 %



The table above describes that, of 40 respondents, 20 students (50%) agree and 18 students (45%) strongly agree that they can have a better understanding and know how to pronounce English words correctly. One student (2.5%) disagrees and another student (2.5 %) strongly disagrees with the statement.

Table 6. The Students Prefer Listening to the English Text Reading First before Reading it Themselves.

Question Number	Option	F	Percentage
5	Strongly Agree	20	50 %
	Agree	18	45 %
	Disagree	2	5 %
	Strongly Disagree	-	-
Total		40	100 %

The table illustrated that 20 students (50%) strongly agree, and 18 students (45 %) agree that they prefer listening to English text reading first before reading it themselves, 2 students (5%) disagree and no one strongly disagrees with the statement. Most of the students prefer to listen to English text reading first before reading it themselves.

Table 7. Applying the Phonetic Method Strategy Can Increase Students' English Achievement.

Question Number	Option	F	Percentage
6	Strongly Agree	12	30 %
	Agree	23	57.5 %
	Disagree	5	12.5 %
	Strongly Disagree	-	-
Total		40	100 %

The table above shows that 23 students (57.5 %) agree, and 12 students (30%) strongly agree that applying the phonetic method strategy can increase students' English achievement. Five students (12.5 %) disagree, and nobody strongly disagrees with this statement. Thus, it can be summed up that the application of the phonetic method can increase students' English achievement.

Table 8. The Phonetic Method Strategy Facilitates the Students' Understanding of English Text.

Question Number	Option	F	Percentage
7	Strongly Agree	13	32.5 %
	Agree	24	60 %
	Disagree	3	7.5 %
	Strongly Disagree	-	-
Total		40	100 %

Related to the table above, 24 students (60%) agree and 13 students (32.5%) strongly agree that the phonetic method strategy makes it easy for them to understand English text. Three students (7.5 %) disagree. Most of the students agree that the phonetic method strategy facilitates their understanding of English text.

Table 9. The Phonetic Method Strategy Increases the Students' Confidence When Asked to Read the Text.

Question Number	Option	F	Percentage
8	Strongly Agree	17	42.5 %
	Agree	19	47.5 %
	Disagree	2	5 %
	Strongly Disagree	2	5 %
Total		40	100 %



The table describes that 19 students (47.5 %) agree and 17 students (42.5 %) strongly agree to the statement. 2 students (5 %) disagree and 2 students (5 %) strongly disagree. Most of the students become more confident when they are asked to read the text with applying phonetic method strategy.

Table 10. The Phonetic Method Strategy Should be Applied Continuously.

Question Number	Option	F	Percentage
9	Strongly Agree	19	47.5 %
	Agree	17	42.5 %
	Disagree	4	10 %
	Strongly Disagree	-	-
Total		40	100 %

Based on the table above, 19 students (47.5%) strongly agree; 17 students (42.5 %) agree with the statement; 4 students (10%) disagree, and no one strongly disagrees. Most of the students hope this strategy will be continued to be applied in learning English. It means that applying phonetic method strategy makes them comfortable.

Table 11. The Student Pronunciation Becomes Better after the Phonetic Method Had Been Applied.

Question Number	Option	F	Percentage
10	Strongly Agree	11	27.5 %
	Agree	22	55 %
	Disagree	6	15 %
	Strongly Disagree	1	2.5 %
Total		40	100 %

The table shows that 22 students (55%) agree, 11 students (27.5%) strongly agree, 6 students (15%) disagree and 1 student (2.5%) strongly disagrees with the statement. Most of the students became better after the phonetic method had been applied. It means that this method is one of the strategies that can improve their ability in pronouncing English words.

4. CONCLUSION AND SUGGESTIONS

Based on the result of the test, teaching experiment, and questionnaires, there is a significant difference between the result of pretest and posttest. Therefore, the writer draws several conclusions as follow:

1. Teaching by using phonetic methodology can improve the students' pronunciation, as proven by students' posttest scores that were higher than the pretest scores.
2. The students give positive responses toward the application of the phonetic method. The students become more confident when they are asked to read the text.

Moreover, several suggestions can be given and beneficial to other from the result of learning by using phonetic method in improving students' pronunciation:

1. Teachers are recommended to use phonetic methodology as an alternative approach to improving students' pronunciation ability.
2. The students should learn English not only at the school but also in other places to improve their English quality. They also must often read the English written text such as magazines, newspapers and other authentic material.

REFERENCES

Cleland, J, A. (2017). The qualitative orientation in medical education research. *Korean J Med Educ.* 61-7.



- Gilakjani, P, A. (2012). The Significance of Pronunciation in English Language Teaching. *English Language Teaching*. 5. 10.5539/elt.v5n4p96.
- Jaske, L, M. (1987). An Overview of the Phonetic Approach to Reading. Graduate Research Papers. University of Northern Iowa.
- Komariah, A. (2018). Problems in pronouncing the English sounds faced by the students of SMPN 2 Halong, Banjar. *Journal of English Language and Pedagogy*, 1(2).
- Moser, A, Korstjens, I. (2017). Practical guidance to qualitative research. Part 1: Introduction. *Eur J Gen Pract*. 271-273.
- Smith, J. (2019). The importance of pronunciation in language learning. *Modern Language Journal*, 103(2), 212-226. doi:10.1111/modl.12552
- Thyer, B, A. (2012). Quasi-Experimental Research Designs. *Oxford University Press*. <https://doi.org/10.1093/acprof:oso/9780195387384.003.0002> P.29–76.
- Umantari, Meldy, P. I. & Laksmi, L, P. & Putra, K, S. (2016). Pronunciation Problems of English Consonants Encountered by Senior High School Students of SMAN 1 Tabanan. *Jurnal Humanis, Fakultas Ilmu Budaya Unud*, 17(2), 228–234.

INNOVATION WITHIN LIMITATION: BATIK CREATION BY DISABILITIES STUDENTS

Farid Abdullah^{1*}, Aneeza Mohd Adnan², Bambang Tri Wardoyo³, Harris Effendi⁴,
Mohammed Iqbal Badaruddin⁵

^{1*}Art Education, Universitas Pendidikan Indonesia, Indonesia

²Jabatan Reka Tekstil, UiTM Kelantan, Machang, Malaysia

^{3,4}Visual Communication Design, Trisakti University, Indonesia

⁵Liberal Studies, College of Creative Art, UiTM Kelantan, Machang, Malaysia

*farid.abdullah@upi.edu

ABSTRACT

The creation of batik among disabled students with sensory limitations is still very limited. Disabled people are often considered inferior by society as a group that needs to be pitied, has limited abilities, and is unproductive. This stigma is very detrimental to people with disabilities, has negative connotations, and is counter-productive. This article uses a descriptive - qualitative method for students with disabilities at Griya Batik Difabel, Social Service, West Java Province, in creating written batik. A number of innovative steps were taken for students with disabilities to produce hand-written batik cloth. Innovation in aspects of ideas, tools, batik creation processes, displays, and introducing batik products to the wider community. The findings from this paper are that students with disabilities have high innovation abilities in creating written batik cloth. The written batik works of students with disabilities have a number of advantages in terms of innovation in ideas for motifs, designs, color compositions, including the display of the batik final work. The innovation of creating written batik created by students with disabilities is very important to be appointed, presented and shown to society as a form of fair recognition as a human being.

Keywords: creation, batik, disability, innovation.

1. INTRODUCTION

Innovation has always been synonymous with infinity. Innovation has always been closely related to freedom of work, freedom of innovation, and no limitations, both in ideas, tools, processes, actors and the final result of the work. Innovation in transportation facilities for people with disabilities is a necessity (Zakiyah & Fadiyah, 2020). Innovation for people with disabilities in the form of creating a Braille Corner for Service Quality and Library Performance is also important to improve inclusive education (Ditasman et al., 2023).

There are problems in the wider community regarding disabled people and people with disabilities being discriminated against. The general understanding of the world community is that people with disabilities are still negative (Widinarsih, 2019). Disabled people are also often associated with exclusive education (Maheswari & Devi, 2022; Idrus, 2022). So far, batik creations have mostly been produced by physically healthy practitioners. Healthy and normal physical abilities are one of the requirements for creating batik.

Batik creators and craftsmen have always been involved in practitioners who are healthy, have complete body parts and are normal. Students with disabilities need to explore their interests, which is very important to explore their potential (Amarudin et al., 2021) including in creating batik. The ability of people with disabilities to work and intellectuals who are able to explore their own potential and have skills in making batik (Umi, 2023). From the artistic aspect, Uma explained that it can help improve cognitive values and critical thinking, including problem solving, sharpening visual-processing skills, providing good focus and attention, providing space to emphasize expression, stimulation skills, developing communication skills, social skills, and reducing attitudes. or because it is negative, improves self-skills and strengthens the power of attention.

Batik is one of the noble works of historical heritage in Indonesia, which is proven by the origins of batik, which has been known since ancient times, and is also an intangible cultural heritage that has been recognized by UNESCO (Putri, 2022). The definition of batik is a textile fabric dyed according to typical Indonesian patterns using batik wax (Widadi, 2020). The creation of batik is synonymous with natural sources of ideas and the existing natural environment (Maziyah & Alamsyah, 2023). The long history of batik in the archipelago also shows the long range of its creation (Habibie et al., 2023).

People with disabilities in creation also receive a lot of attention in Malaysia and are called People with Disabilities (OKU). Lim Anuar, a 52-year-old deaf Malaysian artist, has no problem providing a comfortable life

for his family through selling batik works and art classes. As a person with speech and hearing problems, batik art is the only tool like a smart voice to communicate with people, society and the outside world. Art for him, is a sound that helps express his moods and emotions thereby helping him connect with his family, culture and heritage. Starting out with pen and pencil, Lim started with kung fu comics and developed his skills of concentrating on events happening around him. Although batik painting is a complicated process and requires a great deal of skill and time, the complex works of art that can be produced through batik are quite valuable. For Lim, it is important for every work of art to say something, otherwise it is nothing more than 'splashes of paint dripping on a canvas'. Malaysian culture gave Lim a lot of ideas to work with, and he tried his best to play with lots of colors to invoke a sense of nostalgia among the audience. Touching on the future, Lim shares his dream of opening an art gallery and workshop, allowing him to raise awareness and enable disabled and disadvantaged Malaysians to succeed.

This article aims to report the process of innovative creation among people with disabilities in Indonesia and Malaysia. The purpose of this article is to report innovations that have been carried out by people with disabilities.

2. LITERATURE REVIEW

Previous research related to batik creation carried out by people with disabilities entitled Empowerment of Associations of Persons with Disabilities through the Mango Motif Batik Making Program: A descriptive study of the Indonesian Association of Persons with Disabilities (PPDI) Indramayu Regency, was carried out by Al Kahfi and Muhammad Riyadh (Kahfi & Riyadh, 2023). The innovation of creating written batik canting for people with disabilities has also been carried out by Anggraeni and friends (Anggraeni et al., 2023). Community service to support the marketing of *Jumputan Batik* created by people with disabilities has also been carried out by Pangesti and friends (Pangesti et al., 2024). The creation of batik motifs by people with disabilities to produce new batik motifs has also been carried out in Malang, East Java (Teowarang & Kusumowidagdo, 2023). Setiyaningsih's research at doctoral level on empowering people with disabilities in creating batik crafts has also been carried out previously (Setiyaningsih, 2023). Training for people with disabilities in making eco print batik can train students' creativity and develop their competencies (Zahro et al., 2023; Sari et al., 2022).

Apart from that, Uma stated that one of the interests of studying the production process of a work of art is to positively improve individual skills, especially generating local income. According to Uma, arts, crafts and games are not only an activity in developing intellectuality for the less fortunate but they also improve skills systematically through communication, social activities and visual handwork (Maheswari & Devi, 2022).

3. METHODS

The method in this paper is descriptive - qualitative, because it is reporting an activity. The descriptive approach aims to explain the various activities of the creative process for people with disabilities. Qualitative is a human observation approach without statistics, precise numbers. Qualitative descriptive research from an art and design perspective can be interpreted as part of the creation process which aims to present a detailed picture of a creation process, in this case the creation of *Batik*.

4. RESULTS & DISCUSSION

At this discussion stage, a number of data and analyzes obtained from Griya Batik Difabel, West Java Provincial Social Service, are displayed.

4.1 *Batik Process*

The process of creating batik is divided into two, namely written batik and stamped batik (Susanti & Azhar, 2020). At the Disabled Batik House below, batik making is done using written batik techniques (Figure 1) which are adapted to the physical abilities of disabled batik makers.



Figure 1. Disabled Students Making Batik.

The creation of written batik carried out by the disabled people above (Figure 1) does not show any innovation. Innovation in batik creation has not yet been seen at the Disabled Batik House, but it shows a very high production spirit, focused and full of determination. The advantage of people with disabilities is their excellent work perseverance, some people with disabilities even create batik sincerely and happily.

4.2 *Batik Tools*

Similar to creating batik in general, it requires special work tools (Ditto et al. 2020). Batik working tools ideally use ergonomic principles, in order to reduce injuries after making batik (Saputra, 2020). The creation of written batik among people with disabilities also uses work tools as seen in Figure 2 below.



Figure 2. Batik Tools for Disabled Students.

The tools used for people with disabilities (Figure 2) show little innovation. For wax batik cups and canting, use tools similar to normal batik makers. A simple innovation in heating devices that do not use small stoves or electric heaters, but use gas fuel. The use of gas heaters is rarely used by batik makers in general.

4.3 *Batik Design*

The aspect of batik creation that is still very open to innovation is the creation of new motif ideas. Below is an example of a batik motif design that can be categorized as innovative (Figure 3). Innovation in batik designs for people with disabilities is the highest level of creation because it shows the novelty of the work.



Figure 3. Batik Patterns Made by Disabled Students.

In the motif design above (Figure 3), you can see an unusual composition of batik work, free from certain rules, standards or symbols. In Javanese palace batik motifs, for example, batik motifs rely heavily on royal symbols. Palace batik motifs generally depict order, symbolic meaning and regular composition, and resemble tattoos (Prasetyo, 2022).

4.4 Batik Display

Exhibiting and showing works that have been created by people with disabilities are also required to be innovative. This section shows the Batik Disabled Showroom owned by Griya Harapan Difabel, West Java Provincial Social Service which is located on Jalan Jenderal Amir Machmud No. 331, Cimahi, West Java (Figure 4).



Figure 4. Gallery of Batik Difabel.

In the picture above (Figure 4) is the exhibition room of Griya Batik Difabel, in Cimahi, West Java. Occupying a work exhibition space of 50 square meters, this gallery is an important part of the face of the works of students with disabilities. The existence of a showroom is very important because it aims to increase the functional value of marketing, as well as being a public place that facilitates learning, conservation, recreation and socialization activities (Setiawan et al., 2021). The exhibition space is expected to be a place that is of great benefit, communicative and interactive, and is expected to inspire visitors to create scientific innovations in the future (Wardhani, 2019).

5. CONCLUSION

Creating batik for people with disabilities, with their limitations, can still produce innovative works. There are a number of innovations found from the Disabled Batik Center, Regional Technical Implementation Unit, West Java Provincial Social Service, namely innovations in tools, innovations in creating batik motifs, as

well as innovations in displaying works. An important finding from this article is the high creative spirit of people with disabilities to produce innovative fabrics, which are different from normal batik making. The moral message for all of us is to foster a sense of gratitude, for readers and batik users with disabilities, if the five senses are in complete condition. Innovation creation among people with disabilities will certainly develop according to the demands of fashion, trends and developments in society in the future.

6. ACKNOWLEDGMENTS

Our acknowledgements go to Mrs. Andina Rahayu as Head of Griya Harapan Disabled, Regional Technical Implementation Unit, Social Ministry office, West Java Province, Cimahi, Indonesia. Her sincere support and collaboration made this paper well written.

REFERENCES

- Amarudin, M. T., Setiawan, E., Kastrena, E., Amrulloh, A., Amalia, E. F., Pratama, A. K., & Rahadian, A. (2021). Mengeksplorasi minat siswa penyandang disabilitas terhadap aktivitas fisik di masa pandemi Covid-19. *Jurnal Patriot*, 3(4), 408-418.
- Anggraeni, O. J., Kurniawati, D., Karimah, C. N., Abdurrahman, A., & Subagiyo, A. (2023). Inovasi canting cap batik sebagai upaya peningkatan produksi pada wirausahawan batik disabilitas. *Prawara Jurnal ABDIMAS*, 2(03 JULI), 99-105.
- Ditasman, D., Hartono, R., & Saputra, N. (2023). Inovasi layanan pojok braille dan kualitas layanan Perpustakaan dan Kearsipan Provinsi Bengkulu. *Journal of Governance and Public Administration*, 1(1), 106-129.
- Ditto, A., Yulimarni, Y., & Sundari, S. R. I. (2020). Pelatihan batik cap dalam rangka meningkatkan kreatifitas siswa SLB YPPLB Kota Padang. *Batoboh: Jurnal Pengabdian Pada Masyarakat*, 5(1), 38-45.
- Habibie, A. F., Sahfitri, F. N., & Mandalika, W. D. (2023). Media pembelajaran interaktif “Batik Pedia” berbasis aplikasi android pada ensiklopedia Batik Nusantara. *Jurnal Komputer Teknologi Informasi dan Sistem Informasi (JUKTISI)*, 2(2), 326-338.
- Idrus, M. (2022). Inklusi untuk disabilitas: Perspektif agama dan kebudayaan. *MIMIKRI*, 8(2), 400-414.
- Kahfi, A., & Riyadh, M. (2023). *Pemberdayaan perkumpulan penyandang disabilitas melalui program pembuatan batik motif buah mangga: Studi deskriptif Perkumpulan Penyandang Disabilitas Indonesia (PPDI) Kabupaten Indramayu* (Doctoral dissertation, UIN Sunan Gunung Djati Bandung).
- Maziyah, S., & Alamsyah, A. (2023, December). Cultural environment and natural environment as inspiration for making batik motifs. In *Proceedings International Conference of Culture and Sustainable Development* (Vol. 1). Faculty of Humanities.
- Pangesti, N. A., Muzaki, A., Respatiningsih, H., Saputri, D. A. N., & Wahyuni, N. (2024). PMP peningkatan kapasitas pemasaran usaha batik jumputan pada kelompok disabilitas desa bragolan, kabupaten Purworejo. *JURPIKAT (Jurnal Pengabdian Kepada Masyarakat)*, 5(1), 70-85.
- Prasetyo, P. (2022). Motif Batik Keraton Punya Aura Seperti Rajah. *Artikel Kedaulatan Rakyat*, 21-21.
- Putri, A. D. H. P. (2022). *Kajian tata kelola museum studi kasus: Museum batik danar hadi Surakarta* (Magister Seni, Institut Seni Indonesia Yogyakarta).
- Saputra, A. (2020). Sikap kerja, masa kerja, dan usia terhadap keluhan low back pain pada pengrajin batik. *HIGEIA (Journal of Public Health Research and Development)*, 4(Special 1), 147-157.
- Sari, A. W., Ismillah, T. L., Mufidah, S. N., Indriana, S. W., Multiana, A., & Mahmudah, S. (2022). Peningkatan kemandirian siswa tunarungu SMALB B karya mulia melalui pelatihan pembuatan batik ecoprint. *Transformasi dan Inovasi: Jurnal Pengabdian Masyarakat*, 2(2), 105-110.
- Setiawan, F. T., Hanafiah, U. I. M., & Zahra, M. F. A. (2021). Perancangan desain interior museum batik kota surakarta dengan pendekatan kearifan lokal budaya arsitektur surakarta. *eProceedings of Art & Design*, 8(4).
- Setiyaningsih, N. (2023). *Pemberdayaan penyandang disabilitas melalui program kerajinan batik di komunitas difabel zone* (Doctoral dissertation, UIN Sunan Kalijaga Yogyakarta).

- Susanti, K., & Azhar, F. (2020). Pengenalan proses membatik sebagai upaya pelestarian batik tulis. *SENADA: Semangat Nasional Dalam Mengabdi*, 1(1), 97-106.
- Teowarang, J. R., & Kusumowidagdo, A. (2023). Pengembangan dan pemberdayaan batik artisan disabilitas topeng malangan untuk praktik keberlanjutan fashion. *Jurnal LeECOM (Leverage, Engagement, Empowerment of Community)*, 5(2), 201-210.
- Maheswari, S., Devi C. (2022). Effect of art and craft in developing functional reading skills of children with intellectual disability. *Jurnal ANVESAK*. <https://www.researchgate.net/publication/362047151>.
- Umi, W. (2023). *Pemberdayaan penyandang disabilitas intelektual melalui kerajinan batik ciprat di sheltered workshop peduli (SWP) Nurul Huda kecamatan Gumelar kabupaten Banyumas* (Thesis, Da'wah Faculty, UIN Prof. KH Saifuddin Zuhri, Purwokerto).
- Wardhani, A. J. (2019). *Redesain ruang pameran lantai dasar museum nasional sejarah alam Indonesia bogor* (skripsi, Desain Interior, Institut Seni Indonesia Yogyakarta).
- Widadi, Z. (2019). Pemaknaan batik sebagai warisan budaya takbenda. *Pena: Jurnal Ilmu Pengetahuan dan Teknologi*, 33(2), 17-27.
- Widinarsih, D. (2019). Penyandang disabilitas di Indonesia: Perkembangan istilah dan definisi. *Jurnal Ilmu Kesejahteraan Sosial*, 20(2), 127-142.
- Zahro, F., Mahardika, S. P., Nurjanah, D. S., Salsabila, A., Octavia, S. R., Utami, H. C., Wicaksini, A.K., Mardhatilah, W., Agustin, Z. N. (2023). Pelatihan batik ecoprint sebagai upaya mewujudkan generasi wirausaha kreatif pada siswa luar biasa. *Sasambo: Jurnal Abdimas (Journal of Community Service)*, 5(1), 34-43.
- Zakiyah, U., & Fadiyah, D. (2020). Inovasi pelayanan transportasi publik ramah penyandang disabilitas di DKI Jakarta. *Administratio*, 11(1), 29-36.



ICT TRENDS IN EDUCATION: A BIBLIOMETRICS STUDY OF THE PAST TWENTY YEARS OF STUDIES

Fani Mardianti^{1*}, Winny Liliawati², Parlindungan Sinaga³, Wandu Wandu⁴
^{1,2,3,4}Department of Physics Education, Universitas Pendidikan Indonesia, Indonesia
*fani.mardianti1403@upi.edu

ABSTRACT

Technology is a major component in education. Therefore, it must be investigated in order to gather knowledge for additional study. 185 articles were assessed using the PRISMA approach in conjunction with VOS-Viewer via Scopus data collecting. Analysing the quantity of articles, nations, citations, journals, and research partnerships on digital assessment in education is how evaluation is done. Knowledge map analysis is another way to investigate co-occurrence mapping. According to the research findings, the number of articles published rises annually, with the UK having the highest number of published publications. The research with the most citations is "Affordances of ICT in science learning: Implications for an integrated pedagogy," the journal with the most publications is "International Journal of Science Education," and the most well-liked partnership is the work done in Germany and the United Kingdom. The author with the most citations is "Webb M.E." Additionally, cluster analysis indicates that there are five primary categories—computer science education, education, science education, teaching, and science learning—that are most closely related to one another. Teaching, education, and computer science education are hot subjects right now.

Keywords: education, ICT, science learning

1. INTRODUCTION

The 21st century can be identified as an era dominated by advances in information and communication technology (ICT) (Wu et al., 2018). Rapid developments in this field have brought profound transformation to various aspects of human life. Communication that was once limited is now faster and more efficient, having a significant impact on the way we interact and share information. The internet, as the backbone of the digital revolution, has changed the paradigm in terms of access to information, learning, business and entertainment (Bryda & Costa, 2023). This phenomenon not only broadens global horizons, but also creates new opportunities and challenges that need to be overcome. Therefore, the 21st century can be considered an era that requires understanding and optimal use of information and communication technology so that society can develop sustainably amidst the dynamics of ever-changing times.

The significant impact of advances in Information and Communication Technology (ICT) is clearly visible in the field of education. Changes in the traditional learning paradigm to become more dynamic and open thanks to the adoption of technology. Online learning platforms, educational applications and digital resources have provided wider access for pupils and students to obtain information and learn interactively (Noskova et al., 2021). Distance learning has become the norm, providing students with flexibility in time and place. Additionally, technology enables the integration of innovative learning methods, such as game-based learning, simulations, and augmented reality, which can increase student engagement (Adipat et al., 2021). Thus, advances in ICT have not only changed the way we access information, but have also redefined the way we understand and experience the learning process.

Technology has a very significant role in the world of education today. Its presence is not only a necessity, but also a driving force for transformation in learning methods. One of the biggest contributions of technology in education is enabling access to distance learning. With the existence of online learning platforms, pupils and students can access study materials from anywhere, overcoming geographical limitations and providing extraordinary flexibility in the teaching and learning process. In this way, technology is not only a tool, but also a foundation for creating an educational environment that is inclusive and accessible to all groups. The use of Information and Communication Technology (ICT) in the education sector is very important, especially during the Covid-19 pandemic. In the face of situations that require physical restrictions and restrictions on face-to-face activities, educational institutions from school to university level are switching quickly to online learning solutions. Online platforms, video conferencing applications, and digital resources are the main means of



maintaining the continuity of education without compromising the safety of students and teaching staff. Distance education via ICT is not only an alternative, but also a necessity to ensure the continuity of the learning process amidst the limitations caused by the pandemic. Thus, the role of ICT in education during the Covid-19 pandemic has proven that technology plays a very crucial role in maintaining the continuity and accessibility of education in these difficult times.

However, several studies highlight that the overall use of technology in the teaching and learning process is not completely effective, and is even considered wasteful (Ulkhay, 2021). Meriyanti and Jasmina (2022) revealed that the availability of ICT facilities in the household has a significant positive effect on the learning performance of junior high school students in Indonesia, however, the availability of ICT access in schools has no effect on student learning achievement. Even though technology makes a positive contribution by opening access to various information and facilitating distance learning, the main role of teachers is still very necessary in the success of education. Teachers are not only transmitters of information, but also as guides, motivators and managers of the learning environment. The teacher's ability to guide, provide in-depth understanding, and provide personal response and support to students, is a key element in forming solid understanding and sustainable skills. Therefore, along with the integration of technology, it needs to be understood that quality teachers remain the main pillar in creating an effective and meaningful learning experience for students.

Therefore, this article will review technology trends in education over the last ten years. The period marked a major shift in the way we manage and deliver education. Over the past decade, technology has infiltrated every aspect of learning, from elementary to tertiary levels. Use of the device Educational tools, online platforms and digital resources have become increasingly common as learning support tools. In addition, the concept of distance education and flexible learning models is increasingly developing, especially amidst events such as the global pandemic that encourage rapid adaptation to online learning solutions. Through this article, we can reflect on the significant changes that have occurred in educational paradigms due to technological advances and assess their impact on the learning experiences of current and future generations.

2. METHODS

This study used the PRISMA framework to review the existing literature. Following the PRISMA guidelines, the scoping process was employed to find the most relevant articles about conceptual understanding in physics education. This research uses bibliometrix analysis using R software and vos-viewer. Bibliometrix analysis is carried out to identify technology trends over time. This research uses the Scopus database with the keywords. The search was limited to articles that used "English". The document type used is article. This data was taken at 11:34 on 2/19/2024. A total of 185 documents were processed and then interpreted according to their respective categories. Several keyword combination queries were undertaken to acquire relevant published papers from a known and trustworthy research database, namely Scopus, in order to discover the relevant scientific journals and publications. To discover relevant material, the terms "ICT" AND "science education" OR "science learning" OR "physics learning" OR "physics education". The keyword released in this analysis is "Students". were used in a database search.

The duration of the literature search was set to cover the last decade (2002-2024) to ensure that current ICT was highlighted. Initially, 185 documents were displayed; however, this contained only research articles and reviews, Then, this study was limited to simply using English. The data was then exported to an Excel file so that the systematic review could begin.

3. RESULTS & DISCUSSION

The field of education is now one of those that is greatly impacted by the trend of information and communication technology's (ICT) rapid development. The learning process has changed as a result of this phenomena, which has also accelerated the growth of research into its implications, difficulties, and new prospects. The goal of this research's bibliometric analysis is to present a thorough picture of ICT trends in education throughout the previous 10 years. Using this methodology, we examined a range of research conducted



throughout that time, highlighting significant trends, contributing authors, cross-national partnerships, and publishing journals.

3.1 *Annual trends*

Over the last several years, research on ICT in education has been steadily increasing. The most significant decline occurred in 2018–2019. Conversely, the most notable decline occurred in 2011–2012. In 2023–2024, it remains to be seen whether public awareness of this research is increasing or decreasing. For this reason, the year 2024 is essentially the beginning of the batch data generation process. This can be seen by looking at **Figure 1** below.

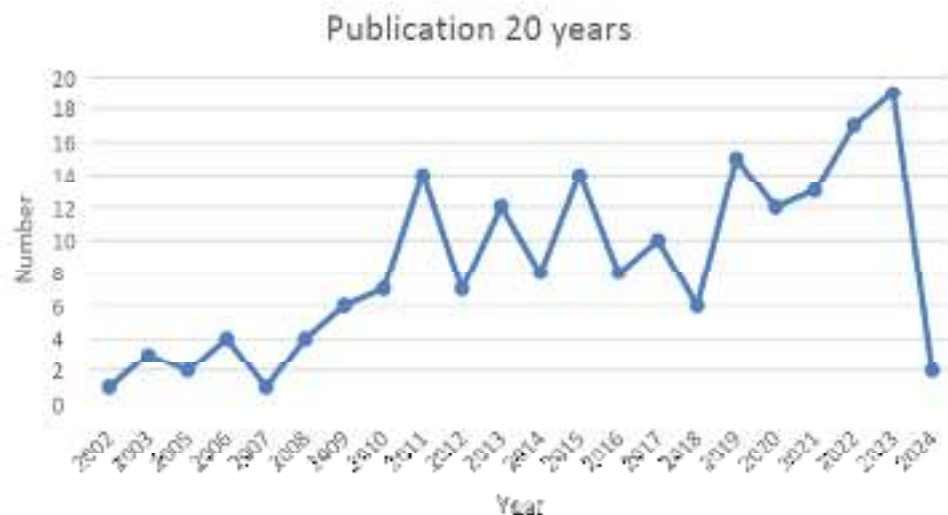


Figure 1. Distribution of Published Documents from 2002 to 2024

The significant increase in research publications in 2018-2019 reflects that research topics are very popular and urgent to research. This is supported by Indonesia's first participation in the computer-based PISA study in 2018. Based on the results of the 2018 PISA study, Indonesia experiences weaknesses in ICT (Putrawangsa and Hasanah, 2022). So, one of the recommendations given by the government is that optimizing information and communication technology (ICT) needs to be used for more effective learning. One form of optimization that can be done is not to use ICT excessively in education (Bhutoria & Aljabri, 2022).

3.2 *Country*

In the discipline of scientific publications, the state plays a major role. A nation's level of research activity can give insight into the popularity and importance of particular subjects in that nation's society. A topic's interest and significance in the academic and social spheres of a nation are more clearly indicated by the number of scientific publications on it. The state-imposed intellectual breakthroughs and research agendas that are deemed essential to the advancement of science and technology are reflected in scientific publications.

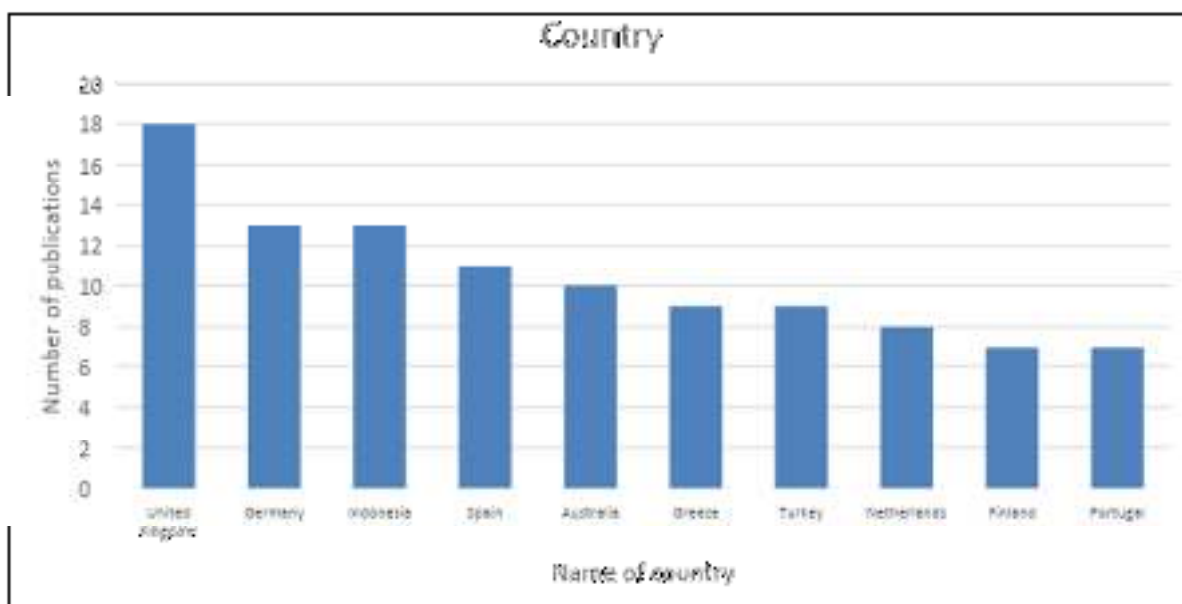


Figure 2. Distribution of Published Documents among Top 10 Countries

The topic of ICT in Education is dominated by the United Kingdom. The UK's leadership in integrating ICT in educational contexts is reflected in the number of research and scientific publications originating from the country. This is in line with research conducted by González-Zamar et al. (2020) regarding research on ICT management to encourage sustainable education in higher education.

3.3 Article Most Cited

One common measure of a scientific article's quality is its number of citations by other scholars. When assessing the effect and relevance of research within the scientific community, citation count is a crucial metric to consider. A study's contribution and relevance to the advancement of the relevant field of knowledge are acknowledged to a greater extent when it is cited in more articles. When the writing and research process may contribute meaningfully and positively influence scientific advancement and general comprehension, it is considered to be of higher quality. As a result, a high citation count may be interpreted as an indication of the importance and caliber of a scientific publication.

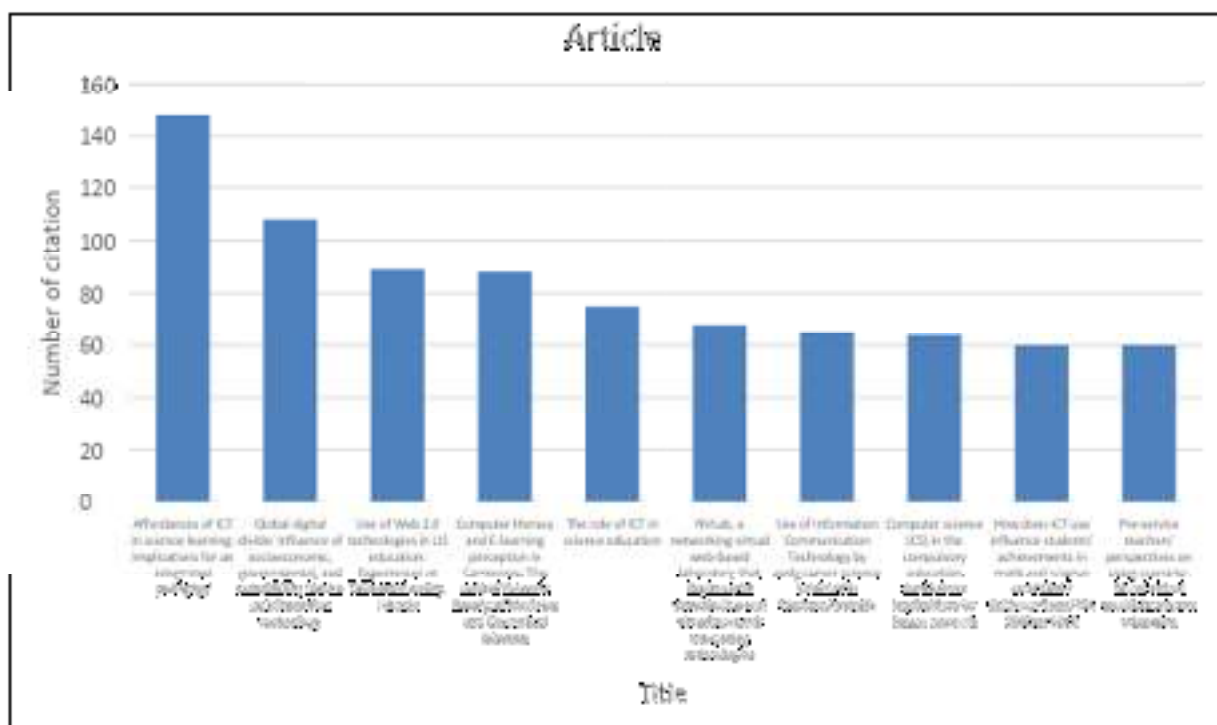


Figure 3. Most Cited Articles in The Last Ten Years

The article with the title "affordances of ICT in science learning: implications for an integrated pedagogy" is the most cited article. This article was published in 2005 and published by the "International Journal of Science Education". This article analyzes how the affordances of ICT-rich environments identified from a literature review support students in learning science at school (Webb*, 2005).

3.4 Journal

The journal that publishes the most about ICT is the "International Journal of Science Education". This journal publishes a significant amount about ICT compared to other journals. This journal covers science research, STEM, and the integration of science education with other scientific disciplines. This journal is in the Q1 quartile with the highest percentile of 84%.

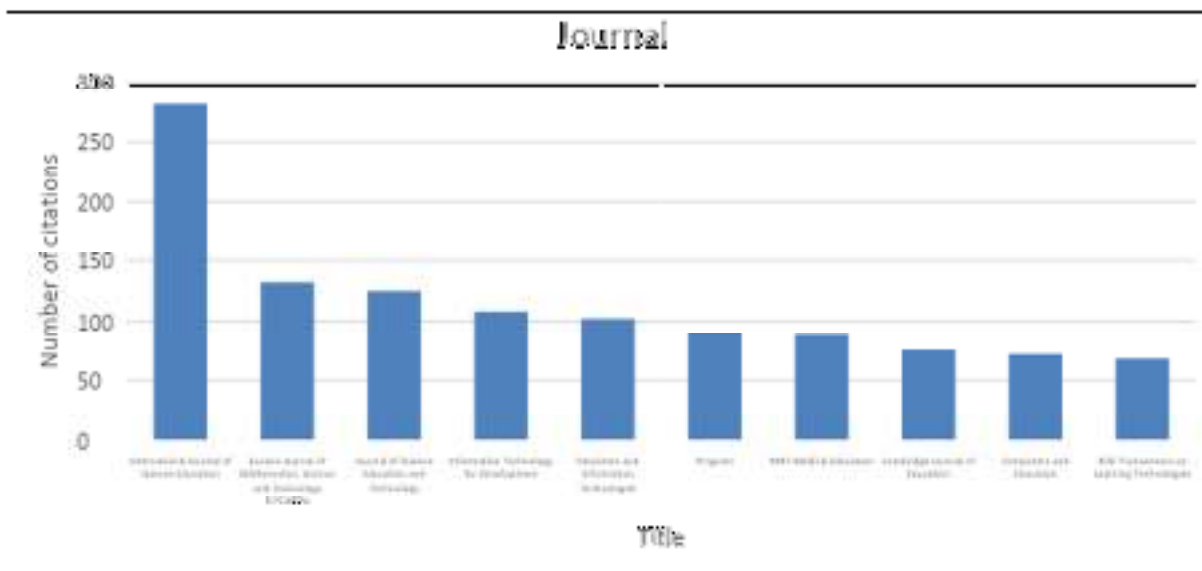


Figure 4. Journal Distribution of Published Records

3.5 Collaboration between Countries

International research collaboration is one of the keystones supporting the advancement and long-term viability of science. Studying with participants from different nations broadens the range of viewpoints and improves the methods and insights employed. Collaboration between nations makes it possible for various groups of scholars with various academic and cultural backgrounds to share ideas, knowledge, and expertise. This improves study quality and fosters a more thorough comprehension of intricate global concerns. Cooperation among nations also makes it possible to divide the workload, speed up research, and make the most of the resources at hand. Cross-border cooperation so becomes a crucial foundation for improving science and attaining more comprehensive problem solving.

Table 1. Collaboration between Countries on the Topic of ICT in Education

From	To	Frequency
Germany	United Kingdom	3
Germany	Austria	2
Germany	Greece	2
Germany	Israel	2
Portugal	Brazil	2
Australia	Denmark	1
Australia	Singapore	1
Austria	Israel	1
Austria	Norway	1
Canada	Rwanda	1

Based on Table 1, collaboration between countries is dominated by Germany and the United Kingdom with a frequency of 3. This means that collaboration between the two countries has occurred three times in ICT research in education. The results of this study are in line with Lee et al. (2019) which states that collaboration between these countries is also known through patent documents: The case of information and communication technology.



Writing for academic audiences requires writers or authors to plan, produce, and deliver their work in the form of articles, papers, or other scientific publications. A publication's list of authors identifies the people or teams that worked on developing concepts, carrying out investigations, or gathering data.

Figure 5. Authors Who Contribute to ICT Research in Education

In VOS Viewer, the term "cluster analysis" is a technique for classifying or clustering things according to connectedness or resemblance patterns inside a network. Cluster analysis aids in locating and visualizing groups or clusters of these elements in the context of VOS Viewer, which is frequently used to examine links between articles or keywords in scientific literature. Element similarity or high association is grouped together into a group in VOS Viewer's cluster analysis method. Researchers can find clusters of related concepts or research foci by using these clusters, which can reflect certain themes or topics in the literature.

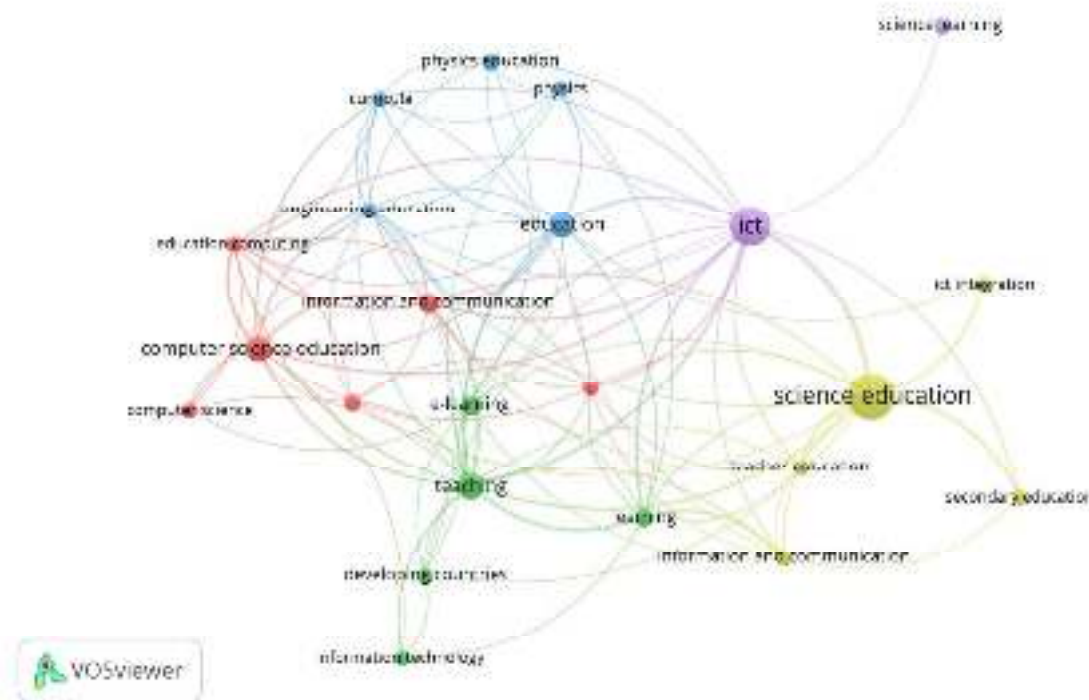


Figure 6. Cluster Analysis Using Vos-Viewer

Based on the figure above, it can be seen that there are five clusters. The five clusters are depicted in purple, yellow, green, red and blue. Computer science education, education, science education, teaching, and science learning—that are most closely related to one another. Teaching, education, and computer science education are hot subjects right now.

4. CONCLUSION

Technology plays a pivotal role in the field of education, necessitating comprehensive investigation to accumulate knowledge for further study. To achieve this, 185 articles were meticulously assessed using the PRISMA approach in conjunction with VOS-Viewer through Scopus data collection. The evaluation process involved analyzing the quantity of articles, nations involved, citations, journals, and research partnerships, specifically focusing on digital assessment in education. Co-occurrence mapping through knowledge map analysis was employed as an additional method of investigation. The research findings revealed an annual increase in the number of published articles, with the United Kingdom emerging as the leader in terms of the highest number of publications. The research article titled "Affordances of ICT in science learning: Implications for an integrated pedagogy" garnered the most citations. The "International Journal of Science Education" stood out as the journal with the highest number of publications, and the most notable research partnership was identified between Germany and the United Kingdom. Notably, "Webb M.E." emerged as the author with the most citations. Furthermore, cluster analysis illuminated five primary categories—computer science education, education, science education, teaching, and science learning—that exhibited strong interconnections. Currently, teaching, education, and computer science education are recognized as hot topics within this domain, reflecting the dynamic and evolving landscape of educational technology research.



REFERENCES

- Adipat, S., Laksana, K., Busayanon, K., Asawasowan, A., & Adipat, B. (2021). Engaging Students in the Learning Process with Game-Based Learning: The Fundamental Concepts. *International Journal of Technology in Education*, 4(3), 542-552.
- Bhutoria, A., & Aljabri, N. (2022). Patterns of cognitive returns to information and communication technology (ICT) use of 15-year-olds: Global evidence from a hierarchical linear modeling approach using PISA 2018. *Computers & Education*, 181, 104447.
- Bryda, G., & Costa, A. P. (2023). Qualitative research in digital era: innovations, methodologies and collaborations. *Social Sciences*, 12(10), 570.
- González-Zamar, M. D., Abad-Segura, E., López-Meneses, E., & Gómez-Galán, J. (2020). Managing ICT for sustainable education: Research analysis in the context of higher education. *Sustainability*, 12(19), 8254.
- Meriyanti, M., & Jasmina, T. (2022). Access of Information, Communication, and Technology (ICT) and Learning Performance of Junior High School Students in Indonesia: Analysis at the District Level. *Jurnal Perencanaan Pembangunan: The Indonesian Journal of Development Planning*, 6(3), 304-326.
- Lee, C., Kogler, D. F., & Lee, D. (2019). Capturing information on technology convergence, international collaboration, and knowledge flow from patent documents: A case of information and communication technology. *Information Processing & Management*, 56(4), 1576-1591.
- Noskova, T., Pavlova, T., & Yakovleva, O. (2021). A study of students' preferences in the information resources of the digital learning environment. *Journal on Efficiency and Responsibility in Education and Science*, 14(1), 53-65.
- Putrawangsa, S., & Hasanah, U. (2022). Analisis capaian siswa Indonesia pada PISA dan urgensi kurikulum berorientasi literasi dan numerasi. *EDUPEDIKA: Jurnal Studi Pendidikan Dan Pembelajaran*, 1(1), 1-12.
- Ulkhag, M. M. (2021). Efficiency analysis of Indonesian schools: A stochastic frontier analysis using OECD PISA 2018 data. In the 2nd International Conference on Industrial Engineering and Operations Management Asia Pacific Conference, Surakarta, Indonesia.
- Webb*, M. E. (2005). Affordances of ICT in science learning: implications for an integrated pedagogy. *International journal of science education*, 27(6), 705-735.
- Wu, J., Guo, S., Huang, H., Liu, W., & Xiang, Y. (2018). Information and communications technologies for sustainable development goals: state-of-the-art, needs and perspectives. *IEEE Communications Surveys & Tutorials*, 20(3), 2389-2406.



IMPROVING SCIENCE PROCESS SKILLS USING GUIDED INQUIRY-BASED STUDENT WORKSHEET

M Mahyuna^{1*}, Deviyani Rusdiyanti Putri², Yusrizal Hasja³, Insan Nuhari⁴, Muhammad Azzarkasyi⁵
^{1,2,3,5}Departement of Physics Education, Faculty of Teacher Training and Education, Serambi Mekkah University,
Indonesia

⁴Departement of Chemistry Education, Faculty of Teacher Training and Education, Serambi Mekkah University,
Indonesia

* mahlunaaceh@gmail.com

ABSTRACT

The use of conventional student worksheets, such as those from publishing companies, the internet, or the ready-made ones where the teacher is not involved in the planning, or preparation process, can cause students to be less active in learning and not meet the needs of students and their learning objectives. This can be overcome by using guided inquiry-based student worksheets, which can increase students' creativity. This student worksheet is very suitable for the needs of students. This paper aims to describe guided inquiry-based student worksheets to improve the science process skills through a review of relevant literature. The results of the literature review explain that guided inquiry-based student worksheets can improve students' science process skills because they can practice hypothesizing, identifying tools and materials, analyzing data, and concluding investigation results. Based on the results of literary studies, it can be concluded that guided inquiry-based student worksheets can have a positive effect on science learning.

Keywords: *Student Worksheet, Science Process Skills, Guided Inquiry.*

1. INTRODUCTION

The 21st century has brought about changes in nearly every field, including education. These changes have been particularly noticeable in the area of curriculum utilized in the current educational system—the independent learning curriculum. Students and teachers need to be able to adjust to changes in the curriculum, particularly when it comes to the teaching and learning process. Educators must offer educational opportunities that motivate learners to enhance their aptitudes and proficiencies.

Primarily, science education stresses hands-on experiences to build skills so that students can investigate and comprehend the natural world from a scientific perspective (Trianto, 2012). This is very much in line with the independent curriculum, which gives teachers the freedom to select, create, and develop instructional materials that can be tailored to each student's individual learning needs while also allowing students to choose the course of their education, select teaching materials, and decide how to evaluate them (Ministry of Education and Culture, 2022). The curriculum necessitates that students acquire 21st-century skills and soft skills like critical thinking, teamwork, communication, creativity, and moral integrity. Therefore, appropriate student worksheets that can highlight the nature of science in a balanced way and comply with curriculum standards are required to support teachers in creating lessons that can help students develop their Sains Process Skills. The teaching resources, particularly the student worksheet, must meet the learning objectives listed in the Pancasila student profile, according to the independent curriculum analysis. Learning outcomes are a set of information, abilities, and attitudes that come together to form comprehensive and ever-evolving competencies.

The use of student worksheets as instructional materials has a significant impact on the process of teaching and learning, so their creation must adhere to several specifications, including didactic, technical, and construction requirements. One type of instructional resource that teachers can create to



assist in-class activities is the student worksheet. These worksheets can be used in conjunction with other learning resources, such as laboratories. The way that lesson content is presented in student worksheets involves delivering the information succinctly and involving students in interactive activities such as practice questions, discussions, and easy experiments. In addition, creating relevant worksheets for students can help them improve their science process skills (Widjajanti, 2008).

According to the quote above, student worksheets are among the most crucial teaching tools for science classes, particularly physics classes, as they help students become more active investigators and develop their scientific process skills. In addition to not taking into account the needs of the students, student worksheets used in schools frequently still rely on publishers' services or can be downloaded from the internet. They also frequently use worksheets that are simply used without any planning, preparation, or arrangement. Such student worksheet steps do not prioritize the process and are not situational, which means they do not develop process skills and do not meet the needs of the learners.

To effectively teach science, science teachers must train or develop process skills because they play the following roles: they help students learn how to develop their minds; they give students opportunities to make discoveries; they improve memory; they give students an intrinsic sense of satisfaction when they succeed; and they aid students in understanding science concepts.

According to the above description, to implement learning more effectively, teaching materials are required to support more effective learning. For instance, teaching materials in the form of student worksheets can be developed and combined with a guided inquiry learning model to improve the quality of learning, thereby improving science process skills and involving students actively in the learning process.

2. METHODS

This study employs a literature review or literature study methodology. To conclude the discussion, data is gathered for analysis and subsequently presented in the discussion results. The research's findings are presented as a percentage of pertinent journal articles on guided inquiry learning models or techniques that, when combined with student worksheets, can improve students' science process skills. The study's methodology involved developing a worksheet for students to use to improve their science process skills, which was then presented to several relevant research journals that covered the guided inquiry model.

3. RESULTS AND DISCUSSION

A student worksheet is one type of teaching material that is used in the teaching and learning process and can be utilized by both teachers and students to aid in the learning process (Kosasih, 2021). Teachers use the student worksheet as a tool to help students understand the concepts they are teaching them. Teachers will find it easier to teach material and save time with this student worksheet, which will also foster interaction between teachers and students during the learning process. Physics practical instructions, in the opinion of Faizi (2013), should include work steps that involve thought processes, work procedures, creativity, and student independence in learning concepts, principles, rules, or laws of physics.

According to research by Çelikler (2010), student worksheets are very beneficial in the teaching and learning process because they let students actively participate in the process and raise student achievement. Additionally, the findings of Yulianti et al.'s (2015) study indicated that a student worksheet could improve conceptual understanding and science process skills.

Student worksheets serve as a tool to help students acquire knowledge, attitudes, and skills during the learning process. Using student worksheets enables teachers to deliver instruction more effectively,



support struggling students, give reinforcement, and help students develop problem-solving skills. (1988, Dhari and Haryono).

According to Dhari and Haryono (1988), students can utilize student worksheets for the following purposes:

1. Encourage more involvement from students in the process of teaching and learning.
2. Teach and cultivate in students the process skills necessary to apply science.
3. Facilitate the collection of notes regarding the content covered in these exercises.
4. Contributes to the body of knowledge about the ideas being studied by the students' methodical learning activities.

The justification provided above highlights the value of student worksheets, which can increase students' scientific process skills by encouraging increased activity, responsiveness, and creativity. To make the process even more efficient, the student worksheet can also be integrated with a model or learning approach like guided inquiry. In this type of inquiry learning, the teacher helps students gain new insights, notice shifts in their research, and acquire knowledge from their own experiences (Mulyatiningsih, 2013). The use of inquiry learning in the classroom is crucial because it can help students develop their capacity for intellectual discipline and the ability to satisfy their curiosity.

Students are given the freedom to develop the concepts they learn through the use of guided inquiry learning. They have the chance to work together to find solutions to the issues they encounter, and in the classroom, they learn how to engage in social interactions with one another and share information between groups. As stated by Ningrum (2013), the goals of this inquiry-based learning are as follows: (a) enhancing students' problem-solving attitudes and abilities; (b) teaching them to make decisions independently and objectively; (c) fostering scientific thinking skills; (d) fostering curiosity about a phenomenon; (e) fostering investigative skills; (f) fostering the ability to explain logically; (g) fostering abilities in cognitive and affective aspects; and (h) fostering the development of students' capacity for learning new information.

Inquiry learning, according to the aforementioned viewpoint, aims to develop process skills by guiding investigative activities and providing logical explanations, allowing students to develop their ability to think critically to obtain new information. This is consistent with the findings of a study conducted in 2013 by Siska et al., who found that using guided inquiry learning greatly improved students' science process skills. This is also consistent with the findings of a study conducted by Ramadhani et al. (2023), which indicated that pre- and post-test results were used to measure effectiveness and show an improvement in students' science process skills following the use of guided inquiry learning models and student worksheets as learning tools.

Because the guided inquiry method's syntax aligns with the scientific approach, which involves students making direct observations of real phenomena and processes through scientific investigation, it is a highly appropriate combination to use with student worksheets. Through this process, learning becomes more student-centered and encourages students to be more creative and active, which improves learning outcomes and their ability to use their sense of self. The aforementioned statement aligns with the findings of Annafi et al. (2015) study, which indicates that employing guided inquiry-based student worksheets can enhance students' learning outcomes, knowledge, attitudes, and skills when compared to students who do not use such resources. Aryani and Nana (2020) noted in their literature review that one potential solution to the challenges faced in enhancing students' science process skills in the classroom is



the guided inquiry model, which is aided by student worksheets. Therefore, using guided inquiry-based student worksheets to implement the independent curriculum is highly appropriate.

The guided inquiry-based worksheet is a learning resource that is created using the guided inquiry learning methodology or by adhering to the guided inquiry syntax. Research by Servitri and Trisnawaty (2018) concludes that the quality of the inquiry worksheets developed is in a good category. Numerous other research findings support the idea that science process skills can be trained and improved through learning using guided inquiry-based student worksheets. According to the research findings of Wulandari and Ismono (2019), guided inquiry-based student worksheets have been proven to be successful in enhancing learning outcomes and developing science process skills. They were also found to be an effective learning medium. A guided inquiry-based student worksheet is a practical and efficient way to help students improve their science process skills, according to research results by Ginting et al. (2020). Consistent with the study findings of Apriliani et al. (2022), which demonstrated that the student worksheet based on guided inquiry was highly feasible, achieving an average score of 3.46. With an average N-Gain score of 0.77 for science process skills and 0.79 for learning outcomes, the guided inquiry-based student worksheet that was created was effective in raising learning outcomes. According to Anisah and Nasrudin's research findings from 2023, as well as other findings, students' science process skills improved when the pretest and posttest data were analyzed using N-gain and scored between 0.70 and 1.00 in a high category.

The above-discussed research results suggest that guided inquiry-based student worksheets can greatly improve students' science process skills. Nevertheless, there are still implementation issues that need to be taken into account when implementing guided inquiry-based student worksheets, such as time allocation, which requires teachers to manage students' time as efficiently as possible throughout the learning process, and preparation of inquiry-based student worksheets, which must be tailored to the subject matter and characteristics of the material because not all of it is appropriate for use as a student worksheet.

4. CONCLUSION

Cognitive or intellectual skills are also a part of the process skills, in addition to psychomotor abilities. The various conversations and research findings that have been presented lead to the conclusion that to effectively teach science, it is essential to provide or develop teaching resources, particularly student worksheets. These resources can inspire students to learn, provide them with the chance to hone a variety of skills and help them uncover scientific concepts through the course of their investigations. Consequently, the standard of student learning and science process skills will rise. The guided inquiry-based learning worksheet for students is highly beneficial and should be developed because it can improve learning outcomes, particularly in terms of developing science process skills.

5. ACKNOWLEDGMENTS

We are grateful to Dr. Septhia Irnanda for helping to improve this paper.

REFERENCES

Anisah, D. C. and Nasrudin, H. (2023). Development of guided inquiry-oriented e-worksheets to improve students' science process skills in acid-base material. *Jurnal Pijar MIPA*, 18(4): 449-457.



- Annafi, N., Ashadi., and Mulyani, S. (2015). Pengembangan Lembar Kegiatan Peserta Didik Berbasis Inkuiri Terbimbing pada Materi Termokimia Kelas XI SMA/MA. *Inkuiri: Jurnal Pendidikan IPA*, 4(3):21-28.
- Apriliani, L., Ramadani, A., Bahri, S., and Mahrus. (2022). Pengembangan LKPD Berbasis Inkuiri Terbimbing untuk Meningkatkan Keterampilan Proses Sains dan Hasil Belajar Biologi Peserta Didik Kelas X. *Jurnal Ilmia Profesi Pendidikan*, 7(4): 2401-2411.
- Ariyani, S. D. and Nana. (2020). Aplikasi Model Inkuiri Terbimbing Berbantuan LKPD Untuk Meningkatkan Keterampilan Proses Sains Pada Materi Kalor. *Physics Learning Innovation Research Journal*, 2(2): 37- 46.
- Çelikler, D. (2010). The effect of worksheets developed for the subject of chemical compounds on student achievement and permanent learning. *The International Journal of Research in Teacher Education*, 1(1):42-51.
- Dahar, R.W. (2003). *Aneka Wacana Pendidikan Ilmu Pengetahuan Alam*. Bandung: Jurusan Pendidikan Kimia FPMIPA UPI.
- Dhari, H. M. and Haryono, A. P. (1988). *Perangkat Pembelajaran*. Malang: Depdikbud.
- Faizi, M. (2013). *Ragam Metode Mengajarkan Eksakta Pada Murid*. Jogjakarta: DIVA Press.
- Ginting, L. Br., Herlina, K., and Rosidin, U. (2020). Pengembangan Lembar Kerja Siswa (LKS) Berbasis Inkuiri Terbimbing Untuk Meningkatkan Keterampilan Proses Sains Siswa SMP. *Paedagoria: Jurnal Kajian Penelitian dan Pengembangan Kependidikan*, 11(1): 75-80.
- Ministry of Education and Culture. (2022). Independent curriculum. (On line). (<https://ditpsd.kemdikbud.go.id/hal/kurikulum-merdeka>).
- Kosasih. (2021). *Pengembangan Bahan Ajar*. Jakarta: PT Bumi Aksara.
- Mulyatiningsih, E. (2013). *Metode Penelitian Terapan Bidang Pendidikan*. Bandung: Alfabeta.
- Ningrum, E. (2013). *Pengembangan Strategi Pembelajaran*. Bandung: CV Putra Setia.
- Ramadhani, P. I., Hariyono, E., and Sudibyo, E. (2023). Development of students' worksheet through guided inquiry model to increase science process skills in the harmonic vibration subject. *International Journal of Recent Educational Research*. 4(4): 468-480.
- Sevitri, O. S. and Trisnawaty, W. (2018). The development of inquiry science worksheet to facilitate the process skills. *Journal of Education and Learning (EduLearn)*. 12(4): 575-580.
- Siska, B. M., Kurnia., and Yayan, S. (2013). Peningkatan Keterampilan Proses Sains Siswa Sma Melalui Pembelajaran Praktikum Berbasis Inkuiri Pada Materi Laju Reaksi. *Jurnal Riset dan Praktik Pendidikan Kimia*, 1(1):69-75.
- Trianto. (2012). *Model Pembelajaran Terpadu: Konsep, Strategi dan Implementasinya dalam Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Jakarta: Bumi Aksara.
- Widjajanti, E. (2008). *Kualitas Lembar Kerja Siswa*. Yogyakarta: FMIPA UNY.
- Wulandari, D. R and Ismono. (2019). Pengembangan Lembar Kegiatan Peserta Didik (LKPD) Berbasis Inkuiri Terbimbing Untuk Melatihkan Keterampilan Proses Sains Pada Materi Termokimia Kelas XI SMAN 2 Kota Mojokerto. *UNESA Journal of Chemical Education*, 8(2): 57-62.



Yulianti, D., Marfu'ah S., and Yulianto, A. (2015). Pengembangan Lembar Kerja Siswa (LKS) Fisika Untuk Membangun Keterampilan Proses Sains Bernilai Konservasi. *Jurnal Pendidikan Fisika Indonesia*, 11(2):126-133.



THE UTILIZATION OF BANANA BLOSSOMS ANTHOCYANIN EXTRACT (*MUSA SPP*) TO IDENTIFY BORAX AND FORMALIN IN DRIED ANCHOVY (*STOLEPHORUS SP*) FROM THE TRADITIONAL MARKET OF PALU

Iren Anatasya Montolu^{1*}, Sri Mulyani Sabang², Ijirana³, Supriadi⁴, Arwansyah⁵

^{1,2,3,4,5}Tadulako University, Indonesia

*imontolu@gmail.com

ABSTRACT

Anthocyanins are red to blue pigments that are widely distributed in plants, one of which is the banana blossoms. This study aims to prove that banana blossoms anthocyanin extract can identify borax and formaldehyde in dried anchovies (Stolephorus sp) from Palu City Traditional Market. The proof was done through a qualitative test by observing the color change of banana blossoms anthocyanin extract on borax positive control, formalin positive control, and negative control as an indication of borax and formalin content in dried anchovies from Palu City Traditional Market. The color change indicates that banana blossoms anthocyanin extract can be used to identify borax and formalin. The color change that occurs is due to a change in the pH of the banana blossoms' anthocyanin extract. Based on the results of this study, the anthocyanin extract changed color to dark brown red when reacting with borax and changed color to red when reacting with formalin. When the anthocyanin extract was reacted with dried anchovies' filtrate, it did not show any color change, so dried anchovies from Palu City Traditional Market did not contain borax and formaldehyde. It can be concluded that banana blossoms' anthocyanin extract can be used to identify borax and formaldehyde in dried anchovies from Palu City Traditional Market as indicated by the color change.

Keywords: Anthocyanin, banana blossom, borax, formalin.

1. INTRODUCTION

Bananas blossoms are the remaining tips of banana blossoms and must be thrown away when the other parts grow into bananas, so as not to inhibit growth and prevent banana diseases so they are considered waste (Hastanto, 2015). The banana blossoms have the structure of the outer layer of skin which is reddish brown-purple, the inner layer of skin is white like milk cream and there is an arrangement of flowers in the shape of a finger between the outer skin (Gistari & Rosnina, 2019). Research conducted by Lestario (2018) tested the total anthocyanin content of Klutuk banana blossoms at 29.66/100 gr and Ambon banana blossoms at 43.74 gr/bb.

Anthocyanins are a group of red to blue pigments that are widely distributed in plants, which indicates the presence of natural dyes. Natural dyes can be used as indicators because they can change color in acidic and alkaline conditions. The occurrence of color changes is influenced by the stability of anthocyanins. Factors that influence the stability of anthocyanins are pH conditions, light, temperature, and solvent conditions when extracted (Gustriani, et al. 2016). Research conducted by Salzabilah, et al (2022) stated that the anthocyanin content in purple sweet potatoes can detect the presence of borax and formalin content.

In modern times, some manufacturers are sometimes still found mixing borax and formalin in the food they produce. These two ingredients should not be consumed by humans, because borax and formalin are commonly used as preservatives for corpses, disinfectants, cosmetic mixtures, and so on (Fitriani, et al. 2022). Based on the Regulation of the Minister of Health of the Republic of Indonesia Number 033 of 2012, types of food additives including preservatives that are prohibited from being used in food products include borax and formalin. Borax and formalin are often found in food ingredients as preservatives such as salted fish (Mirna, et al. 2016).



Salted fish is a traditional processed fish product that is widely consumed by the public. The salting process functions to preserve the fish so that it does not experience bacterial spoilage by adding 15-20% salt (Singgih, 2013). One type of fish that is often found and processed into salted fish is anchovies. Dried anchovies are very popular among people because they have a distinctive taste, scent, and texture (Savitri, et al. 2018). Based on research conducted by Madonsa, et al (2019), the test results of dried anchovy samples P1, P2, and P3 from the Winenet market and Girian market in Bitung City were positive for containing formalin. Research conducted by Aeni (2017) from the results of qualitative tests, 58.3% of anchovy samples were positive for containing borax.

2. METHODS

2.1. Sample preparation

Take the 3-4th layer of the outer skin of the Ambon banana blossoms which is not defective and not dirty. Cleaned using running water. Cut the banana blossom skin into small pieces and then dry at room temperature. Then, mash it using a blender and put the Ambon banana blossom peel powder into a closed container.

2.2. Banana Blossoms Anthocyanin Extraction

Weigh 20 grams of Ambon banana blossom peel powder. Put the banana blossoms peel powder into the Erlenmeyer. Add 200 mL of 96% ethanol solution, then acidify with 1% HCl solution. Cover the Erlenmeyer tightly using aluminum foil. Stir for 30 minutes using a shaker until the mixture is homogeneous. Leave the mixture at room temperature for 1×24 hours. Filter the Ambon banana blossoms extract using filter paper. Store the Ambon banana blossoms extract in an Erlenmeyer flask and cover tightly using aluminum foil (Sulfiani & Sukmawati, 2020).

2.3. Making positive controls and negative controls

1. Prepare 4 test tubes and put 1 mL of banana blossom extract into each test tube.
2. Add 2 mL of borax solution with varying solution concentrations, namely 0.5%, 1%, 5%, and 10% to each test tube, then stir the mixture as a positive control for borax.
3. Prepare 4 test tubes and put 1 mL of banana blossoms extract into each test tube.
4. Add 2 mL of formalin solution with varying solution concentrations, namely 0.5%, 1%, 5%, and 10% to each test tube, then stir the mixture as a positive formalin control.
5. Prepare 1 test tube and add 1 mL of banana blossom extract.
6. Add 2 mL of distilled water then stir the mixture as a negative control for borax and formalin.

2.4. Qualitative Test of Borax and Formalin using Banana blossoms extract

Weigh 5 grams of dried anchovy and grind the dried anchovy using a blender. Put dried anchovy powder into a porcelain cup. Then, add 10 mL of distilled water and stir the mixture. Leave the mixture for 30 minutes, then add 1 mL of banana blossoms extract. Filter the mixture using filter paper. Observe the color changes and compare them with the positive control and negative control.

3. RESULTS AND DISCUSSION

Table 1 Ambon Banana Blossoms Extract

Name	Extract Results
Ambon banana blossoms powder	The extract is orange-brown

Table 2 Positive control and negative control
Formalin positive control

Concentration of formalin solution	Extract color after reaction with formalin
0.5 %	Faded red
1 %	Red
5 %	Red



10 %	Red
------	-----

Description:(+) contains formaldehyde

Borax positive control

Borax solution concentration	Extract color after reaction with formalin
0.5 %	Dark brown red
1 %	Dark brown red
5 %	Dark brown red
10 %	Dark brown red

Description:(+) contains borax.

Negative control

Extract color before reacting with distilled water	Extract color before reacting with distilled water
Brownish orange	Brownish orange

Description: (-) does not contain borax and formalin.

Table 3 Identification of borax and formaldehyde in dried anchovies

Market Name	The color of the banana blossom extract reacts with the anchovy filtrate
Masomba Market	Brownish orange
Inpres Market	Brownish orange

Banana blossoms contain many ingredients, one of which is anthocyanin. According to Lestario, et al (2009), Banana blossoms contain anthocyanins such as Klutuk banana blossoms of 909.44 ± 225.97 mg/100 g and Ambon banana blossoms of 1515.40 ± 156.06 mg/100 g. Anthocyanins are natural components that accumulate in vacuoles and are responsible for giving red, blue, and purple colors to fruit, vegetables, flowers, and other plants (Ifadah, et al. 2021). Anthocyanins are found in the form of aglycones called anthocyanidins, in the form of glycones they are called sugars. Anthocyanins with an oxygen atom attached to three carbon atoms link two benzene aromatic rings (C_6H_6) in the main structure. Anthocyanins have a characteristic carbon skeleton ($C_6C_3C_6$) with a basic structure of 2-phenyl-benzophyllium from Flavilium salt (Priska, et al. 2018).

Banana blossoms anthocyanin was macerated using 96% ethanol solvent which was then acidified with 1% HCl. Based on research conducted by Agustin & Ismiyati (2015) stated that the greater the concentration of ethanol used, the greater the anthocyanin levels obtained. Where the ethanol solvent with a concentration of 96% produces higher anthocyanin levels. Adding 1% hydrochloric acid (HCl) solution to the ethanol solution will denature the plant cell membrane and then dissolve the anthocyanin pigment out of the cell (Sulfiani & Sukmawati, 2020).

The extract results are stored in a place not exposed to direct sunlight. Because, light affects the stability of anthocyanin in formation and the rate of degradation, thus affecting the stability of the anthocyanin pigment contained in the extract and can increase the destruction of anthocyanin pigment. As a result, the color of the anthocyanin pigment extract will change (Surianti, et al. 2019).

The results of the extraction of banana blossoms anthocyanin were orange-brown in color. This is caused by the type of anthocyanin compound contained in banana blossoms. According to research by Lestario, et al



(2009), Klutuk banana blossoms only contain two types of anthocyanidins, namely cyanidin and delphinidin. while the blossoms of ambon banana contain 3 types of anthocyanidin, namely cyanidin, delphinidin and pelargonidin.

Based on research by Purnama & Jose, (2021), the results of anthocyanin extraction from hibiscus flowers are orange-brown in color, due to the anthocyanin content of the pelargonidin type, pelargonidin plays a role in giving the color orange, red-orange, to brown-orange.

The results of observations on the positive control of borax showed that the banana blossom anthocyanin extract changed color from orange-brown to dark red-brown. This is in accordance with research conducted by Purnama & Jose (2021) which stated that before the anthocyanin extract was reacted, the color of the anthocyanin extract was orange-brown, when it was reacted with meatballs containing borax it turned dark red brown, this was because the anthocyanin compound pelargonidin reacted with the compound. borax. Meanwhile, the formalin positive control showed a color change from orange-brown to red. A study conducted by Setyawan & Hanizar, (2021) stated that a color change from purple to red indicates that the sample is positive for formalin.

The concentration of the borax solution was varied to 0.5%, 1%, 5%, and 10% where the detection limit for the banana blossoms anthocyanin extract obtained in this study was 0.5% which showed a red-brown color change. The concentration of the formalin solution was varied to 0.5%, 1%, 5% and 10% where the detection limit of the banana blossoms anthocyanin extract obtained in this study was 1% which showed a red color change.

Color changes that occur due to color degradation are due to changes in the stability of anthocyanins due to changes in pH. pH is one of the factors that influences the stability of anthocyanins so that they experience color changes. The color change that occurs is caused by the amphoteric nature of anthocyanins, namely having the ability to react with both acidic and basic pH.

According to Setyawati and Daryanti (2020), anthocyanin compounds are influenced by pH or acidity level and will be more stable in an acidic or low pH environment. At low pH, anthocyanins change to red flavilium cations. The higher the pH, the color of the anthocyanin pigment will change to a colorless chalcone compound (Tensiska, et al. 2007).

Supiyanti, et al (2010) stated that the color change of plantain flower extract depending on the influence of pH is an indicator of the anthocyanin because it can change color depending on the acidity and alkalinity factors of the solution. So, the cause of the Ambon banana blossoms anthocyanin extract changing color is due to the difference in pH of formalin and borax.

Dried anchovy is obtained from traditional markets in the city of Palu, namely Masomba market and Inpres Manonda market. Based on the results of this research, it shows that dried anchovy from both markets do not contain borax and formalin as indicated by the absence of color changes in the extracts adjusted to the positive control and negative control.

4. CONCLUSION

Based on the research results obtained, it can be concluded that banana blossoms anthocyanin extract can be used to identify borax and formalin in dried anchovy from traditional markets in Palu City which are characterized by a red color change if it is positive for containing formalin and a dark red-brown color if it is positive for containing borax. It is recommended that future researchers examine borax and formalin using banana blossoms' anthocyanin extract strip indicators in other foods. As well as developing the use of banana blossom's anthocyanin extract as a food and non-food coloring agent.

5. ACKNOWLEDGMENTS

The author would like to thank the Chemistry Education Study Program, Faculty of Teacher Training and Education, Tadulako University. As well as to all those who have provided motivation and prayer support.



REFERENCES

- Aeni, N. (2017). Analisis Bahan Pengawet Pada Ikan Teri (*Stolephorus* sp.) Asin dari Pasar Tradisional Kota Maksiar Sulawesi Selatan. (Thesis, Faculty of Mathematics and Natural Sciences, Universitas Hasanuddin: Makassar).
- Agustin, D., & Ismiyati, I. (2015). Effect of solvent concentration on the anthocyanin extraction process from hibiscus flowers. *Journal of Conversion*, 4(2), 9-16.
- Gustriani, N., Novitriani, K., & Mardiana, U. (2016). Penentuan Trayek pH Ekstrak Kubis Ungu (*Brassica Oleracea* L) Sebagai Indikator Asam Basa Dengan Variasi Konsentrasi Pelarut Etanol. *Jurnal Kesehatan Bakti Tunas Husada*, 16(1), 94–100.
- Hastanto. (2015). Analisis Kelayakan Pengembangan Agroindustri Abon Jantung Pisang (*Musa Acuminata Balbiana Colla*) Dengan Penambahan Keluwih (*Artocarpus Camansi*). Thesis. Faculty of Agricultural Technology. University of Jember.
- Ifadah, RA, Wiratara, PRW, & Afgani, CA (2021). Ulasan Ilmiah : Antosianin dan Manfaatnya untuk Kesehatan. *Jurnal Teknologi Pengolahan Pertanian*, 3(2), 11-21.
- Intisari & Rosnina. (2019). Pemberdayaan Masyarakat Melalui Pelatihan Berbagai Olahan Jantung Pisang di Desa Pabbarasseng Kecamatan Bua Kabupaten Luwu. *To Maega: Jurnal Pengabdian Masyarakat*, 2(2), 31–35.
- Lestario, LN, Lukito, D., & Timotius, K.H. (2009). Anthocyanin Content and Identification of Anthocyanidin of Banana Bract Klutuk Variety (*Musa Brachycarpa Back*) and Ambon. *Journal of Food Technology and Industry*, 20(2), 143-148.
- Lestario, L.N. (2018). *Antosianin: Sifat Kimia Perannya dalam Kesehatan dan Prospeknya sebagai Pewarna Makanan*. Yogyakarta: UGM Press.
- Madonsa, R., Datu, O.S., Ginting, A.R., Tumbel, S.L., & Tombuku, J.L. (2019). Identifikasi Formalin Pada Ikan Teri Kering Yang Beredar Di Pasar Tradisional Girian Dan Winenet di Kota Bitung. *Biofarmasetikal Tropis*, 2(2), 75-79.
- Mirna, Karimuna, L., Asyik, N. (2016). Analisis Formalin Pada Ikan Asin di Beberapa Pasar Tradisional Kota Kendari. *Jurnal Sains dan Teknologi Pangan*, 1(1), 31–36.
- Regulation of the Minister of Health of the Republic of Indonesia No. 033 of 2012 concerning Food Additives.
- Priska, M., Peni, N., Carvallo, L., & Ngapa, YD (2018). Review: Antosianin dan Manfaatnya. *Cakra Kimia (Indonesian E-Journal of Applied Chemistry)*, 6(2), 79-97.
- Purnama, R., & Jose, A.S. (2021). Effectiveness of Using Anthocyanin Extract of Hibiscus Flower Plants to Detect Borax in Meatballs. *Jurnal Delima Harapan*, 8(2), 21-25.
- Salzabilah Nadya, Inayah, & Khaer, A. (2022). Analisa Kandungan Boraks Pada Makanan Dengan Menggunakan Ekstrak Ubi Jalar Ungu Di Pasar Karuwisi Makassar. *Jurnal SULOLIPU*, 22(2), 304–311.
- Savitri, I.K.E., Silaban, B., Sormin, R.B.D. (2018). Mutu Produk Teri (*Stolephorus* sp.) Kering Pulau Buru Dengan Metode Pengering Surya Tertutup. *JPHPI*, 21(3), 543-548.
- Setyawan, A., & Hanizar, E. (2021). Deteksi Formalin pada Ikan Asin Menggunakan Ubi Jalar Ungu (*Ipomea batatas* L.). *Saintifika: Jurnal Ilmu Pendidikan MIPA dan MIPA*, 23(2), 33-41.
- Singgih, H. (2013). Uji Kandungan Formalin Pada Ikan Asin Menggunakan Sensor Warna Dengan Bantuan FMR (*Formalin Main Reagent*), *Jurnal Eltek*, 11(1); 55-70.



- Sulfiani, S., & Sukmawati, S. (2020). Pemanfaatan Ekstrak Bunga Mawar Merah (*Rosa hybrida*) Asal Desa Bonto Majannang Kabupaten Bantaeng sebagai Indikator Formalin pada Ikan Asin. *Jurnal Abdidas*, 1(5), 478-486.
- Supiyanti, W., Wulansari, ED, & Kusmita, L. (2010). Test of Antioxidant Activity and Determination of Total Anthocyanin Content In Rind of Mangosteen (*Garcinia Mangostana* L). *Majalah Obat Tradisional*, 15(2), 64-70.
- Surianti, S., Husain, H., & Sulfikar, S. (2019). Uji Stabilitas Pigmen Merah Antosianin dari Daun Jati Muda (*Tectona Grandis* Linn F) Terhadap pH Sebagai Pewarna Alami. *Chemica: Jurnal Ilmiah Kimia dan Pendidikan Kimia*, 20 (1), 94-101.
- Tensiska, Surkaminah E, and Natalia D. (2007). Extraction of natural colorant from Red Raspberry (*Rubus idaeus* Linn.) and its application in food system. *Jurnal Teknologi dan Industri Pangan*, 18(1): 25-31.



FACILITATING ENGLISH LANGUAGE ACQUISITION PROCESS THROUGH TECHNOLOGY CLUBS

Sharon Samson^{1*}, Karthiga S.V.²

¹School of English, Kumaraguru College of Liberal Arts And Science, Coimbatore, India

²Department of English, Faculty of Science and Humanities, SRM Institute of Science and Technology, Kattankulathur, Chennai, India

*sharonsamsonenglish@gmail.com

ABSTRACT

English language acquisition can be significantly enhanced through technology clubs, offering learners a relaxed environment distinct from traditional classrooms. These clubs facilitate subconscious language acquisition, promoting immersion and natural communication. By embracing technology, learners access a wealth of resources independently, expanding vocabulary and usage while encouraging informal interaction. Technology clubs foster active engagement, allowing learners to express themselves freely.

This paper examines the role of technology clubs in supporting language acquisition processes. In the contemporary landscape, technology is paramount in language acquisition, with clubs providing dynamic platforms for immersive English language engagement. Leveraging multimedia resources like videos and podcasts, learners hone listening and comprehension skills, tailored to individual preferences. Interactive platforms within these clubs offer engaging activities, from language games to virtual conversations, fostering collaboration and a supportive learning community. Mobile applications further enhance learning accessibility, enabling practice anytime, anywhere. Technology clubs curate immersive environments, where learners engage in authentic communication through virtual simulations and online communities. Peer collaboration is encouraged through forums and projects, facilitating shared learning experiences. In conclusion, technology clubs offer a versatile and engaging approach to language acquisition, empowering learners with diverse opportunities to develop proficiency. Through multimedia resources, interactive platforms, and peer collaboration, technology clubs facilitate effective language learning.

Keywords: Language learning, Technology clubs, Multimedia, English language acquisition.

1. INTRODUCTION

In today's globalized world, proficiency in the English language has become increasingly essential for individuals seeking to participate effectively in academic, professional, and social spheres (Jones, 2020). However, traditional methods of language instruction often fall short in engaging learners and providing meaningful opportunities for practice and skill development. With the rapid advancement of technology, there is a growing recognition of its potential to enhance language learning experiences. In this research article, we explore the concept of "Technology Clubs" as a novel approach for facilitating the English language acquisition process for students in India.

2. METHODS

For participant selection, three methods were employed. The first method involved random sampling from a list of all current 11th-grade students to ensure representation of diverse backgrounds and English proficiency levels. The selected students were then invited to partake in the study, receiving comprehensive information about its purpose and procedures. The second approach, voluntary participation, entailed announcing the study to all 11th-grade students, elucidating its objectives and benefits in enhancing English language skills through Technology Clubs. Students interested in joining voluntarily signed up, ensuring a varied representation of proficiency levels and interests. Lastly, the third method involved consulting English language instructors to



recommend students who could benefit from Technology Clubs. Recommendations were based on factors such as motivation, enthusiasm for technology, and potential for growth in English proficiency. Invitations were extended to recommended students, urging them to actively engage in Technology Clubs sessions (Smith & Johnson, 2022).

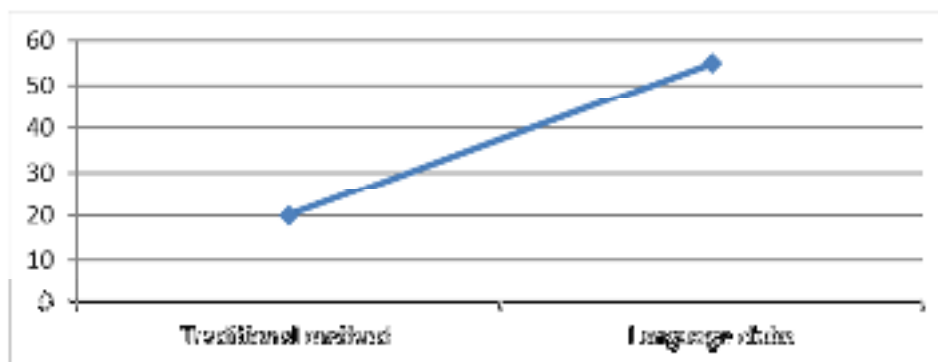


Figure 1. Students' performance

The "App Challenge" activity investigated the potential of mobile language learning apps. In this activity, participants were introduced to a variety of apps focusing on different language skills (e.g., vocabulary building, grammar drills, conversational practice). Divided into small groups, learners explored a designated app, engaging with its exercises and activities for a predetermined period. This hands-on exploration allowed participants to experience the app's functionalities firsthand. Following this exploration, a group discussion was facilitated to delve into the features and perceived effectiveness of each app. Learners shared their experiences and insights, fostering a collaborative exchange on the strengths and weaknesses of the explored language learning tools. This activity provided valuable qualitative data on learner engagement and their perceptions of the effectiveness of various mobile language learning apps.

To explore the affordances of online platforms for language learning, the learners were introduced to the "Online Language Exchange Forum." A dedicated online forum or chat group (e.g., WhatsApp, Discord, Slack) was created specifically for Technology Club members. This platform facilitated text-based conversations in English, encouraging active participation and language practice. The guided discussions stimulated interaction, prompts and conversation topics were provided. Additionally, clear guidelines were established to promote respectful and constructive communication within the forum. The researcher monitored the forum regularly, offering feedback, answering questions, and fostering engaging discussions. This approach aimed to encourage active participation among learners and fostered a supportive online community where members could learn from each other's language journeys.

Further exploring the use of virtual environments for language learning, this study implemented "Virtual Language Cafe" sessions. Utilizing video conferencing platforms like Zoom and Google Meet, these sessions provided opportunities for informal language practice and social interaction. Technology Club members were invited to participate in these sessions held at designated times. The researcher facilitated informal conversations in English, focusing on a variety of engaging topics (e.g., hobbies, travel, current events). Encouraging participants to take turns speaking and actively engage, the sessions fostered a relaxed and supportive atmosphere where learners felt comfortable practicing their English skills. Icebreaker questions and conversation starters were employed to stimulate discussion and maintain a conversational flow. Following each session, a group reflection discussed successes, challenges, and ideas for future iterations, further enriching the overall learning experience.

3. RESULTS & DISCUSSION

The study revealed a significant enhancement in English language acquisition among students engaged in Technology Clubs compared to those following traditional instructional methods. Assessments, including written



exams and oral presentations, demonstrated higher proficiency levels in reading, writing, speaking, and comprehension among club participants. Notably, Technology Clubs fostered increased motivation and enthusiasm through interactive activities, utilizing diverse technological resources to practice language skills. This personalized approach accommodated various learning styles, leading to greater student satisfaction and academic achievement. Conversely, traditional instruction yielded limited progress due to its passive nature and lack of practical application. These findings underscore the potential of Technology Clubs to revolutionize language education by providing a dynamic, immersive learning environment.

4. CONCLUSION

In conclusion, the implementation of Technology Clubs has shown remarkable effectiveness in enhancing English language acquisition among students compared to traditional instructional methods (Smith & Johnson, 2023). Through diverse assessments, it is evident that participants in these clubs demonstrated heightened proficiency in reading, writing, speaking, and comprehension skills. The interactive nature of Technology Clubs facilitated greater motivation and engagement, catering to individual learning styles and fostering increased satisfaction and academic achievement. In contrast, traditional methods proved less effective due to their passive approach and limited opportunities for practical application. These findings emphasize the transformative potential of Technology Clubs in revolutionizing language education, offering a dynamic and immersive learning environment conducive to comprehensive skill development.

REFERENCES

- Jones, A. (2020). The role of technology in enhancing language learning experiences. *Journal of Language Education*, 10(3), 45-56.
- Smith, T., & Johnson, R. (2022). Methods for participant selection in language acquisition studies. *Journal of Educational Research*, 25(4), 67-79.
- Smith, T., & Johnson, R. (2023). Enhancing English language acquisition through Technology Clubs. *Journal of Language Education*, 18(2), 35-48.
- Warschauer, Mark. "Transforming Language Education through Technology." *Modern Language Journal*, 87(1), 48-64.
- Belz, W. (2012). Mobile Learning in English Language Teaching. *The TESOL Quarterly*, 46(4), 791-814.
- Liu, X. (2018). Technology and Language Learning: A Narrative Inquiry of Adult Learners' Experiences. *System*, 72, 142-155.



DEVELOPMENT OF A DESKTOP-BASED INFORMATION SYSTEM FOR REPORTING STUDENT LEARNING RESULTS AT SMK NEGERI 1 TINAMBUNG

Noer Ekafitri Sam^{1*}, Purnamawati², Abdul Muis Mappalotteng³

^{1,2,3}Engineering Vocational Education Department, Universitas Negeri Makassar, Makassar, South Sulawesi 90222, Indonesia

*noerekafitrisam.nes@gmail.com

Abstract

This research aims to determine: (1) the stages of developing a desktop-based information system for reporting student learning outcomes at SMK Negeri 1 Tinambung, and (2) the efficiency of developing a desktop-based information system for reporting student learning outcomes at SMK Negeri 1 Tinambung. The research method used is the Research and Development (R&D) method. The process of developing a desktop-based student learning outcomes report at SMK Negeri 1 Tinambung refers to the ADDIE development model including the analysis stage, design stage, development stage, implementation stage, and evaluation stage. The results of the research show that the development of a desktop-based student learning outcomes report information system at SMK Negeri 1 Tinambung is said to be efficient based on the Usability aspect test which includes the Usefulness aspect, the Ease-of-Use aspect, the Ease of Learning aspect, and the Satisfaction aspect. The information system for reporting student learning outcomes is said to be efficient because it is in the very good category. It is hoped that this system can make it easier for users to process student learning outcomes reports at SMK Negeri 1 Tinambung.

Keywords: ADDIE, Development, Report Cards, Information Systems, Usability

1. INTRODUCTION

Learning outcomes assessment functions to monitor student progress, monitor learning outcomes, and detect the need to improve student learning outcomes by graduate competency standards or methods for teachers in the following semester. Based on the Minister of Education and Culture Regulation Number 66 of 2013 concerning Educational Assessment Standards Article 1, for the implementation "assessment of student learning outcomes at primary and secondary education levels is carried out based on national education assessment standards that apply nationally". Meanwhile, educational assessment standards are criteria regarding mechanisms, procedures, and instruments for assessing student learning outcomes (Permendikbud, 2013).

At the end of each semester, schools conduct assessments to measure the academic development of students in the semester that has passed. Each teacher processes the grades and then submits them to each homeroom teacher. Each homeroom teacher then collects and makes one document of the assessment so that it becomes one document called a student report card. From the results of observations made by researchers at SMK Negeri 1 Tinambung, at the end of each semester, a final assessment documentation is held to determine the level of students' abilities. The student report card processing system is computerized using the Microsoft Excel application.

The homeroom teacher receives subject grades from each subject teacher which will be processed into a report card to be shown to the students' parents/guardians. The report processing process carried out at SMK Negeri 1 Tinambung uses a report card application designed/made using Microsoft Excel which can be said to be less efficient. Several problems occur in making reports on student learning outcomes (report cards), including (1) processing student learning outcomes (report cards) still uses the Microsoft Excel application which can be said to be still simple; (2) the homeroom teacher re-enters the grades received from each subject teacher; (3) the student learning outcomes report application used has a simple appearance consisting of several sheets (cover, student bio-data, biodata database, report card, school database, report card database, back and description) and the level of security for access is not exists, so anyone can see and even change its contents.



2. THEORETICAL BASIS

Sitorus and Sakban (2021) stated that a system is a series of two or more components that are interrelated and interact to achieve a goal. As an illustration, if in a system there are elements that do not provide benefits in achieving the same goal, then these elements are definitely not part of the system (Mulyanto et al., 2020). In general, information can be defined as data that is processed into a more meaningful form for those who receive it. According to McLeod, quoted by Yakub (2012) in the book *Understanding Information Systems*, information is data that is processed into a more useful and meaningful form for those who receive it. Meanwhile, according to Sutabri (2012) in the book *Information Systems Analysis*, information is data that has been classified, or processed or interpreted for use in the decision-making process.

An information system is a system within an organization that meets daily transaction processing needs that support managerial organizational functions in the strategic activities of an organization to be able to provide certain external parties with the necessary reports (Sutabri, 2005). Learning outcomes are real changes in student behavior after the teaching and learning process is carried out by the teaching objectives (Jihad and Haris, 2010).

Microsoft Excel is a form of application that is part of Microsoft Office. Microsoft Excel is usually used for various kinds of data processing, such as organizing, analysing data, calculating, and also presenting data in the form of graphs or diagrams. The function of Microsoft Excel is to carry out a form of data calculation operation and also present the data in tabular form (Basuki, 2020).

3. RESEARCH METHODS

The type of research used is Research & Development (R&D) with the ADDIE development model. The stages of the ADDIE model are Analyse, Design, Develop, Implement, and Evaluate.

The data collection techniques used were observation techniques, questionnaires, and interviews. Meanwhile, the data analysis used is: (a) observation and interview techniques carried out during initial observations are analysed using descriptive techniques; (b) questionnaires in the form of questionnaires were analysed using percentage techniques. This research focuses on user satisfaction and ease in using the information system for processing student learning outcomes reports so that the instrument used for this research is testing the usability aspect. In the usability aspect, testing uses an evaluation sheet in the form of a questionnaire which is distributed to respondents directly after trying the information system. The questionnaire used is the USE Questionnaire by Lund (2001) which has four criteria, namely usefulness, ease of use, ease of learning, and satisfaction. Questionnaire Testing usability aspects use Likert scale quantitative data analysis. The Likert scale contained in the USE Questionnaire instrument can use a scale of five. According to Sugiyono (2009), the answers to each instrument that uses a Likert scale have gradations from very positive to negative. The value 1 is the smallest one while the value 5 is the largest one. The following formula is used as in (Sugiyono, 2009)

$$\text{Percentage (\%)} = \frac{\text{Total Score}}{\text{Maximal Score}} \times 100\%$$

Information:

Total value = total value obtained from the respondent's answers

Maximum value = number of statements x number of respondents x 5

After getting the calculation results, the values obtained are then converted into qualitative values in the assessment percentage table. Before knowing the assessment percentage table, first look for the Likert scale assessment distance interval using the following formula.

Interval = $100 / \text{Total Score (Likert)}$

= $100 / 5$

= 20



From the interval calculation, it can be seen that the results of the distance interval for the assessment percentage table are 20, so the assessment percentage can be seen in Table 1 below.

Table 1. Percentage of Assessment

No	Percentage of achievement	Interpretation
1	0% - 19.99%	Very Not Good
2	20% - 39.99%	Not good
3	40% - 59.99%	Enough
4	60% - 79.99%	Good
5	80% - 100%	Very good

4. RESULTS AND DISCUSSION

The Process and Stages of the Student Learning Result Report Information System at SMK Negeri 1 Tinambung consists of 5 (five) stages, namely:




First Stage: Analyze (Needs Analysis)

Namely, the initial stage carried out observations in the field (SMK Negeri 1 Tinambung) which consists of two parts, namely: (a) System Requirements: the initial step taken is by analyzing functional needs which is carried out directly, either through the interview and observation stages. The target object in this process is the class teacher at the Tinambung 1 Vocational School. (b) Hardware and Software Requirements: to be able to run the system you need hardware, including a computer/laptop, mouse, keyboard, and printer. Meanwhile, the software includes: Operating System: Windows, and Application: Microsoft Excel.









Second Stage: Design (Design/Designing)

At the design stage, the process carried out in creating the system is designing the user interface design. The following is the storyboard or display format on the screen of the application design for information system development for student learning outcomes reports presented in Table 2 as follows.

Table 2. Report card application design storyboard

Scenes	Picture	Information
1		Login Id Page
2		Dashboard page, the page that appears after successful login.
3		The page that appears after clicking "School Data" on the dashboard contains school information







4		The page that appears after clicking "Student Data" on the dashboard contains a display for inputting student biodata
5		The page that appears after clicking "Student Biodata" contains student biodata
6		The page that appears after clicking "Report" on the dashboard, this display is the report card cover
7		The value input form displays a form for inputting values
8		The value database page displays which display all the data that has been entered in the value input form
9		Display the grades page which displays information on all course grades
10		Display the back page of the report card containing information on street vendors, extracurricular activities, and student absences.
11		Display the description page which contains a description of the student's character development.



Third Stage: Develop (Development)

The student learning outcomes report information system application was developed by utilizing the Developer Menu Tab in the Microsoft Excel Tab. There are 2 (two) development stages as shown in Table 3 as follows.

Table 3. Display of Login ID, Dashboard, Input

Part	Picture	Information
		Login ID Page Display
		Dashboard / Main Menu Display
		Biodata Input Display
		Value input page

Fourth Stage: Implement (Implementation)

The software created and developed will then go through the implementation stage. This stage aims to test the product on users. Several process stages contained in the implementation stage including socialization of product use, product testing, and product use testing.

Fifth Stage: Evaluate Stage (Evaluation)

At the evaluation stage, the software will be evaluated by carrying out 2 stages, namely product revision and product implementation. This stage will evaluate any criticism and suggestions from active users who have used the software and make improvements and improvements to the software during the usage trial process.

Data analysis

Testing in this research focused on testing the usability aspect. The test uses the USE Questionnaire proposed by Lund (2001) which consists of 30 statement items which are divided into 4 aspects, namely the usefulness aspect, the ease-of-use aspect, the ease of learning aspect, and the satisfaction aspect. Test data is presented in the following tables.



Table 4. Data Results for Usefulness Aspects

No	Respondents	Statement Number								Total	Max
		1	2	3	4	5	6	7	8		
1	Respondent 1	5	5	4	4	4	5	5	5	37	40
2	Respondent 2	5	4	5	4	5	4	5	5	37	40
3	Respondent 3	4	4	4	4	4	4	4	4	32	40
4	Respondent 4	4	4	5	3	4	4	5	5	34	40
5	Respondent 5	5	5	5	4	4	5	4	4	36	40
6	Respondent 6	4	4	5	3	4	4	4	4	32	40
7	Respondent 7	5	5	5	4	4	5	4	5	37	40
8	Respondent 8	4	4	4	4	5	5	5	5	36	40
Amount										281	320
Percentage (%)										87.81	

Table 5. Ease of Use Aspect Data Results

No	Respondents	Statement Number												Total	Max
		9	10	11	12	13	14	15	16	17	18	19			
1	Respondent 1	4	4	4	4	4	4	4	4	3	4	4	43	55	
2	Respondent 2	5	4	4	4	5	4	4	4	3	4	4	45	55	
3	Respondent 3	5	5	4	5	5	5	4	4	3	5	4	49	55	
4	Respondent 4	5	5	4	4	5	5	4	4	3	5	5	49	55	
5	Respondent 5	5	4	5	4	5	4	5	4	3	5	4	48	55	
6	Respondent 6	5	5	4	4	5	5	4	4	3	4	4	47	55	
7	Respondent 7	5	5	4	4	4	4	4	4	3	4	4	45	55	
8	Respondent 8	5	4	4	4	4	4	4	4	3	4	5	45	55	
Amount													371	440	
Percentage (%)													84.32		

Table 6. Data Results for the Ease of Learning Aspect

No	Respondents	Statement Number				Total	Max
		20	21	22	23		
1	Respondent 1	5	4	4	4	17	20
2	Respondent 2	4	5	4	3	16	20
3	Respondent 3	4	4	4	3	15	20
4	Respondent 4	4	5	4	5	18	20
5	Respondent 5	4	4	4	4	16	20
6	Respondent 6	5	4	5	5	19	20
7	Respondent 7	4	4	5	5	16	20
8	Respondent 8	4	4	3	4	15	20
Amount						132	160
Percentage (%)						82.50	



Table 7. Aspect Data Results Satisfaction

No	Respondent's Name	Statement Number							Total	Max
		24	25	26	27	28	29	30		
1	Respondent 1	5	5	4	4	4	4	4	30	35
2	Respondent 2	5	4	4	4	5	4	4	30	35
3	Respondent 3	4	4	3	3	4	3	4	28	35
4	Respondent 4	4	4	4	4	3	4	4	31	35
5	Respondent 5	4	4	4	4	4	4	4	28	35
6	Respondent 6	4	4	4	4	4	4	4	32	35
7	Respondent 7	4	4	4	4	5	4	4	30	35
8	Respondent 8	4	5	4	5	4	4	4	32	35
Amount									240	280
Percentage (%)									86.07	

The four tables are collected and accumulated so that they will produce a summary of the usability testing of the student learning outcomes processing information system with a total score which can be seen in Table 8 below.

Table 8. Accumulated Data Results of Usability Test Results

No	Aspect	Mark	Percentage	Category
1	Usefulness Aspect	281	87.81%	Very good
2	Ease Of Use Aspect	371	84.32%	Very good
3	Ease Of Learning Aspect	132	82.50%	Very good
4	Satisfaction Aspect	241	86.07%	Very good
Total Score		1025	85.42%	Very good

The Usefulness aspect received a score of 281 with a percentage of 87.81%, so it can be said that the development of a desktop-based student learning outcomes report information system at SMK Negeri 1 Tinambung has a usability value with very good criteria. The Ease of Use and Use of Learning aspects respectively received a score of 371 and 132 with percentages of 84.31% and 82.50%, so it can be concluded that the development of a desktop-based student learning outcomes report information system at SMK Negeri 1 Tinambung is easy to implement, to use and also easy to learn. The Satisfaction aspect obtained a score of 240 with a percentage of 85.71% indicating that users are satisfied with the software developed. From this data, it can be seen that the total score for these four aspects is 1025 with a percentage of 85.41%, and it can be concluded that the desktop-based student learning outcomes report information system at SMK Negeri 1 Tinambung meets usability standards in the "very good" category.

5. CONCLUSION AND SUGGESTIONS

From the results of the discussion explained, it can be concluded that the desktop-based information system for reporting student learning outcomes at SMK Negeri 1 Tinambung that was developed is said to be efficient based on usability testing. Based on the conclusions, the author suggests developing a desktop-based student learning outcomes report information system for SMK Negeri 1 Tinambung if it can be developed even better.



REFERENCES

- Basuki, H.S. (2020). *Teknologi Perkantoran (C2) Kelas X Malang*. In Tim Quantum Book.
- Jihad, Asep dan Haris, Abdul. (2010). *Strategi Belajar Mengajar*. Jakarta: PT. Raja Grafindo Persada.
- Lund, A.M (2001). Measuring usability with the USE Questionnaire. STC Usability SIG Newsletter, 8:2.
- Mulyanto, A., Sumarsono, Niyartama, T.F., Syaka, A.K. (2020). Application of Technology Acceptance Model (TAM) in Testing the Acceptance Model of Application MasjidLink. *Semesta Teknika*, 23(1), 27-38.
- Peraturan Menteri Pendidikan dan Kebudayaan Nomor 66 Tahun 2013 tentang Standar Penilaian Pendidikan.
- Sitorus, J.H.P. & Sakban, M. (2021). Perancangan Sistem Informasi Penjualan Berbasis Web Pada Toko Mandiri 88 Pematangsiantar. *Jurnal Bisantara Informatika*, 5(2), 1-13.
- Sugiyono, (2009). *Metode Penelitian Pendidikan Pendekatan Kualitatif, Kuantitatif, dan R&D*. Bandung: Alfabeta.
- Sutabri, Tata. (2012). *Analisis Sistem Infromasi*. Yogyakarta: Andi.
- Yakub. (2012). *Pengantar Sistem Informasi*. Yogyakarta: Graha I



THE UTILIZATION OF CODE-SWITCHING AMONG STUDENTS IN THE ENGLISH DEPARTMENT

Rizky Syaputra^{1*}, Rahmatun Nisa², Cut Mawar Helmanda³

^{1,2,3}University of Muhammadiyah Aceh, Banda Aceh

*rizkysyaputra0100@gmail.com

ABSTRACT

This study aimed to investigate and analyze the application of code-switching by students enrolled in the English Department. The research employed a quantitative descriptive methodology, utilizing a questionnaire to collect data from students who actively incorporated code-switching in their daily interactions on campus. Results indicated that students in the English Department employed code-switching in various communication contexts, including informal class conversations, campus interactions, and social engagements beyond the campus boundaries. The primary motives behind the use of code-switching were identified as the need for self-expression, enhanced comprehension, and adaptation to social and cultural settings. Furthermore, the research findings highlighted that the prevalent code-switching pattern involved shifts between English and Indonesian languages, particularly emphasizing the use of specific phrases or words lacking direct equivalents in the target language. This research contributes to a more profound comprehension of the code-switching phenomenon among English Department students, shedding light on its implications in social, cultural, and educational domains. Recommendations derived from this study emphasize the importance of adopting a more creative approach to language learning that accommodates the diverse linguistic backgrounds of students.

Keywords: Code-Switching, Linguistics, Multilingualism, Code-Mixing

1. INTRODUCTION

The occurrence of language switching is a common phenomenon in our country, particularly among individuals proficient in two or more languages. This switch often takes place spontaneously, catching individuals off guard. A prevalent instance observed in the public domain involves the fluid transition between English and Indonesian languages, garnering significant attention and sparking varied perspectives from onlookers. Some view it as peculiar, while others perceive it as a positive practice that enhances self-confidence and speaking abilities.

Language serves as a vital tool for communication and social interaction within a community. Additionally, it plays a crucial role in defining the identity of a society, as the language one possesses becomes intricately linked to their identity. It is evident that language holds a multifaceted function, acting as both a means of communication and a marker of societal identity.

In the broader context, language functions as a cornerstone for social life, facilitating communication, interaction, and connection among individuals. Brown (2007) emphasizes the indispensability of language in human life, asserting that it serves as a medium for daily needs and social communication. Consequently, every society is inherently intertwined with language, making it an inseparable aspect of communal existence. Essentially, no society exists without a language, and conversely, there is no language devoid of people utilizing it.

This implies that language serves as a means of communication for people in their daily lives, allowing them to engage with others to acquire necessary information. The emergence and evolution of language are products of interpersonal interactions within a society. Numerous individuals often employ a combination or interchange of their primary language with their mother tongue, particularly when communicating with those who comprehend different languages. In English teaching sessions, the practice of code-switching has become prevalent in both teacher and student conversations. Typically, individuals whose first language is Indonesian utilize it regularly and only delve into the second language during classroom learning.

Moreover, during their interactions in English classes, individuals frequently engage in code-switching and code-mixing, blending both Indonesian and English languages. There are instances where they might not even be aware that they are employing these language-shifting techniques in their conversations. This tendency is not exclusive to students; teachers, too, demonstrate a similar behavior. Whether intentionally or unintentionally,



educators often switch and blend languages while delivering lessons. Code-switching and code-mixing are recognized characteristics of the typical bilingual speech patterns found in various human societies globally, where the utilization of these practices is notably widespread across different languages.

One of the authors originates from a region where the prevalent mode of communication is commonly observed, particularly in Jakarta. However, it is worth noting that the impact of this phenomenon may extend beyond the local area, largely due to the widespread influence of social media, which has contributed to its viral nature. Typically, this trend is noticeable among today's teenagers, often referred to as the millennial generation. Consequently, the authors aim to investigate a comparable phenomenon within the university setting, specifically focusing on linguistic terms such as Code-Switching and Code-Mixing.

As per Basnight-Brown, D. M., & Altarriba, J. (2007), code-switching involves the incorporation of words, expressions, or segments of an extended conversation from one language into another. This occurrence serves as the foundational concept prompting the authors to undertake research on code-switching, aiming to explore the intricacies of the issues it presents. Code-switching is a frequent phenomenon in communication and language utilization, and individuals in the process of language acquisition commonly encounter it. In general, code-switching occurs when students face unfamiliar words or phrases during communication, prompting them to interject a language they find more familiar.

In a prior study akin to the present research on code-switching, Ajiza.M (2022) contends that language plays a crucial role for students, serving as a fundamental tool for communication. The proficiency in multiple languages facilitates students in both understanding and expressing information more effortlessly. While English stands as an international language imperative for mastery, the situation in Indonesia differs from some other countries. In Indonesia, English is considered a foreign language and is not commonly used for daily communication but is restricted to specific domains like education. This limited integration poses a distinct challenge for students seeking proficiency. To address these challenges, the researchers have adopted the code-switching method. In the course of learning two languages, English and Indonesian, code-switching is employed selectively. Unlike its application in other classes, code-switching here is restricted to instances when the lecturer provides instructions, when students share ideas or information, and during the evaluation process.

Ajiza (2022) employed a qualitative descriptive method in their research, gathering data through observation and transcription. The findings of Ajiza.M's study indicate a positive impact on English learning, with students demonstrating improved understanding of lecturers' instructions and enhanced ability to express and communicate their ideas in the classroom.

In a concurrent study, Novedo & Linuwih (2018) asserted the frequent utilization of code-switching and code-mixing in discussions within social circles, encompassing interactions with friends, family, and others. They underscored the diverse functions of each phenomenon, illustrating their points through examples from the Sarah Sechan talk show. The objective of their research was to identify the specific types of code-switching and code-mixing employed by Sarah Sechan and Cinta Laura during the Sarah Sechan Talk Show, with a primary focus on instances of discourse featuring these language phenomena.

Novedo & Linuwih (2018) conducted their research using a descriptive qualitative approach to analyze the conversations. Their findings revealed the presence of four types of code-switching, three types of code-mixing, and six reasons underlying the use of these linguistic phenomena. These reasons included discussing particular topics, expressing emphasis, interjecting, using repetition for clarification, intending to clarify speech content for the interlocutor, and expressing group identity.

Due to the prevalence of this phenomenon, this project is designed with the purpose of investigating students' views regarding the utilization of code-switching in social interactions. The primary focus is on understanding the students' opinions about the use of code-switching in these contexts. Through a thorough examination of this phenomenon within a university setting, the authors aim to contribute significantly to students' perspectives on code-switching. This research holds potential implications for teachers, students, and readers of this project, offering techniques to enhance English language proficiency. Ultimately, understanding this language phenomenon in the context of learning can lead to more engaging and effective teaching and learning strategies.



2. METHODS

2.1. Research Design

The research adopted a descriptive quantitative methodology, selected to acquire a comprehensive insight into the application of code-switching among students in the English department. By employing this approach, the author could systematically analyze the context, reasons, and patterns associated with the use of code-switching in the daily interactions of students. Descriptive quantitative methods prove to be well-suited for exploring intricate phenomena and contextual aspects within a higher education setting, as advocated by Merriam (2009).

2.2. Data Source

This research encompassed participants from several institutions, namely the University of Muhammadiyah Aceh, Bina Bangsa Getsempena University, Iskandar Muda University, IAIN Takengon, University of Islam 45 Bekasi, and University of Bhayangkara Bekasi. Cross-cultural communication skills are vital for students within academic settings. The authors are motivated to share this study primarily due to the observed lack of enthusiasm among students when it comes to completing the provided questionnaire, as well as to optimize the efficiency of the research process.

The writer selected a subset from the total population of currently enrolled students specifically majoring in the English Department. The sample for this study comprised 33 respondents, chosen through a random selection process from the aforementioned population. Utilizing a sample size of 33 respondents is deemed adequate for the thorough exploration and analysis of students' opinions regarding the use of code-switching.

2.3. Data Collection

To collect the data the authors were asked to the participants to fill out a online questionnaire by them selves. The online questionnaire would be provided by the author via Google Form and shared to the respondents via the WhatsApp Messenger group. The data collection techniques has been carried out by collecting and make some conclusions from the results of the answers of students who have answered the questionnaire. Because to obtaining varied descriptive information directly from the sources studied, the authors used a questionnaire for more specific data.

The data analysis involved the process of coding, categorization, and searching for thematic patterns in the data obtained from the questionnaire document analysis which has been answered by the participants. So, the author can identified emerging themes from the collected data and drawn descriptive conclusions to strengthen the validity of the findings. The data obtained from this questionnaire instrument were then analyzed with the stages of data reduction, data presentation, and drawing conclusions.

3. RESULTS & DISCUSSION

3.1 Result

This study was chosen to be conducted at the university to comprehend the phenomenon of code-switching in the general use of English and its application as a tool for interaction to enhance the English skills of students. English department students are well-acquainted with the practice of code-switching. The intention is for code-switching to serve as a tool enabling students to grasp the context under discussion. The research aims to scrutinize the use of code-switching among students, particularly those in the English department who frequently utilize English in diverse situations.

Furthermore, the authors gathered data from participants who responded to a questionnaire comprising 10 questions designed by the authors. Through the simplification of the collected data, the authors identified the prevailing responses to each question provided online. Participants expressed a range of opinions, including positive, negative, and neutral responses. Some opted for a neutral stance, particularly when questions did not necessitate detailed explanations, but only brief answers. The subsequent table presents a condensed summary of responses from students who completed the questionnaire, detailing the obtained data:



Table 1. Research Result

No	Questions	Dominan Answer	Percentage	Responses		
				Positive	Neutral	Negative
1.	Do you know about code-switching code-mixing are?	C. I know a little bit	51,5%	√	-	-
2.	How did you get the knowledge about code-switching and code mixing from?	D. Through the media (internet, television, radio)	36,4%	-	√	-
3.	How often do you use code-switching and code-mixing in your daily conversations?	C.Sometimes	60,6%	√	-	-
4.	What is your main reason for using code-switching and code-mixing in your conversations?	C. Adjusts to social situations	39,4%	-	√	-
5.	In an academic context, how often do you use code-switching and code-mixing in campus activities?	C. Sometimes	63,6%	√	-	-
6.	What is your opinion of the use of code-switching in the campus environment?	A. Code-switching is an accepted and common practice among university students	66,7%	√	-	-
7.	What do you think about the use of code-switching and code-mixing affects to your English language skills?	A. To improve understanding and mastery of English	78,8%	√	-	-
8.	Do you feel dependent on code-switching and code-mixing when communicating in English language?	A. No	45,4%	-	-	√
9.	How do the lecturers respond to the use of code-switching and code-mixing by students?	A. Encourage the use of code-switching as a supporting tools	81,8%	√	-	-
10.	In the use of code-switching, which switch or	A. Indonesian-English	66,7%	-	√	-



	mix of languages do you often to use?					
--	--	--	--	--	--	--

The information presented above illustrates the outcomes of condensing the predominant responses from participants for each question. Through the simplification of this data, the authors were able to articulate the research findings, outlined as follows:

Understanding of code-switching and code-mixing: Derived from the data collected from 33 participants, a significant majority (51.5%) acknowledged having limited knowledge about code-switching and code-mixing. This implies that most participants possess a fundamental or modest grasp of these concepts. While they may have a general awareness of the practices of code-switching and code-mixing in everyday conversation, their knowledge might not extend to a comprehensive understanding of the associated terminology and underlying linguistic principles. The term "limited knowledge" encompasses a broad understanding of the use of mixed languages in daily discourse or direct exposure to such language blending, without a profound comprehension of the theoretical or linguistic aspects involved. This indicates a potential avenue for further research into the perceptions and comprehension of code-switching and code-mixing among a more diverse range of students, along with its implications for everyday language usage.

Students gained awareness of code-switching and code-mixing: The data reveals that a significant portion of respondents (36.4%) obtained their understanding of code-switching and code-mixing through various media channels, including the internet, television, and radio. This highlights the pivotal role of mass media in spreading information about language and linguistics to the broader public. With easy access to diverse media platforms, individuals have the opportunity to learn about different aspects of language, such as code-switching and code-mixing. Mass media can wield considerable influence in shaping the perspectives and comprehension of the public, particularly English language students, regarding language and communication. This is achieved by presenting instances of mixed language usage in real-life scenarios or through informal education. The reliance on media as a knowledge source for code-switching and code-mixing signifies a shift in how individuals acquire information, increasingly leaning towards technology and digital platforms. Nevertheless, it is crucial to acknowledge that information garnered from media may not always be precise or comprehensive, prompting individuals to supplement their understanding with additional sources like scholarly literature or firsthand experiences. Moreover, the pivotal role of educational institutions and linguistic professionals in imparting knowledge about code-switching and code-mixing is essential to ensure a thorough and accurate comprehension of these linguistic phenomena among students.

The utilization of code-switching and code-mixing in everyday discussions: Findings reveal that a majority of respondents (60.6%) incorporate code-switching and code-mixing into their daily conversations, albeit infrequently. This implies that these linguistic phenomena are prevalent in the participants' day-to-day communication. The inclusion of code-switching and code-mixing in routine conversations might mirror the linguistic and cultural diversity encountered in everyday life, where individuals frequently engage with people from diverse cultural and linguistic backgrounds. The reasons behind the occasional adoption of code-switching and code-mixing can vary significantly.

Motivations for employing code-switching and code-mixing: A notable portion of participants (39.4%) indicated that they engage in code-switching and code-mixing to adapt to social contexts. This suggests that contextual factors, such as social norms, the desire for inclusion in a group, or the pursuit of more effective communication with others, often influence the use of these linguistic strategies. Other reasons contributing to the adoption of code-switching and code-mixing may include the expression of cultural or linguistic identity, the strengthening of social connections with specific groups, or the bridging of language gaps among conversational partners. It is crucial to recognize that these motivations can vary among individuals and are contingent on the specific circumstances of the conversation or situation. The employment of code-switching and code-mixing as a means of social adaptation underscores individuals' linguistic adaptability in navigating diverse communicative scenarios..



The utilization of code-switching and code-mixing in an academic setting: Data reveals that a majority of participants (63.6%) employ code-switching and code-mixing in their campus activities, albeit sporadically. This indicates that the phenomena of code-switching and code-mixing are prevalent in academic environments. The incorporation of mixed languages in academic contexts encompasses scenarios like classroom discussions, presentations, or interactions with peers and professors. The reasons behind employing code-switching and code-mixing in academic settings may vary, including the desire to simplify complex concepts in more accessible language, adapting to group communication preferences or norms, or enhancing engagement and comprehension in the learning environment.

Students' perspectives on code-switching in the campus environment: A majority of participants (66.7%) view code-switching as a common and accepted practice among students. This reflects a positive perception of code-switching in both academic and social settings on campus. The opinions expressed by these students suggest that code-switching is considered a normal and acceptable practice, particularly within English language departments. This recognition highlights the understanding that language is a flexible and dynamic tool adaptable to the needs and preferences of speakers and communicative situations. The favorable view also indicates an attitude of tolerance towards linguistic and cultural diversity among students. However, it's essential to note that attitudes towards code-switching can vary among individuals and depend on specific contexts. Some individuals may hold more critical or skeptical views regarding its use in communication, while others see it as a feature that enriches and expands the expressive possibilities of language. By grasping students' perspectives on the use of code-switching in campus environments, higher education institutions can develop more responsive approaches to their communicative needs and support the cultivation of flexible and diverse language skills among students.

Impact of Code-Switching on English Language Skills: The majority of survey participants (78.8%) express the belief that employing code-switching and code-mixing can positively contribute to the comprehension and proficiency of the English language. This optimistic perspective underscores the notion that code-switching allows speakers to draw upon knowledge and vocabulary from both languages, thereby enriching and broadening their grasp of the English language. In the realm of higher education, the utilization of code-switching can grant students access to a more extensive array of resources and information in English, such as academic literature or online learning materials, ultimately enhancing their understanding of the subjects studied. Nevertheless, it is crucial to recognize that relying solely on code-switching does not guarantee an enhancement in English language proficiency, especially if used as a substitute for more in-depth efforts to grasp and apply English accurately and effectively. Moreover, an excessive dependence on code-switching may impede the development of comprehensive and advanced English language skills.

Dependency on Code-Switching and Code-Mixing: A majority of participants (45.4%) assert that they do not feel reliant on code-switching and code-mixing when communicating in English. This suggests that most participants feel self-assured in their ability to communicate in English without resorting to mixed language usage. This confidence may stem from their belief in using English independently and competently, coupled with the recognition that code-switching is not always necessary in certain communication contexts. However, a minority of participants may find comfort or familiarity in employing code-switching in English communication, whether due to habit, personal preference, or situations that necessitate mixed language use. Overreliance on code-switching in English communication serves as a signal for individuals to expand and deepen their English language skills while bolstering their confidence in communicating solely in English. It is imperative to tailor the use of code-switching to the specific communication context and goals, emphasizing its role as a complementary tool rather than a substitute for independent and effective English language use.

Lecturers' Responses to the Use of Code-Switching and Code-Mixing: A significant majority of respondents (81.8%) express feeling supported by their lecturers in utilizing code-switching as a communication tool. This indicates that most students perceive their lecturers as endorsing the use of code-switching and code-mixing as valid communication strategies within an academic setting. This favorable perception may underscore lecturers' inclusive and adaptable attitudes towards students' limitations in expressing themselves in English in class. It also reflects an acknowledgment of the value and utility of code-switching in aiding students' comprehension and active participation in the learning process. Supportive responses from lecturers contribute to



fostering an inclusive learning environment and facilitating diverse conversations in both English and other languages. However, it is essential to recognize that lecturers' responses to students' use of code-switching and code-mixing may vary based on specific contexts and learning objectives. Some professors might encourage consistent English use to strengthen language skills, while others may prioritize contextual appropriateness and flexibility in mixed language usage. Lecturers' role in supporting students' utilization of code-switching and code-mixing may encompass providing constructive feedback on language use and offering additional resources to enhance students' language proficiency.

Languages Preferred in Student Code-Switching: The majority of respondents (66.7%) tend to employ a blend of Indonesian and English when engaging in code-switching. This suggests that Indonesian and English stand out as the most frequently used languages in code-switching conversations among the participants. This language usage pattern may mirror the sociolinguistic context prevalent in the campus environment or participants' daily lives, where Indonesian and English play significant roles as official languages, languages of instruction, or languages in daily activities. The preference for an Indonesian-English combination in code-switching may also signify communication habits developed through interactions with diverse social groups or various communicative situations.

3.2 Discussion

The author conducted a study to explore students' opinions on the use of code-switching in social interactions. The collected data revealed that students perceived code-switching as a valuable tool for improving their English language proficiency, not only in academic settings but also in social interactions.

The observed phenomenon, as indicated by the gathered data, suggests that students do not feel dependent on code-switching as an internal phenomenon. It appears to be a spontaneous and unplanned practice for them. In terms of external factors, such as the perspectives of lecturers on students employing this method, the findings show strong support from lecturers, considering code-switching as a beneficial supportive tool for students.

The study's results align with a previous study that also emphasized the positive impact of code-switching on enhancing English language skills, particularly in adapting to individuals with multiple languages. However, notable differences exist between this study and previous research, including variations in research methods, locations, and sample selection. This research represents the latest exploration of code-switching among students in the English Department, contributing fresh insights to the existing body of knowledge on this topic.

4. CONCLUSION

The analysis of the gathered data indicates that nearly half of the 33 participants had limited knowledge about code-switching, with their primary source of information being classroom lessons. Participants reported occasional use of code-switching and code-mixing in their conversations, primarily to adapt to various social interactions. Similarly, in academic contexts, participants sometimes employed these methods when interacting with their lecturers, and code-switching was perceived as an accepted and common practice among university students. According to participants, using code-switching was deemed effective in enhancing their understanding and proficiency in the English language. However, about half of the participants did not feel dependent on this method. The response from lecturers was supportive, encouraging students to use code-switching as a helpful tool. The analysis revealed that code-switching was most frequently observed between Indonesian and English, with variations in the use of other languages and specific combinations based on individual needs. Several limitations were identified in this study. The small sample size of 33 participants from six universities may limit the generalizability of the results beyond the scope of the study. Future research with a larger and more diverse participant pool is recommended for more accurate insights. Additionally, the diversity in individuals' learning styles and experiences with code-switching may have influenced the research outcomes. Longer-term studies are suggested to comprehensively explore the lasting impacts of code-switching on language development, providing a more nuanced understanding of its usage over time.



5. ACKNOWLEDGMENTS

We would like to express our sincere gratitude to all the participants who generously shared their time and insights for this study. We also extend our appreciation to the faculty members and staff who supported and facilitated the research process. Additionally, we acknowledge the invaluable contributions of our colleagues and peers who provided valuable feedback and guidance throughout the project. This study would not have been possible without the support and cooperation of everyone involved.

REFERENCES

- Ajiza, M. (2022). *Penggunaan "Code-Switching" dalam Pembelajaran Bahasa Inggris untuk Mahasiswa Teknik. SESMINA 2022*, 219-221.
- Basnight-Brown, D. M., & Altarriba, J. (2007). Code-switching and code-mixing in bilinguals: Cognitive, developmental, and empirical approaches. *Speech and language disorders in bilinguals*, 69-89.
- Bazeley, P., & Jackson, K. (2013). *Quantitative Data Analysis with NVivo*. Sage Publications.
- Brown, C. L. (2007). Strategies for making social studies texts more comprehensible for English-language learners. *The Social Studies*, 98(5), 185-188.
- Chaer, A., & Agustina, L. (2014). *Sosiolinguistik pengenalan awal*. Jakarta: Rineka Cipta.
- Holmes, J. (2000). *An introduction to sociolinguistics*. Pearson Education.
- Kompas. (n.d.). *Pengertian Kontak Sosial Primer dan Sekunder*. Diambil dari <https://www.kompas.com/skola/read/2022/12/06/100000969/pengertian-kontak-sosial-primer-dan-sekunder?page=all>
- Kothari, C. R. (2004). *Research Methodology: Methods and Techniques*. New Delhi, India: New Age International.
- Merriam, S. B. (2009). *Quantitative research: A guide to design and implementation*. Jossey-Bass.
- Novedo., & Linuwih, E. R. (2018). *Code Switching and Code Mixing Used by Sarah Sechan and Cinta Laura in Sarah Sechan Talk Show*. Seminar Nasional Ilmu Terapan (SNITER)
- Saidin, S. Z. (2003). *Research Methods in Education*. USM Press.
- Studenta. (n.d.). *Apa Sih yang Dimaksud Code Mixing dan Code Switching?* Diambil dari <https://studenta.id/apasih-yang-dimaksud-code-mixing-dan-code-switching/>
- Tim CNN Indonesia. (2023, Februari 6). *Pengertian Interaksi Sosial, Ciri-Ciri, dan Syarat Terjadinya*. Diambil dari <https://www.cnnindonesia.com/edukasi/20230203111551-569-908465/pengertian-interaksi-sosial-ciri-ciri-dan-syarat-terjadinya>.



NEEDS ANALYSIS FOR DEVELOPMENT OF THE CONTENT LANGUAGE INTEGRATED LEARNING (CLIL) MODEL ON LITERARY APPRECIATION

Asrul^{1*}, Hamsu Abdul Gani², Mustafa³
^{1,2,3}Makassar State University, Indonesia
*asrul7884@gmail.com

ABSTRACT

This research aims to determine the initial situation in the field regarding the need to develop the Content Language Integrated Learning (CLIL) model to increase literary appreciation. This research uses a qualitative descriptive method that aims to analyze students' needs in learning literature by involving two variables. This research is only limited to analyzing the needs derived from the results of interviews and questionnaires of students. The data collection technique in this research uses the needs analysis instrument: interviews for lecturers and questionnaires for students. The results of the analysis showed that (1) lecturers have not conducted coaching and development of CLIL learning models, so they are constrained, (2) lecturers have not developed and used CLIL models, so they support and express readiness to be involved in development, (3) the learning models used by lecturers so far have no indication of leading to CLIL learning models, (4) understanding of students with less categories, and (5) students have abilities that need to be improved in a better direction. The implication is that the development of the CLIL model is a strategy to increase literary appreciation.

Keywords: Needs analysis, CLIL model, literary appreciation.

1. INTRODUCTION

Progress in the field of Information and Communication Technology (ICT) has become an integral part that cannot be separated because it has provided many benefits in various activities of human life. The use of ICT can help humans from the limitations of space and time, one of which is in terms of exchanging information from all humans in various parts of the world wherever they are. This development in the ICT sector is an opportunity in the education sector, especially in this country. With these developments, lecturers are required to be more diligent in designing their learning effectively and efficiently. Therefore, learning resources in the form of literary learning can also be presented online by utilizing digital learning resources. Classroom learning can also utilize this technology. According to Arsyad (2013), developments in science and technology are increasingly encouraging updates in the use of technological results in the learning process. Apart from being able to use the available tools, lecturers are also required to be able to develop skills in creating teaching materials that will be used (Purwaningtyas, 2017). According to Arsyad (2013), a learning model is a supporting tool that can be used to convey messages or information in the learning process so that it can stimulate attention in learning. To facilitate the achievement of the objectives of implementing literary learning activities, researchers need a learning tool in the form of teaching materials designed by the demands of the 21st-century curriculum. Teaching materials are modified according to learning needs and used as intermediary media that can be used to convey messages and stimulate thoughts, feelings, and willingness to learn. One of the teaching materials that can be used is the lesson plan and syllabus. The literature learning course is a course given in the fourth semester of the English Language Education Study Program. Students who can take this course are students who have completed an introductory literacy course. The description of the material that will be studied in this literature learning course is related to literary studies, especially writing poetry and short stories. The presence of material that is



complex and requires a lot of direct practice in learning activities as well as limitations in lecture time is what motivated the research team to develop teaching materials as a type of teaching material that can be used in lectures and will be packaged systematically, planned and directed to be more effective. and efficiently used in learning activities, especially in literary appreciation courses. The material will be arranged in a syllabus design and lesson plans into the form of teaching materials systematically and interestingly to study which includes the material.

With a material design like this, it is hoped that students can obtain information about lecture material independently. In the era of the Industrial Revolution 4.0, the use of literary learning tends to mix the learning process well to continue to encourage students to innovate in the field of learning, one of which is by converting teaching materials into teaching materials. Teaching materials function to improve students' ability to learn on their own without depending on their educators. In the teaching materials, there is material that has been prepared in detail about the material to be studied and there is also an evaluation so that it can support educators in providing material in the form of reasoning. According to (Melati, 2012), it is very important to instill reasoning in language and literature learning.

Students' low literacy (thinking) abilities cannot be denied as an impact of the language learning model that lecturers choose and apply in the learning process. Therefore, developing skills to appreciate literature through the ability to write texts needs to be done. Text-based writing ability is an effort to foster and develop students' thinking patterns quickly, coherently, critically, and creatively. At this level, students are required to write sentences with more focused ideas. This means that students are required to develop writing in text form based on more complete guidelines such as text structure and topic development. Apart from that, the choice of words and use of sentences as well as the language style must also be carefully scrutinized. (Bachman, 2014). Writing ability must be based on students' mastery or possession of adequate linguistic rules and high contextual sensitivity. Because even simple writing is impossible without knowledge of simple language rules and good insight into the story environment. However, the field shows that the results of students' learning of writing skills are still far from expectations. There are still many students who are not able to express ideas in writing well, or develop themes into scripts and coherent written content, even though they have taken literature lessons since elementary school.

The results of observations regarding the implementation of literature learning carried out by lecturers by training are starting to look good, but students are more directed only at writing a text and this is done after the explanation about writing ends. As a result, learning to write becomes a long theoretical explanation and the practice of writing is rarely done or if it is done it becomes homework that does not necessarily receive intensive guidance in making the writing a reality. The impact of learning to write at home makes learning outcomes less effective and meaningless for students because the process of putting ideas into text is not directly experienced by students. As part of the learning process managed by the lecturer through "constructing context and studying models" which should provide clarity in writing, but because the writing results are not corrected together as an effort to "construct the text together and construct the text independently". This makes a literary work appear as if it is not developing well.

Mastery of writing components, such as content (suitability of title to content), text structure, word choice, use of effective sentences, and language style and mechanics has not been fully realized. Writing story texts such as short stories is part of the skills demanded in higher education. (Wiratno, 2014). Therefore, students must be able to write texts well by lecturers in literature courses, especially in poetry and literature appreciation courses. Writing ability is a person's skill in language which is productive because it produces a product, namely writing. Murray and Moore (2009) state that writing ability is a complex and creative process for someone to



produce writing from a series of words into sentences and paragraphs using written language. Writing ability is a person's skill in combining language and a sequence of thoughts in writing so that the reader conveys the message well. Byrne (in Yulistio, 2012) states that writing skills are the result of a person's efforts in realizing and collecting linguistic knowledge and processing ideas through thoughts that are reflected in written form so that they can be communicated to readers successfully.

Literary works in the form of short stories are short, fictional narrative texts with a simple single plot that tells an event intending to entertain or instill moral values. Short stories are a person's skill or ability to express ideas, feelings, and thoughts through the form of fictional narrative writing which aims to entertain and convey a moral message. In the process of learning to write short stories, students can learn to write interesting and memorable life experiences to be narrated and shared with others in the form of short stories. By writing short stories, students are required to be able to develop their ideas and experiences so that they can inspire other people when they read them.

Students can convey the meaning of life by instilling moral life values. Considering that currently learning to write short stories has not been able to build students' creativity to write regularly as a creative skill. Learning to write short stories is still limited to studying the theory of writing short stories and does not yet familiarize students with literary creation directly. Due to the theoretical nature of learning, students have difficulty writing down ideas and short stories well and systematically. When learning to write short stories, students have not been directed to think critically, creatively, and systematically in developing story ideas into short story writing. This happens because the learning method used is still teacher-centered with learning still focused on providing knowledge about short stories. Learning is one-way and causes students to quickly get bored and less creative. As a result, learning to write short stories is considered less interesting.

The reality is that students' needs for literature learning in the English language education study program at Khairun University have not been implemented well because it is only theoretical so students are weak in understanding the concept of literature learning in class. This is due to curriculum factors, lecturers, infrastructure, and a low understanding of the concept of literature. This will make students bored and only focused on what they learn in each theory, therefore learning must be directed at creativity in understanding, interpreting, assessing, and ultimately producing.

Apart from that, literature learning is still hampered by several factors, namely: (1) lecturers' basic knowledge and abilities in the field of literature are very limited. The literary material obtained during formal education is very limited. The literary course material obtained is more theoretical, while what is needed in the field is more practical; (2) limited books and reading material to support literature learning. Even if there is, the use of reading books is not optimal because there are other factors, namely students' low interest in reading.

To support the creation of an effective learning process, literature learning must empower students' skills in appreciating literature to create a cooperative and communicative learning atmosphere in building their knowledge. Students are actively involved in the short story writing process, direct their knowledge, and are responsible for what they do. Lecturers no longer dominate the learning process, but an interactive process occurs between students and lecturers during the teaching and learning process.

Students need integrated literature learning. Therefore, researchers used learning with content language integrated learning (CLIL) which is commonly known as 4C as stated by Coyle (2010). The four components are content, communication, cognition, and culture. Content related to the theme. Communication is related to what language will be used. Cognition is related to thinking skills. Culture is related to local culture. Make the campus a place for literature, innovative learning, and teaching literature based on CLIL which integrates literature



learning that is not just theory, but involves 4 language skills, namely listening, speaking, reading, and writing, so that literary practice can be empowered in a sustainable, systematic and tolerant.

Based on the description above, it is clear that there is a gap for English language education study program students in understanding and appreciating the literature that they need. Also understand that learning is carried out in an integrative manner by improving the curriculum, especially literary studies, to be more creative and innovative in self-development. Therefore, special attention is needed to answer these problems by developing a model and approach to integrated learning.

2. METHODS

This research uses a qualitative descriptive method that aims to analyze students' needs in learning literature by involving two variables, namely independent and dependent. The independent variable in this research is the CLIL learning model (X) and the dependent variable is the ability to read literary works in FKIP Unkhair students, English language education study program (Y).

The population in this study were all students of the English Language Education Study Program for the 2023/2024 academic year. The sample is students of the English Language Education Study Program, semester IV.

The sampling technique used was a stratified random sampling technique. The multistage random sampling technique is a sampling technique that groups the population into homogeneous layers and then selects samples to estimate population parameters.

The research instrument used questionnaires and interviews. The questionnaire contains 5 assessment criteria, namely: very needed, needed, somewhat needed, less needed, and not needed. Meanwhile, interviews are in the form of tied interviews (yes and no) by responding to the statements given on the interview sheet.

Data collection and analysis techniques are carried out by qualitatively describing the results of student and lecturer responses by connecting data and information related to the research focus. After that, the researcher made conclusions from the results of the discussion.

3. RESULTS & DISCUSSION

The study regarding the analysis of lecturers' needs in this preliminary study stage research was carried out by giving questionnaires to lecturers in charge of literary appreciation courses. Informants are determined based on their skills and proficiency in the field of literary language studies. Apart from that, the determination of informants is also based on their skills in expressing their opinions regarding the suitability of the teaching materials used so far with their needs for the Literary Appreciation Course teaching materials that they expect. Based on the results of a questionnaire given to lecturers in charge of the Literary Appreciation course, English Language Education Study Program, Faculty of Teacher Training and Education, Khairun University, the results obtained were 83.33-91.67% of lecturers stated that learning literature was essential to teach, and 58.33% of lecturers stated that learning literature important to teach. The reason is that this course functions as capital in understanding literary works.

The results of data collection from the needs analysis were obtained through interviews with lecturers and questionnaires distributed to students of the English Language Education Study Program. Both instruments address student learning needs. During the lecture process, students need aspects of learning to ensure the learning process runs smoothly. Aspects of learning needs include (1) involvement of lecturers using the CLIL model



when learning literature, (2) students' ability to understand the literature learning process and (3) improving student qualifications in a better direction.

Below are the criteria for assessing student needs in the high, medium, and low categories.

Table 1. Student Needs Assessment Criteria

Category	Intervals	%Interval	Frequency
Very High	48-60	81% - 100%	0
High	36-48	61% - 80%	27
Medium	24-36	45% - 60%	5
Low	12-24	22% - 44%	0
Very low	1-12	≤21%	0

Above it can be seen that the range of student needs in literature learning is in the very high category at the interval 48-60 (81-100%) with a frequency of 0, and the high category is at the interval 36-48 (61-80%) with a frequency of 27, the medium category is in the interval 24-36 (45 – 60) with a frequency of 5, the low category is in the interval 12 – 24 (22 – 44%) with a frequency of 0, and very low 0 – 12 (less than 21%) with a frequency of 0.

The next table is the results of an analysis of student needs in literature learning with assessment criteria of 5 = very needed, 4 = needed, 3 = somewhat needed, 2 = less needed and = not needed.

**Table 2. Results of Analysis of Student Needs in Literature Learning
(N= 32 Students)**

												%	Category
P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12		
5	4	4	4	5	5	5	4	5	5	5	4	91.67	Very High
4	2	5	5	5	3	2	3	5	3	2	2	68.33	High
5	5	5	5	4	5	5	5	5	5	4	5	96.67	Very High
5	4	5	4	4	4	5	4	5	5	5	4	90.00	Very High
5	5	5	4	4	4	5	4	4	4	5	5	90.00	Very High
5	5	4	5	5	5	5	5	5	5	5	5	98.33	Very High
5	3	4	4	4	4	3	4	5	3	4	4	78.33	High
5	4	4	4	4	4	4	4	5	5	4	5	86.67	Very High
5	4	5	5	5	4	4	4	3	4	4	4	85.00	Very High
5	5	5	4	4	3	5	3	4	3	4	5	83.33	Very High
4	4	4	3	4	4	4	4	4	4	3	5	78.33	High
5	5	4	4	5	5	5	5	5	5	5	5	96.67	Very High



5	4	4	5	5	5	5	5	5	5	5	5	96.67	Very High
5	5	3	4	4	4	5	5	5	4	4	5	88.33	Very High
5	5	4	4	4	3	4	4	5	4	4	3	81.67	Very High
5	5	4	4	4	5	5	5	4	4	4	5	90.00	Very High
5	4	4	5	4	5	4	4	5	5	4	5	90.00	Very High
5	5	5	4	5	4	5	4	5	5	5	5	95.00	Very High
5	4	5	4	4	4	4	4	4	5	5	4	86.67	Very High
5	4	5	5	5	5	5	5	3	3	5	5	91.67	Very High
5	5	5	4	5	5	4	4	4	4	4	4	88.33	Very High
5	5	3	3	4	4	3	4	5	3	4	4	78.33	High
5	4	3	2	4	3	5	2	5	4	2	3	70.00	High
5	5	4	4	4	4	5	5	5	5	5	5	93.33	Very High
4	3	4	4	5	5	5	5	3	4	4	5	85.00	Very High
5	5	5	4	5	5	5	5	4	5	4	5	95.00	Very High
5	5	5	4	5	4	4	4	5	4	4	4	88.33	Very High
5	4	5	4	4	5	5	4	5	4	5	5	91.67	Very High
5	5	4	4	5	4	4	5	4	5	4	4	88.33	Very High
4	4	4	4	5	5	5	4	5	4	4	5	88.33	Very High
5	5	4	5	5	5	5	5	5	5	5	5	98.33	Very High
5	5	5	5	4	5	4	3	5	5	4	5	91.67	Very High

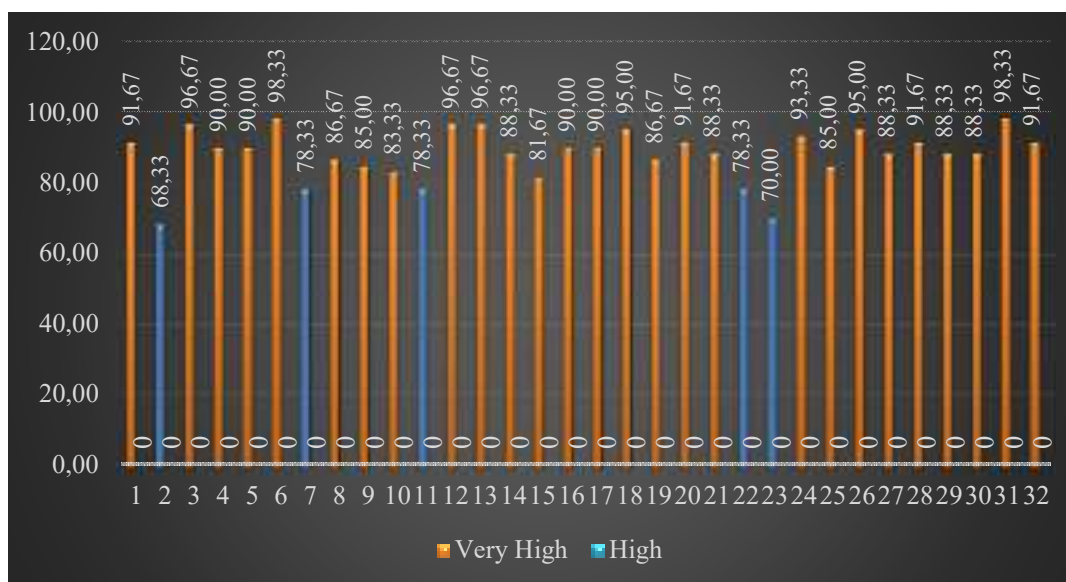


Diagram 1. Student Needs in Literature Learning



From the data presented above, it can be seen that most respondents need learning literature using the language-integrated learning (CLIL) content approach above 81% or the very high category and the remaining respondents do not need to study literature using the CLIL approach below 78% or high category. The results of this research can be used as a preliminary test at the development stage of integrated literary learning.

Table 3. Lecturer Interview Assessment Criteria

Category	Intervals	%Interval	Frequency
High	9-12	$\geq 70\%$	2
Medium	5-8	35-69%	1
Low	0-4	$\leq 34\%$	0

Table 3 above is the lecturer interview assessment criteria which can be seen in 3 categories, namely high with intervals 9 – 12 above (70%) with 2 frequencies, medium category with intervals 5 – 8 (35 – 69% with 1 frequency, and low 0 – 4 less than (34%) with 0 frequency.

Table 4. Results of Lecturer Interview Analysis

P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	%	Category
1	1	1	1	0	0	1	0	0	0	1	1	58.33	Medium
1	1	1	1	1	1	1	1	1	0	1	1	91.67	High
1	1	1	1	1	0	0	1	1	1	1	1	83.33	High

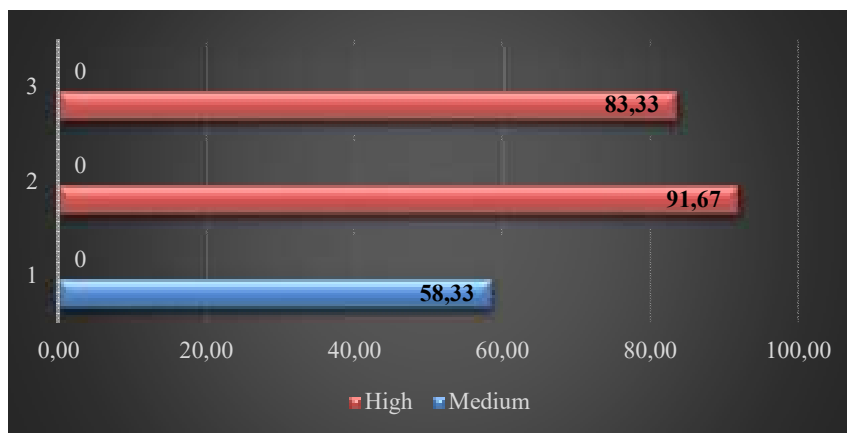


Diagram 2. Students' Ability to Write Literary Works

In Table 4 or Diagram 2 above, it can be seen that the three lecturers have different responses to students who can write literary works well. On average, students can write literary works well, at 91.67% and 83.33% and



the medium category is 55.83%. This means that literature learning using the integrated learning model (CLIL) can be said to be good or high.

If we refer to previous research conducted by Helaluddin (2018) with the title "Needs analysis in syllabus redesign (RPS) for Indonesian language courses" it was found that 75% of lecturers wanted the long-term goals of language learning to be better.

From the results of this research, the researcher plans to develop CLIL-based literature learning, because based on the results of interviews and questionnaires, data was obtained that students are interested in using this learning model so that it is easy to understand.

4. CONCLUSION

Based on the results and discussions carried out by researchers, there are two research focuses developed in this study, namely problem and needs analysis. In understanding theory and literary appreciation, researchers found four problem analyses based on the results of questionnaires and interviews. These four problems are (1) The concept of literary appreciation is still not strong, (2) The practice of literary appreciation by students is still not appropriate, (3) Low student literacy, and (4) Limited teaching materials for theory and literary appreciation. Language learning that is transferred to literature learning can see changes in the learning process. With this model of learning change, it can be seen that students who can write literary works well are in the high category 91.67% and 83.33% medium. After carrying out the problem analysis, the researcher continues to analyze the needs. There are three needs for English Language Education Study Program students based on the results of the needs analysis. First, students need theoretical and literary appreciation teaching materials that are easy to understand. Second, students need teaching materials that are in line with the latest curriculum. Third, students need teaching materials that have lots of exercises based on cultural literacy. This research only measures two variables, namely needs analysis and literary learning, so the scale is still limited. Likewise, the population and sample size are still limited to one study program at Unkhair. Considering these limitations, in the future researchers will expand their research to develop Theory and Literary Appreciation teaching materials for Unkhair English Language Education Study Program students that are based on cultural literacy.

REFERENCES

- Arsyad, A. (2013). *Media Pembelajaran*. Raja Grafindo Perkasa.
- Bachman, L.F. (2004). *Statistical Analyses for Language Assessment*. Cambridge University Press.
- Coyle, D. (2005). *Planning and Monitoring CLIL*. University of Nottingham.
- Helaluddin. (2018). Analisis kebutuhan dalam Mendesain Silabus (RPS) Mata Kuliah Bahasa Indonesia di Perguruan Tinggi. *Jurnal Gramatik*, 4(2) 85–103.
- Melati. (2012). Hakikat Bahan Ajar. Universitas Terbuka Repository. <http://repository.ut.ac.id/4157/1/IDIK4009-M1.pdf>.
- Murray, R. & Moore, S. (2009). *The Handbook of Academic Writing, A Fresh Approach*. Mc-Graw Hill.
- Muryati (2013) *Peningkatan Kemampuan Berbicara Dengan Menggunakan Strategi Role Playing Pada Mata Pelajaran Bahasa Indonesia Siswa Kelas V Madrasah Ibtidaiyah Nurul Huda Kota Baru Kecamatan Keritang*. Thesis, Universitas Islam Negeri Sultan Syarif Kasim Riau.
- Puryaningtyas. (2017). Pengembangan Modul Elektronik Mata Pelajaran Pendidikan Jasmani, Olahraga dan Kesehatan kelas XI berbasis Online dengan Program Edmodo. *Jurnal Pendidikan: Teori Penelitian dan Pengembangan*, 2(1), 121-129.



- Wiratno, Tri. (2014). Pembelajaran Bahasa Indonesia berbasis Teks dalam Kurikulum 2013. *Materi Pelatihan Instruktur Nasional Pembelajaran Bahasa Indonesia Berbasis Teks*. Badan Pengembangan dan Pembinaan Bahasa.
- Yulistio, Didi. (2012). “Pengaruh Strategi Pembelajaran dan Kemampuan Penalaran Terhadap Keterampilan Menulis”, *Disertasi Unpublished*. Universitas Negeri Jakarta.



THE DIFFICULTIES OF SPEAKING ENCOUNTERED BY THE STUDENTS AT ENGLISH COURSE

Naniek Jusnita^{1*}, Arismunandar², H. Ansar³

^{1,2,3}Universitas Negeri Makassar, Indonesia

*naniekunkhair@gmail.com

ABSTRACT

The objectives of this research are: 1) to analyze what are the difficulties of speaking encountered by the students, 2) to know what are learning styles that students prefer to use in learning speaking. The researcher applied qualitative method and analyzed the data by using descriptive analysis. thirteen respondents involved in this research. The instrument used in this research were observation and questionnaire. The result of this research shows that all respondents involved in this research have difficulties in speaking. There were five difficulties that found in this research. The first was pronunciation 3.53%, the second was vocabulary 3.46%, the third was grammar 3.07%, the fourth was translation 3.07% and the last was self-confidence 3.07%. While on learning style, there were 85% students agreed on kinesthetic learning style as the best way in learning a language, followed by auditory learning style 69% and the last was visual learning style 54%.

Keywords: speaking difficulties, learning styles, English course.

1. INTRODUCTION

Language is a tool used by people to communicate among themselves. Language is also used to convey information, ideas, concepts or feelings, with words as a tool to convey something. According to Fishman (1971:17), "language is not only about how to express ideas but also to explains the meaning of words. Language is not only about explaining things but also as a tool to express identity and social relationships". In this globalized era, the ability to speak English is essential for interact between people especially in places where people speak English almost every day. Many people use English as a medium of communication and make it easier for people who come from different countries to interact and communicate. As one of the international languages, English is also taught in Indonesia both in formal and non-formal institutions. It has been taught from primary school to university level. Although English has been learning from elementary school, many students still get difficulties in using English.

There are three language elements that play an important role in supporting the four skills as mention by Standford (2003), namely pronunciation, vocabulary, and grammar. To achieve optimal English proficiency, professional language instructors are needed to produce quality learners. Mastering material and practice must be given in equal portions. However, to realize an ideal language class is not an easy thing. To have sufficient knowledge of the material, a language teacher should know the level of mastery the English language of each learner. If all conditions are generalized, it will be difficult to achieve the expected learning goals. Because basically every student has different characteristics including learning techniques and learning material as in the concept of multiple intelligence (Stanford, 2003)

In the process of learning English, students found obstacles in speaking. These obstacles can cause less than optimal student learning outcomes. This can happen to anyone including students who take an English course at English Training Center (ETC) of Ternate for SMA level. Hasan (2000) states that the difficulty faced by learners of English as a foreign language is the lack of understanding English pronunciation which is spoken at a normal speed through listening. However, speaking skills in foreign languages is uneasy for students to master. Students consider that speaking is the most difficult skill to master because it requires



preparation to speak well such as knowing what topic is going to discuss with our classmates, how to start it, how to extend the talk, and how to end the talk or discussion with a polite way. It is in keeping with Bohari (2019) who informs that students can perform their speaking abilities through discussion activities. It is reinforced by Wahyuningsih (2018) who states if students can do all of those, learning a new language will not be difficult for students even though the language is not our mother tongue or our national language.

Furthermore, Abidin (2011: 125) states that speaking skills occupy a very important position because it is a characteristic of students' communicative abilities. In other words, the ability to speak does not only play an important role in learning but it also plays an important role in other learning (Chien et al., 2019). Speaking skills also means as an indicator of students' success in learning the language. If they can speak English fluently, it will be easy for students to express their ideas verbally in a particular subject class (Pawlak, 2018). The ability to speak is usually seen as a key manifestation of learners' ability in the target language. If all is done well like memorizing the words every day, doing a great deal of practice, knowing a grammatical point well, students will definitely be able to speak English well and their listeners will get a message or main point easily from the words that are spoken by the speakers. In terms of daily life, this has the goal that teaching in speaking skills is to enable students to understand and use language appropriately and in accordance with clear situations.

There are also many senior secondary students still lacking in speaking skills such as lack of vocabulary, bad or unusual pronunciation, and poor grammar (Heriansyah, 2012, p.31). In order to make students be able to speak English, the students have to memorize many English words, they know how to pronounce the English words correctly, and they have to be able to arrange a good sentence by comprehending grammatical point (Lail, 2019). In addition, the problem is then considered not only to lie in the instructional methods that have been applied by teachers in the teaching of four language skills, speaking, writing, listening, and reading (Haerazi & Irawan, 2020). It is assumed that some problems lie with the students themselves because they have crucial roles in learning processes. The most important main factor is that many students who when asked to speak in class will reject the reasons for fear, shame, and fear of being wrong, lack of confidence in students is caused by lack of preparation and lack of understanding of the elements of language and non-language influences in speaking skills (Aprianoto & Haerazi, 2019). Success can be found in themselves. One aspect that is involved in the process is developing speaking skills in terms of language learning strategies undertaken by students.

Previous research identified several factors that inhibit students in communicating or doing speaking activities in class. Inayah & Lisdawati, (2017), found that students have problems with motivation and self-confidence. Students are afraid of being wrong, embarrassed, anxious and lack confidence (Nakhalah, 2016). Speaking learning (Paakki, 2013), too grammar-orientated and theoretical, late start of learning, fear of mistakes, lack of practice and experience, and social pressure. Seligson, (1997) added that students' speaking difficulties include linguistic and non-linguistic problems. Linguistic problems include lack of vocabulary, pronunciation, grammar knowledge, while non-linguistic problems include inhibition, nothing to say, uneven participants, mother tongue disorders, speech disorders, anxiety, shyness, lack of confidence and low motivation. Megawati & Mandarani (2016) in their research found that the difficulty that students often face when speaking English lies in the lack of vocabulary. Rifai, (2019) in his study on students' difficulties in speaking has found five aspects that contributed to their obstacles in speaking such; expression, pronunciation, grammatical, psychology, language environment.

In the process of learning a language particularly a second language, there are many factors including age, gender, motivation, intelligence, anxiety level, learning strategies and language learning styles that determine the academic success of learners (Sharp, 2004). Students learn in different ways by seeing and hearing; reflecting and acting; reasoning logically and intuitively; memorizing and visualizing etc. The ways in which an individual characteristically acquires, retains, and retrieves information are collectively termed the



individual's learning style. Since the learning style is one of the predominant factors which influence the students' success play a crucial role in the learning process, teachers and educators should not ignore the identification of their students' learning styles. Reid (1995) has developed learning style model based on how students learn best using their perceptions: visual, auditory, kinesthetic and tactile preferences and also two social aspects of learning: group and individual preferences.

From the findings above, the researcher concluded that the learning process requires communication as a signal of effective and efficient interaction (Bahrani & Soltani, 2008). In addition, students' opportunity to speak directly is necessary to improve their speaking skills (Liao, 2009). All language learners will use language-learning strategy in their learning process. Learners employed language learning strategies consciously when processing new information and performing tasks. The strategies help them to comprehend better and quicker. Therefore, language learning strategies are fundamental to success in learning a new language. Based on above elaboration, this study is aim to answer some following questions: 1. What are the speaking difficulties encountered by the students? What are the students' learning style in speaking skill?

2. METHODS

The researcher applied qualitative method to analyze the students' difficulties and their learning style in speaking English. Leo (2013) stated that qualitative research is a research based on the data collecting, analyzing, and interpreting in narrative form to get deep understanding from the particular phenomenon observed. The subjects were thirteen (13) students from English Training Center (ETC) at Toboko, Ternate of senior high school level.

Instrument used in collecting data were observation and questionnaire. The result of observation data was analyzed using oral proficiency categories that involved three aspects of speaking elements such pronunciation, fluency and vocabulary. The observation was conducted when students performed their conversation in font of class. Researcher used video recording to get accurate visual and sound to analyze students speaking performance. To get maximum score, students' scores were divided by getting scores required, then they were multiplied by 100. To comprehend the data of students' learning style, researcher applied questionnaire for students. Researcher used a rate scale by Likert (1932) and the percentage formula.

3. RESULTS & DISCUSSION

3.1. Results of Students' Speaking Difficulties

Based on the data result of observation and questionnaire, the students' speaking difficulties has been identified as follow: Observation result showed that most of the students obtain difficulty in pronouncing English word. They often made a mistake of English pronunciation in their speaking performance. students also face other problems in speaking such as, less of vocabulary, less of fluency, ungrammatical structure, nervous and lack of self-confidence. Below is the observation checklist data from thirteen (13) students.

Table 1. The result of students' observation Checklist

No.	Respondents	Vocabulary	Pronunciation	Fluency	Total
1.	N.P.R.M	3	3	4	67
2.	F.A	3	3	3	60
3.	N.B	3	3	4	67
4.	M.A	3	2	3	53
5.	M.F	3	1	3	47
6.	N.G.B	3	3	3	60
7.	A.A.S.F	3	3	3	60



8.	M.I.P	4	3	4	73
9.	N.W.I.M	3	3	2	53
10.	J.S.W	1	2	2	33
11.	V.Y	1	2	2	33
12.	G.I.M	2	1	2	33
13.	N.K.A	1	1	2	27

The result of students' observation in speaking showed that students still have difficulties in speaking English. There are five students have lowest score in poor level of their speaking ability. There are two students have poor to average level of their speaking ability. The last, there are six students have average to good qualification level of their speaking and none have a good to excellent score.

The data result of questionnaire is supported the observation result. The percentage of 3.53% respondents choose English pronunciation as the first problem that students face in speaking performance. The second difficulty is lack of vocabulary the percentage is 3.46% and the level of problem is moderate. The third is about English grammar with the percentage is 3.07%. The fourth is translation from Indonesia to English the percentage is 3.07% and the last difficulty encountered the students was lack of confidence with the same percentage that is 3.07%.

Table 2. The results of student's questionnaire

No.	Statement	Knowledge Level					Level of Problem	Agreement	Percentage %
		SL	S	A	GT	SP			
1.	I am able to speak English	1	1	1	4	4	Low	Disagree	3.53%
2.	I find difficult to speaking English because of my/our oral Repetition	1	4	6	1	-	High	Agree	4.52%
3.	It becomes English pronunciation I am speaking English. I find it difficult because my mouth.	1	-	2	3	2	Low	Disagree	2.53%
4.	I find difficult to speaking English because lack of vocabulary	2	2	4	2	-	Moderate	Uncertain	3.46%
5.	I find difficult to speaking English because of my limited in understanding grammar	1	2	2	2	1	Moderate	Uncertain	3.07%
6.	Explain from the lesson I receive translate from Indonesian to English before I speak English	1	4	4	2	1	Moderate	Uncertain	3.07%
7.	I am afraid that people will laugh at me if I make mistakes while speaking English	2	1	2	4	4	Low	Disagree	2.53%
8.	I lose my self-confidence when I make mistakes in speaking English	2	2	2	3	2	Moderate	Uncertain	2.53%
9.	My English teacher does not speak English in the class	-	-	1	2	13	Very Low	Disagree	2.53%
10.	My English teacher does not encourage me to speak English	-	-	-	3	13	Very Low	Disagree	1.53%
11.	My teacher does not encourage me to support activities in speaking	1	-	4	4	4	Low	Disagree	2.53%



12.	I like English, but I have lack of confidence when I speak	2	3	3	4	1	Moderate	Uncertain	3.07%
13.	I am shy to practice speaking with my smart friend because I am afraid that they will laugh at me.	-	2	1	6	4	Moderate	Uncertain	2.53%
14.	I am shy to speak English in front of my classmates.	-	1	3	3	6	Low	Disagree	1.92%
15.	I hardly ever speak English with my teachers	-	1	3	3	4	Low	Disagree	2.01%
16.	I hardly ever speak English with my classmates	1	3	2	4	5	Moderate	Uncertain	2.61%

The percentage on statements above showed that English pronunciation was the first difficulty that encountered by the students in speaking English. The respondents agreed that pronunciation was the most difficulty that students faced in learning speaking.

3.2. Result of Students' Learning Styles

The result of students' questionnaires related to students' learning style as explained below: There were three kinds of students learning styles that has been identified by researchers. The first is kinesthetic learning style which selected by 7 students (50%). The second is Auditory learning styles which identified 4 students (35%) and the third is visual learning style which identified 2 students (15%). The result can be seen in the table below:

Table 2. The Scores Qualification of Students Learning Style

Learning styles	Respondents	Percentages %
Kinesthetic	7	50%
Auditory	4	35%
Visual	2	15%

3.3. Discussion

This study is aimed at finding the students' speaking difficulties and identifying students learning style in learning English. During this research, the researchers noticed that almost of students could not speak English well. There were some reasons or difficulties to make them difficult to speak English. Actually, they knew how to make themselves good at speaking. They knew the strategies but the question was whether the students applied those strategies. These are the reasons why the students were difficult in speaking English.

3.4. Students' difficulties in speaking performance

Pronunciation

Students' speaking difficulties occurred in students' pronunciation as the highest percentage (3.53%). It means that students frequent do errors in pronouncing words and sentences but it can be understood dealing with unfamiliar word or terminology. Their accent is intelligible though often quite faulty. They made errors never interfere with understanding and rarely disturb the native speaker, and sometimes their accent may be obviously unclear.

Vocabulary

Some students understand and participate in speaking performance and short conversation within the



range of their experience with a high degree of precision of vocabulary. Some still lack of vocabulary inadequate to express their experience and daily life activities. Their speaking vocabulary is sufficient to express simply with some circumlocutions. Students able to speak the language with sufficient vocabulary to participate effectively in most formal and informal conversations on practical, social and professional topics.

Fluency

Students able to use the language fluently on perform speaking in front of the class although the pronunciation quite in problem. They can participate in some short conversation within the range of this experience with a high degree of fluency. Hesitation to speak when certain words are not familiar for them still recognized, and the un-confidence with what they speak also existed.

Questionnaires data reported that pronunciation still become obstacles in speaking practice. They lack of vocabulary, problem in English grammar, difficult to translation from Indonesia into English. Another factor that recognized were students lack of confidence to perform, hardly to speak English with classmates and with teacher, shy to practice English with friends, do not want to continue speaking when someone laughing.

The issues of students speaking difficulties may support the previous research from Seligson (1997), Megawati & Mandarani (2016) that students' speaking difficulties include linguistic and non-linguistic problems. Linguistic problems include lack of vocabulary, pronunciation, grammar knowledge, while non-linguistic problems include inhibition, nothing to say, uneven participants, mother tongue disorders, speech disorders, anxiety, shyness, lack of confidence and low motivation.

Students' Learning Style

Recognizing students' learning style may contributed to motivate their learning process. Based on data questionnaire, it has been identified some learning style from students at ETC English course.

Kinesthetic

The data showed that seven (7) students (50%) agree that kinesthetic is appropriate style to learn English speaking. Students like to study language by doing and practicing such making Role-Play. They prefer to learn best in class when participate in related activities. It is approved when speaking practice, students were snatched to be first performance.

Auditory

Four (4) students (35%) choose auditory learning style because they tended to learn by hearing and listening to the music, like to have discussion and more understand on teachers' explanation. Most of the students in these types of learning, like listening English songs thus, making more comfortable in studying English by listening songs.

Visual

Two (2) students (15 %) like studying by seeing English videos such film, reading a book, reading magazine to understand the subject. Those finding showed that students tended to learn in active way, they are motivated in class game design, students like lots of hands-on movement and enjoy working. They love to learn through music or song and like to watch video or film. This evidence is supported previous research by Reid (1995) has developed learning style model based on how students learn best using their perceptions: visual, auditory, kinesthetic and tactile preferences and also two social aspects of learning: group and individual preferences. Thus, in this learning style, researcher only focused on three learning style such kinesthetic, auditory and visual.

4. CONCLUSION

Learning speaking need a lot of communication practices in class especially in English courses. Students needed to practice their pronunciation, mastery vocabulary, speaking fluently, and learn grammatical features for good English communication. By practicing speaking regularly, speaking obstacle



such fear, shy, un-confidence will easily be overcome. Recognizing students' learning style, will help teacher to attain their learning goals for students. Teacher will design model, method and strategy to meet the students' need.

5. ACKNOWLEDGMENTS

We grateful thank to the committee who held the conference, so the authors can have opportunity to express their research about speaking difficulties encountered by English course. We also thank to our colleagues from University of Negeri Makassar who provided insight and expertise that greatly assisted the research. The last we thank to the participants, who give their time and effort to us.

REFERENCES

- Aprianoto & Haerazi. (2019). Development and Assessment of an Interculture-based Instrument Model in the Teaching of Speaking Skills. *Universal Journal of Educational Research*, 7(12): 2796-2805.
- Bahrani, T, & Soltani, R. (2008). How to Teach Speaking Skill? *Journal of Education and Practice*, 3(2), 25-29.
- Haerazi & Irawan, A. (2020). The Effectiveness of ECOLA Technique to Improve Reading Comprehension in Relation to Motivation and Self-Efficiency. *International Journal of Emerging Technologies in Learning*, 15(1), 61-76.
- Hasan, A. S. (2000). Learners' perceptions of listening comprehension problems. *Language Culture and Curriculum*, 13(2), 137-153.
- Heriansyah, H. (2012). Speaking problems faced by the English department students of Syiah Kuala University. *Lingua Didaktika: Jurnal Bahasa dan Pembelajaran Bahasa*, 6(1), 28-35.
- Inayah & Lisdawati. (2017). Exploring Students' Difficulties in Speaking English and Their Attitude In Speaking English. *Acuity: Journal of English Language Pedagogy, Literature and Culture*, 2(1), 12-23.
- Lail, H. (2019). The effectiveness of using English movie with English subtitles in teaching vocabulary at the eighth-year students of SMPN 1 Selong in the academic year of 2018/2019. *JOLLT Journal of Languages and Language Teaching*, 6(2), 100-107.
- Likert, R. (1932). *A Technique of Measurement of Attitudes*. New York: New York University
- Megawati, F., Mandarani, V. (2016). Speaking Problems in English Communication. The First ELTiC Conference. Universitas Muhammadiyah Purworejo.
- Nakhalah, A. (2016). Problems and Difficulties of Speaking that Encounter English Language Students at Al Quds Open University. *International Journal of Humanities and Social Science Invention*, 5(12), 96-101.
- Paakki, H. (2013). *Difficulties in Speaking English and Perceptions of Accents: A Comparative Study of Finnish and Japanese Adult Learners of English*. Unpublished Master's Thesis, University of Eastern Finland.
- Reid, J. (1995). *Learning Styles in the ESL/EFL Classroom*. Boston: Heinle & Heinle.
- Rifai, M. (2019). *Kesulitan Siswa dalam Berbicara Bahasa Inggris*. Tesis. Program Pascasarjana IAIN Tulungagung.
- Seligson, Paul. 1997. *Helping Students to Speak*. London: Published by Richmond Publishing.
- Sharp, A. (2004). Language learning and awareness of personality type in Chinese settings. Retrieved from <http://www.asian-efl-journal.com>
- Stanford, P. (2003). Multiple intelligence for every classroom. *Intervention in school and clinic*, 39(2), 80-85.





THE MEANING OF LEARNING IN VIRTUAL CLASSROOMS: STUDY OF THE UTILIZATION OF DRILL MODELS AND PRACTICES IN SDIK NURUL QURAN

Badratun Nafis^{1*}, Septian Fatianda², Fitriani³, Monadia Liiman⁴, Syarifah Yanti Astryana⁵

^{1,2,3,4,5}Universitas Serambi Mekkah, Banda Aceh, Indonesia

*nafisnafisa0505@gmail.com

ABSTRACT

In this research, the problem is that there are still teachers and students who do not understand ICT while the facilities in the school already support to use of the drill and practice model, in addition, the drill and practice model is not suitable to be applied in all subjects. The drill and practice learning model are one of the learning models that use ICT to train students' skills in applying the concepts, knowledge, and skills that students have through speed in solving problems and providing hands-on training and experience to students. The purpose of this research is to know the utilization of drill and practice models so that learners are more meaningful improve the effectiveness of student learning during online learning and know the use of ICT to students with teachers in using drill and practice models. This type of research uses a qualitative approach with a case study research method and data analysis technique through observation and interview of SDIK Nurul Quran teacher. The results showed that SDIK Nurul Quran has used drill and practice models in the learning process, and facilities in schools strongly support the application of drill and practice models using Information and Communication Technology. Based on the results of this drill and practice model research can improve the effectiveness of student learning and learning feels more meaningful during online learning.

Keywords: *Drill and practice model, Learning, Meaningfulness, Online learning, Information and Communication Technology.*

1. INTRODUCTION

In the midst of the current pandemic online learning is one of the policies taken so that the teaching and learning process must be implemented from home through online or distance learning so that students get the right to learn. Thus the development of student learning is very dependent on the process of teaching and learning activities delivered by educators / teachers (Nurhayati, 2013). The development of student learning at home during the current pandemic tends to be different from the development of learning in schools so teachers who act as facilitators must have various innovations and models in conveying learning and providing motivation for students in carrying out online learning activities so that learning goals are achieved (Sudjana, 2017).

Online learning in elementary can be seen today educators still do not use the model when online learning so learners are still less effective which affects student learning outcomes. The learning model is a way to present information to convey learning goals. Drill and practice model as a basis for learning a scientific field. After a deeper review, this drill and practice model is still rarely studied and rarely used in the learning process in school, only a few schools that have used this model even though there are still schools that know the steps of the drill and practice learning model. This drill and practice learning model is one of the learning models that use Information and Communication Technology to train students to have skills and apply a concept knowledge, rules, or procedures learned so that learning feels more meaningful (Munir, 2012).

Meaningful learning is fun learning that has the advantage of finding and getting information in its entirety to improve students' abilities. Meaningful learning is characterized by the relationship between new aspects, concepts, information, or situations with relevant components in the cognitive structure of the student (Putri, 2015). The learning process is not just memorizing concepts but is an activity of connecting concepts to produce a complete understanding so that the concepts learned will be well understood and not easily forgotten. For meaningful learning to occur, teachers must always try to know and explore the concepts possessed by students



and combine them with new knowledge that will be taught (Rusman, 2013). So, learning will be more meaningful if the child experiences directly in everyday life and connects with what has been learned.

This drill and practice model uses repeated exercises that help students smooth out and remember a concept until it is completed. This model is suitable for use in calculation learning materials, foreign languages, and improvements in the mastery of newly acquired vocabulary (Alessi, & Tropllip, 2011). The form of interaction is advanced in the form of feedback or feedback for every student who does the problem correctly. The goal of the drill and practice model is to gain students' skills in remembering systematically with repetitive teaching techniques, knowing the skills students have through speed in solving problems, and being able to provide students with hands-on experience (Mutia, 2019). The purpose of this study is to find out the effectiveness of the drill and practice model and the online learning process in the pandemic era.

Online learning is one of the distance learning solutions when social distancing during the current pandemic period. Online learning is a formal education organized by each school where students and teachers are in separate locations so they need systems and communication tools as a connecting medium for both to continue the learning process (Syarifudin, 2020).

Research conducted by Nurfaedah (2019) "Analysis of Utilization of Information and Communication Technology in the Learning Process at SMK Negeri Se-Kota Makassar". Nurfaedah's research results showed that the ability possessed by teachers in the utilization of ICT at the time of learning in SMK Negeri in Makassar city is very good while the ability of students in the criteria is very good so the utilization of ICT in the learning process runs smoothly without obstacles based on the results of research observations (Nurfaedah, 2019). The difference with this study is to find out whether learning feels more meaningful in virtual classes by benefiting the drill and practice model in SDIK Nurul Quran in the learning process.

Research conducted by Heriyanto (2020) "Utilization of ICT in Improving blended learning model of Teachers of Buddhist High School and Vocational Education in Tangerang". The results of Heriyanto's research showed that the utilization of ICT in improving the blended learning model of high school and vocational school Buddhist education teachers in Tangerang consists of the utilization of social networks, the use of internet technology, the use of email, and making media based on interactive multimedia learning (Heriyanto, 2020). The disparity between Heriyanto's research and this study lies in both the model or topic employed to gauge ICT utilization in learning, as well as the resulting findings. In the author's investigation, it is revealed that despite the presence of supportive ICT facilities within schools, there persists a notable proportion of teachers and students who lack a comprehensive understanding of ICT. Moreover, the utilization of the drill and practice model, while feasible within certain contexts, proves unsuitable for application across all subjects. Notably, the demographics of the study participants also vary, with Heriyanto focusing on high school students, while this study centers on elementary school children. Consequently, these discrepancies underscore the substantial differences between Heriyanto's research and the present study.

Research conducted by Rahman et al. (2018) "Development of web-based learning media using drill and practice model". The results of the study reveal that the web-based learning media drill and practice model meets the criteria of completion and practicality so that it is suitable for use in the learning process. This web media development must pay attention to the needs of teachers and learners and media design must be made as attractive as possible, so that it can be accessed easily by many people through Android. The difference with the research conducted by the author is to find out whether learning feels more meaningful in virtual classes by benefiting the drill and practice model in SDIK Nurul Quran in the learning process so that it affects the achievements obtained in school using drill and practice models.

Research conducted by Sari et al. (2019) "Drill And Practice As An Alternative Learning Method For Manufacturing Accounting Practicum Subjects In Vocational High Schools" The results of this research drill and practice learning method can be recommended as an alternative learning method for manufacturing accounting practicum subjects because this method focuses on exercises that are very suitable with the material that is There is in school so that it can improve the ability of students in training and remembering them in subjects. The



difference with the research conducted by the author is to find out whether learning using drill and practice models feels more meaningful in virtual classrooms by benefiting Information and Communication Technology at SDIK Nurul Quran in the learning process to foster ability for students in the learning process.

Based on the above research, it can be concluded that the drill and practice model show that the utilization of Information and Communication Technology can improve students' ability in the learning process with ICT facilities that support student learning such as computers/laptops, internet networks, and media tools used in learning both visual media and audio media.

Based on the results of research observations conducted at SDIK Nurul Quran researchers found there are still teachers and students who do not understand Information and Communication Technology while the facilities in the school itself are already supportive, besides this drill and practice model is not suitable to be applied in all subjects because this model uses exercises and then there is application at the end of learning, This model is more relevant applied to calculating subjects (mathematics) and foreign languages such as Arabic and English. This model if continuously given exercise, students tend to be bored and lazy to learn. Based on the description above, researchers want to reveal a deeper question about what is learning more meaningful by benefiting the drill and practice model in virtual learning during this pandemic. Then the researchers attached this title with the theme "The Meaning of Learning in Virtual Classrooms: Study of Utilization of Drill Models and Practices in SDIK Nurul Quran".

2. METHODS

The research method the authors use is a case study using a qualitative approach. Qualitative research leads to a detailed description of the conditions and processes, that relate to the subject matter found in the research objective (Supoto, 2006). Case study research is research that focuses on some cases in detail by digging data in depth to obtain various sources of information that want to be researched to find the necessary data (Creswell, 2015). In this study, the subject of research was the teacher of SDIK Nurul Quran which numbered 5 people. The sampling technique used by researchers is purposive sampling. The data instruments used in this study are observations and interviews.

This case study research technique uses observation, and in-depth interviews with teachers about models used to support student learning in virtual grades (Meleong, 2014). The researchers conducted the data using the Spradley Technique. Information obtained from the results of research of SDIK Nurul Quran teacher then is described based on this research problem. This research focused on the application of the drill and practice model in learning, conformity of drill and practice model in learning, whether school facilities support to implementation drill and practice model in learning, how teachers can apply drill and practice models, and Supporting factors and inhibiting its implementation.

3. RESULTS & DISCUSSION

The drill and practice model is a mode of learning by training students on the subject matter that has been given, through the drill and practice model found certain habits in the form of exercises. With continuous exercise, embedded and then over time become a habit (Sutrisno, 2012). In addition to instilling habits, this model can also increase speed, determination, and perfection in doing things, and can also be used as a way to repeat the exercise material that has been delivered to increase speed (Rusman, 2012).

This model provides a more specific or real and meaningful learning experience by creating an imitation of the experience that approaches the actual atmosphere. The benefits of the drill and practice model are that it can provide feedback to students, create student learning motivation so that learning is more meaningful, Students less time, and teacher time is also more efficient (saving teacher time) (Roblyer, 2017).

The steps in learning the exercise model are as follows: 1.) Introduction/introduction. 2.) Present the problem in the form of a training problem. 3.) Students do exercises. 4.) The teacher records the student's appearance, gives evaluations, and provides feedback. 5.) If the student's answer is correct, the teacher will ask the next question, if the student's answer is wrong, the teacher will provide facilities for retraining, and a complete exercise can be given at the end of the question. 6.) Cover (Djamal, 2011).



Analysis of data from the results of this study with interviews from several teachers who use drill and practice learning models, namely:

1. Application of drill and practice models in learning

Based on the results of interviews with several teachers in schools, all teachers have applied the drill and practice model at several meetings during the learning process. The facilities in the school are very supportive to implementing the drill and practice model by using Information and Communication Technology such as laptops/computers, books, internet, audio and visual media, InFocus, and so on. However, the drill and practice model is not suitable for all subjects, this model is more relevant for mathematics and foreign language subjects (English and Arabic) because the learning is by providing exercises and after that, there is application or practice, because the learning is essentially from the results of learning concepts. Mastery of mathematical concepts and foreign languages requires practice, skill, and repetition to increase the effectiveness of students in such learning (Susilowati, 2013).

2. Suitability of drill and practice models in delivering learning

Based on the results of teacher interviews, the drill and practice model is suitable for the delivery of learning because by using this learning model students practice more, indirectly students are faster to receive a lesson. Plus, they directly do their exercises, so that they can hone students' knowledge and skills and easy to practice in everyday life. The purpose of this learning model is to provide a more concrete learning experience through the provision of problem exercises aimed at testing students' performance and abilities through the speed of solving the problems that have been given (Kurniawan, 2015). The use of information and communication technology in subjects can make it easier for teachers and students to convey the desired learning goals.

3. Improve the effectiveness of student learning by using drill and practice models

Based on the results of the interview, applying the drill and practice model can increase the effectiveness of student learning, because with this model students are required to practice first, then practice directly in the field so that this learning model feels more meaningful and effective.

Effectiveness in learning can be measured through the success of a process of interaction between students and between students and teachers in educational situations to achieve the goals of learning (Masruri, 2017). Effectiveness in learning can be seen from the activities carried out by students during learning, student response to learning, and mastery of concepts that students have during the learning process so that learning feels more meaningful (Rohmawati, 2015).

4. School facilities that support the implementation of drill and practice model

Based on the results of the interview, the facilities in the school already support the application of drill and practice models in learning, using Information and Communication Technology such as laptops/computers, internet networks, InFocus, audio and visual media, and others. Teachers who act as facilitators must have various innovations in delivering learning and providing motivation for students to carry out online learning activities to achieve the expected results in learning (Sudjana, 2017).

5. The Ability of teachers to apply drill and practice models

Based on the results of the interview, the teacher's ability to apply the drill and practice model in the learning process can be seen from teachers who use drill and practice model steps in learning. Start the preliminary stage by starting the implementation steps provided with continuous exercises with learning materials until students understand and get used to ending by motivating the learning spirit for students and providing feedback (Padmanthara, 2012).

The drill and practice model uses practice repeatedly so that it helps students smooth and remember a concept until it is completed. This model is suitable for learning count materials, foreign languages, and improvements in the mastery of new vocabulary (Deni, 2013).

6. Supporting factors and inhibiting the implementation of drill and practice learning models

Based on the results of the interview there are supporting factors and there are factors that hinder the implementation of the drill and practice model in schools, the supporting factor of the drill and practice learning model is to create media that can be used in the learning process, the availability of infrastructure in schools such



as internet networks, laptops/computers, InFocus, and the availability of learning media both audio and media. Visual media to support the implementation of drill and practice models (Hamzah 2011, 9).

While the inhibiting factor of the drill and practice model is that not all teachers and students understand Information and Communication Technology (ICT), there are still some students and teachers who find it very difficult to follow the learning process by using the drill and practice model and when applying it, and if constantly given training students will tend to be bored and lazy to learn.

Based on the results of the analysis of interview and observation data in SDIK Nurul Quran, it can be known that the use of drill and practice models using ICT already uses drill and practice models and facilities in schools have supported to implementation of the model. This can be seen from the interviews of teachers in schools who have applied this model in the implementation of learning to increase effectiveness and meaningful in learning students. There is also the purpose of this drill and practice learning model is to hone students' skills and improve students' skills by learning to create a new atmosphere. And the lesson is more meaningful (Sagala, 2017).

The supporting factor in the implementation of the drill and practice learning model is to create media that can be used in the learning process and the existence of supporting facilities and infrastructure in schools such as wifi, computers, and audio media and visual media to support implementation with drill and practice models. While the inhibiting factor of the drill and practice model is that not all teachers and students understand Information and Communication Technology (ICT), there are still some students and teachers who find it very difficult to follow the learning process by using the drill and practice model and when applying it, and if constantly given training students will tend to be bored and lazy to learn.

Based on the above research, it can be concluded that the drill and practice model show that the utilization of Information and Communication Technology can improve students' ability in the learning process with ICT facilities that support student learning such as computers/laptops, internet networks, and media tools used in learning both visual media and audio media. Based on the results of the analysis of interview and observation data in SDIK Nurul Quran, it can be known that the use of drill and practice models using ICT already uses drill and practice models and facilities in schools have supported to implementation of the model. This can be seen from the interviews of teachers in schools who have applied this model in the implementation of learning to increase effectiveness and meaningful in student learning. The purpose of this drill and practice learning model is to hone students' skills and improve students' skills by learning to create a new atmosphere and more meaningful lessons.

4. CONCLUSION

The problem in this study is that not all teachers and students understand Information and Communication Technology (ICT), there are still some students and teachers who find it very difficult to follow the learning process using drill and practice models and when applying, and if constantly given training students will tend to be bored and lazy to learn. After the authors analyze the data, research using the drill and practice learning model can be used as one of the learning models that provide exercises to students so that they can hone students' skills and improve students' skills by learning to create a new atmosphere and learning becomes more meaningful. This can be seen from the interviews of teachers in schools who have applied this model in the implementation of learning to increase effectiveness and meaningful in student learning. Readiness of educators in the utilization of drill and practice models by using Information and Communication Technology in the learning process and the existence of supporting facilities and infrastructure in schools such as wifi, computers, and audio media and visual media to support implementation with drill and practice models to achieve the desired learning goals. For further research, the author suggested that researching on the development of media used drill and practice models to improve ICT in learning, especially during the 19th pandemic so that learning is more effective for teachers and students and not bored in learning. In this study, the limitations of the authors are the time and place of the study so they cannot compare the drill and practice model used in learning in one school with other schools given the current pandemic situation.



REFERENCES

- Rahman, A., Kaharuddin, and Yani, A. (2018). Pengembangan media pembelajaran berbasis web menggunakan model drill and practice. Thesis. Universitas Negeri Makassar.
- Alessi, S. M., & Tropplip, S. R. (2011). *Multimedia for Learning Methods and Development* 3rd. <http://digilib.stiem.ac.id:8080/jspui/bitstream/123456789/329/1/Pengembangan%20Media%20Pembelajaran.PDF>.
- Creswell, J. W. (2015). *Penelitian Kuantitatif & Desain Riset*. Yogyakarta: Pustaka Pelajar.
- Deni, D. (2013). "Teknologi Pembelajaran." Dalam . Bandung: PT. Remaja Rosdakarya.
- Djamal, M. A. (2011). "Tips Efektif Pemanfaatan Teknologi Informasi dan Komunikasi dalam Dunia Pendidikan." Dalam . Yogyakarta: Diva Press.
- Hamzah. (2011). *Teknologi Pembelajaran & Informasi Pembelajaran*. Jakarta: Bumi Aksara.
- Heriyanto. (2020). "Pemanfaatan TIK dalam Peningkatan model Blended Learning Guru Pendidikan Agama Budha SMA dan SMK di Tangerang." <https://files.osf.io/v1/resources/g9pmj/providers/osfstorage/5c6e242782a395001ac8ceeb?direct=&mode=render>.
- Kurniawan. (2015). "Pembelajaran Berbasis Teknologi Informasi dan Komunikasi." Dalam . Jakarta: Rajawali Pers.
- Masruri. (2017). "Analisis Efektifitas Program Nasional Pemberdayaan Masyarakat Mandiri Perkotaan." *Padang: Akademia Permata*. <https://journal.umy.ac.id/index.php/GPP/article/view/2995>.
- Meleong, L. (2014). *Metodologi Penelitian Kualitatif dan kuantitatif*. Bandung: PT Remaja Rosdakarya.
- Munir. (2012). *Multimedia Konsep & Aplikasi dalam Pendidikan*. Bandung: Alfabeta.
- Mutia. (2019). Pelaksanaan Standar Pengelolaan Pendidikan di Madrasah Tsanawiyah Negeri 2 Bandar Lampung. Thesis. Universitas Islam Negeri Raden Intan Lampung.
- Nurfaedah. (2019). "Analisis Pemanfaatan Teknologi Informasi dan Komunikasi dalam Proses Pembelajaran pada SMK Negeri Se-Kota Makassar." <http://eprints.unm.ac.id/13246/>.
- Nurhayati, Fitri. (2013). Efektifitas pembelajaran dengan metode drill and practice dan learning cycle 5E disertai media pembelajaran crossword puzzle terhadap prestasi belajar siswa pada materi pokok hidrokarbon kelas X semester genap SMA Negeri Kebakkramat Tahun Pelajaran 2012/2013. *Jurnal Pendidikan Kimia (JPK)* 2(3), 191-198.
- Padmanthara, S. (2004). Pembelajaran Berbantuan Komputer (PBK) dan Manfaat sebagai Media Pembelajaran. *Tekno*, 1, 15-22.
- Putri, A. C. (2015). Pengembangan media pembelajaran fisika berbasis web untuk meningkatkan adversty qoutient peserta didik. *Prosiding Seminar Nasional Fisika (E-Journal) SNF2015*, 4, 165-168.
- Roblyer, et al. (2017). *Integrating Educational Technology into Theaching*. New York: Person Education.
- Rohmawati, A. (2015). Efektivitas Pembelajaran. *Jurnal Pendidikan Usia Dini*, 9(1), 15-32.
- Rusman. (2012). *Pembelajaran Berbasis Teknologi Informasi Dan Komunikasi Mengembangkan Profesional Guru*. Jakarta: Rajawali Pers.
- Rusman. (2013). *Belajar dan Pembelajaran Berbasis Komputer Mengembangkan Profesionalisme Guru Abad 21*. Bandung: Alfabeta.
- Sagala, S. (2017). *Konsep dan Makna Pembelajaran*. Bandung: Alfabeta.
- Sudjana. (2017). *Penilaian Hasil Proses Belajar Mengajar*. Bandung: PT. Remaja Rosdakarya.
- Supoto. (2006). *Metodologi Penelitin Kualitatif*. Surakarta: UNS.



- Susilowati, et al. (2013). "Penggunaan Metode Pembelajaran Drill and Practice Sebagai Upaya Meningkatkan Presentasi Belajar." *Jupe UNS*, 1(3), 1-10.
- Sutrisno. (2012). Kreatif Mengembangkan Aktifitas Pembelajaran Berbasis TIK. Jakarta: Referensi.
- Syarifudin, A.S. (2020). Implementasi Pembelajaran Daring untuk Meningkatkan Mutu Pendidikan Sebagai Dampak Diterapkannya Social Distancing. *Metalingua: Jurnal Pendidikan Bahasa dan Sastra Indonesia*, 5(1), 31-34.
- Sari, V.F. Afriyenti, M. and Betavia, A.E. (2019). "Drill and Practice Sebagai Metode Pembelajaran Alternatif Untuk Mata Pelajaran Praktikum Akuntansi Manufaktur di Sekolah Menengah Kejuruan. *Wahana Riset Akuntansi*, 7(2), 1541-1550.



DEVELOPMENT STRATEGY FOR THE USE OF "GEO EXPLORER BLOGSPOT" BASED ON LOCAL WISDOM IN HIGH SCHOOL GEOGRAPHY LEARNING IN TOBA DISTRICT TO ENHANCE TEACHERS' TEACHING IMPROVISATION SKILLS TOWARDS SOCIETY 5.0 ERA

Weni Ayu Sunita Zandroto^{1*}, Yuniarto Mudjisusatyo², Arif Rahman³

^{1,2,3}Medan State University

*weniayuzandroto@gmail.com

ABSTRACT

This study examines the use of technology in the digitalization era of education towards Society 5.0 within the framework of local cultural wisdom in Geography Education subjects, which is expected to strengthen students' understanding of local wisdom to prepare them to face future challenges. This study aims to analyse the knowledge, understanding, and skills of teachers in using "Geo Explorer Blogspot". This type of research is descriptive quantitative conducted in the Geography Teachers Association of Toba District High Schools, North Sumatra, with a sample of 9 Geography subject teachers. Data collection used questionnaires and analysis was conducted using descriptive statistics. The results showed that 44% of teachers using Blogspot were in the category of underutilized by teachers in their teaching. However, as much as 56% understand well the use of Geo Explorer Blogspot. In addition, 44% of teachers also have good skills in operating and using features in Blogspot. 44% of teachers also realize that Geo Explorer Blogspot can improve student learning outcomes and motivation. However, teachers need to integrate more local wisdom in learning using the Geo Explorer Blogspot teaching media because there are still teachers who never raise Toba's local wisdom in Geography learning even though the related material is about local wisdom. Alternative strategies are recommended to improve the professional competence of Geography teachers in developing Geo Explorer Blogspot using the ADDIE training model.

Keywords: *Geo Explorer Blogspot, Local Wisdom, Teacher Professional Competence.*

1. INTRODUCTION

Educational digitalization is a revolutionary transformation in the education world that involves the integration of information and communication technology in all aspects of learning and teaching. In the current era of globalization and digital transformation, education has undergone significant development towards a society that is increasingly connected and technology-oriented, often referred to as Society 5.0. One important aspect of improving the quality of learning is the integration of technology into the learning process. One innovative technology to improve Geography learning at the High School level is "Geo Explorer Blogspot". This platform offers great potential to bring a more interactive, up-to-date, and relevant learning experience to the local context.

Toba District, North Sumatra, as one of the regions with rich cultural and local wisdom, has great potential to utilize technology such as "Geo Explorer Blogspot" in enhancing Geography learning in high schools. However, challenges in integrating local wisdom with technology in the learning process are still experienced by teachers hindered by several factors such as the lack of awareness to integrate local wisdom into the curriculum and limited access to technology, resulting in Geography subject learning being less relevant and impacting the lack of student interest. In responding to these challenges, the development of the use of "Geo Explorer Blogspot" based on local wisdom in Geography learning



becomes an alternative solution to improve the quality of Geography learning. The utilization of digital technology combined with the local wisdom of Toba District in a platform is expected to be an effective tool in improving students' understanding of Geography and strengthening their connection with the environment.

The perspective of Society 5.0 which facilitates technology and humanism to be integrated, drives teachers to play a more important role as creative and adaptive learning facilitators. Therefore, the development strategy of using "Geo Explorer Blogspot" is expected to enhance teachers' improvisation skills in presenting relevant lesson materials in the local context and preparing students to face an increasingly developing and complex future. The success of the learning process is influenced by several factors, such as teacher, student, media, and environment (Sanjaya, 2009). Learning media can also attract children's attention, motivate learning, and help students learn independently according to their abilities and interests (Azwandi, 2007). The position of media that has become an integral part of learning is greatly influenced by the teacher's ability to choose and design appropriate media. Teacher pedagogic competence as professionals is indicated by their creativity in utilizing learning resources to create learning media so that the material is more easily understood by students. Media has also been proven to optimize learning (Nurdyansyah & Andiek, 2015).

The role of media in learning is said to be very important because learning media can clarify the presentation of informational messages, thereby facilitating the learning process and improving learning outcomes including digital media such as Geo Explorer Blogspot (Hasanah and Nulhakim, 2015). The benefits of blogs for teachers are (1) Online storage space for teachers; (2) Becoming an online learning media; (3) proving the professionalism of teachers; and (4) Building online communication. Based on the usefulness opinions of blogspot in learning according to the experts above, it can be concluded that the advantages of online learning using blogspot are: (1) blogspot media in learning knows no time or can be accessed fully 24 hours; (2) economical, because there are free blogspot; (3) through blogspot, positive interaction can be established; (4) easy and fast as well as simple creation because the steps are easy (Panjaitan, 2013). Blog media has been confirmed to be effectively used as alternative learning media in schools because it can improve student achievement and motivation (Sartono, 2016).

"Geo Explorer Blogspot" as a learning media is a digital platform designed to present Geography education content with a web-based or blogspot-based approach. A blog is a web-based application, software, or software created by an individual (blogger or blog user) intentionally for certain purposes and reasons designed in such a way in the form of text, images, and videos that can be used to present learning material online.

2. METHOD

This quantitative descriptive study aims to analyse the knowledge, understanding, insight, and skills of teachers in using "Geo Explorer Blogspot" based on local wisdom by optimizing the utilization of blogspot technology as an alternative strategy to improve the quality of learning in Geography subjects in high schools. The research sample consisted of high school Geography teachers who are members of the Geography Teachers Association in Toba District, North Sumatra. Data collection used Likert scale questionnaires. Data were analysed using descriptive statistics (Sugiyono, 2009).

3. RESULTS AND DISCUSSION

3.1. *Profile of Usage, Understanding, and Skills of Teachers in Utilizing Geo Explorer Blogspot*

The results of data collection regarding the usage, understanding, and skills of teachers in utilizing Geo Explorer Blogspot are presented in Figure 1 to Figure 3 as follows:

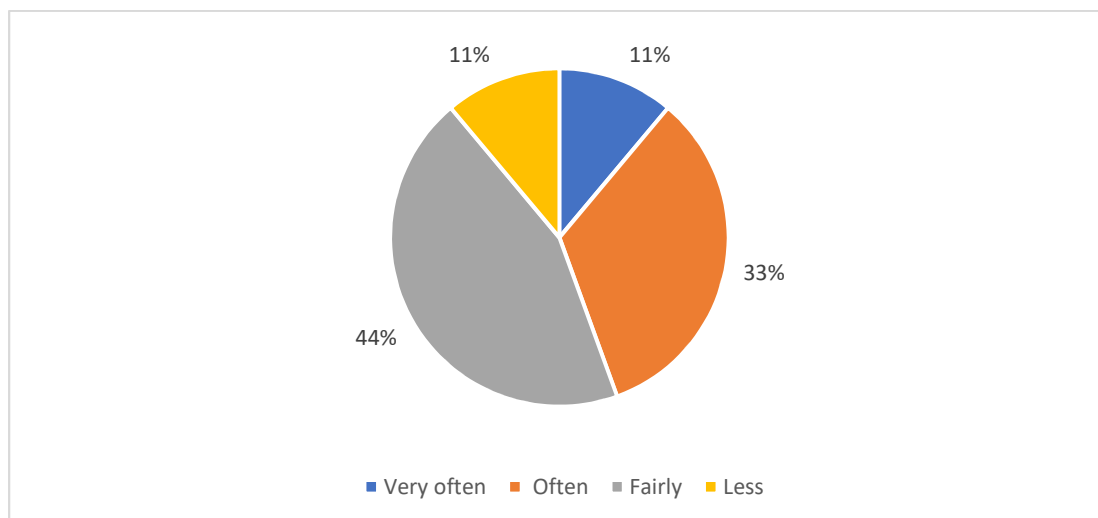


Figure 1. Profile of Geo Explorer Blogspot Usage

After conducting research by providing questionnaires to respondents, the results obtained that 11% of respondents answered that they rarely or never use blogspot in learning and 33% often use blogspot. However, 44% rarely use it with sufficient frequency. It means that teachers are at the stage of getting to know blogspot but rarely use it in learning. This is caused by several factors such as lack of time in teaching and learning activities and supporting media, as well as relatively insufficient mastery of teachers. Many teachers often use and have a good understanding of using geo explore blogspot. The highest value of respondents answered that they use blogspot well/often. It can be concluded that geo explore blogspot is favoured by teachers and students for use in learning, but further training is needed to explore more interesting features of blogspot.

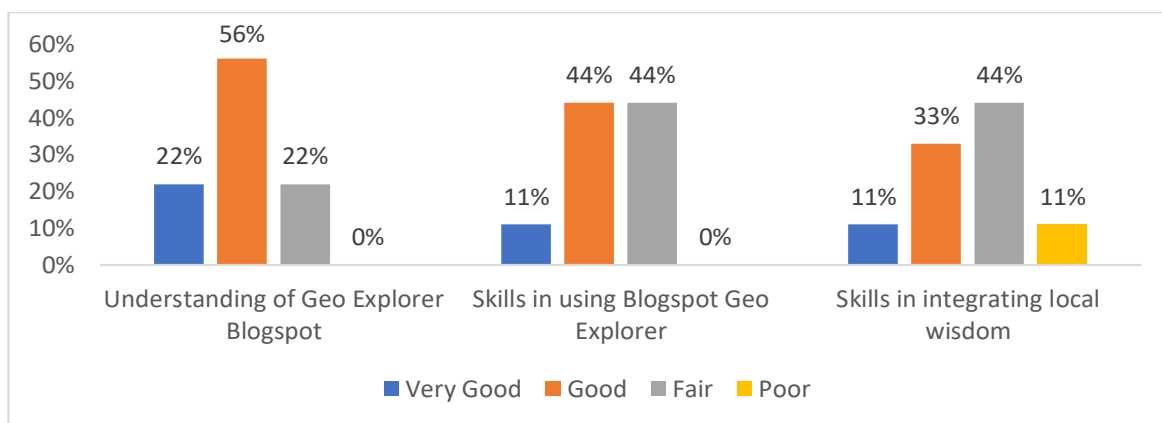


Figure 2. Understanding and Skills in using Geo Explorer Blogspot and Skills in integrating local wisdom



- Understanding

Based on the graph above, teachers have a good understanding of using Geo Explorer Blogspot. This is supported by the digital facilities they have such as laptops and wifi in schools. So, most teachers are familiar with and understand the use of blogspot. The majority of geography teachers' understanding is at a good level. It means that the introduction, use, and development of blogs have been mastered by teachers. However, their usage has not been optimized. Yet, much geographic information is presented in certain blogs, enriching the learning references for teachers and students.

Innovation: there is a need for training and sharing sessions among subject teacher's in-depth introduction regarding the features of blogspot.

- Skills

Geography teachers who have good skills in using Geo Explorer Blogspot usually excel in several key aspects. They can smoothly operate the platform, and utilize various features and tools available to design engaging and informative learning experiences for students. These teachers also have high creativity in integrating technology into their teaching, presenting geography material in an interesting and relevant way, thus promoting deeper and sustainable understanding in students. Additionally, they have a strong understanding of the geography material they teach, and can effectively link it to the content presented through Geo Explorer Blogspot, providing rich and meaningful context for student learning.

On the other hand, geography teachers who are less skilled in using Geo Explorer Blogspot may face several challenges. They may feel uncomfortable or unsure about operating the platform and tend to rely on conventional teaching methods rather than trying new approaches involving technology. A lack of understanding about the features and potential uses of Geo Explorer Blogspot can also limit their ability to create engaging and meaningful learning experiences for students. Moreover, difficulty in connecting the geography material taught with the content presented through the platform can result in a lack of cohesion in teaching and shallow understanding in students.

In addressing these differences, the approach applied to improve the skills of geography teachers in using Geo Explorer Blogspot needs to involve appropriate training, continuous technical support, and the creation of relevant and easily understandable resources. Additionally, efforts to encourage collaboration among teachers and sharing best practices can be an effective step to strengthen the use of this technology in the context of geography learning.

Innovation: An interesting innovation in the use of Geo Explorer Blogspot in geography teaching is the development of web-based GIS research projects by teachers and students. In this project, teachers guide students to conduct geographic research on specific topics, such as environmental changes, population migration, or distribution of natural resources. Students use Geo Explorer Blogspot to access relevant spatial data, such as maps, satellite images, and other layers of geographic information, to analyse and visualize the phenomena they are studying. Additionally, they can use the collaborative features of Geo Explorer Blogspot to discuss and share their findings with fellow students and teachers. By conducting this research project, students not only develop a deeper understanding of geography concepts but also enhance their practical skills in using GIS technology and stimulate critical thinking and team collaboration.

Interestingly, the skills in using Geo Explorer Blogspot are still balanced between good and less skilled categories. This is due to the lack of time for teachers to develop themselves by using blogspot. Similarly, in integrating local wisdom, most teachers are less skilled in integrating it. However, it can be concluded that on average, teachers can use blogspot well and often. Because thereby, it can increase student motivation and learning outcomes. Unfortunately, the use of blogspot by teachers still rarely integrates local wisdom into learning, which needs to be improved in the future. Most teachers agree and realize that the use of geo explorer blogspot can improve the quality of teaching and learning as well as student motivation and learning outcomes. However, teachers rarely associate it with local wisdom



material that should serve as a means of introducing local culture. This is because teachers tend to forget and are pressed for time in using blogspot. Teachers often use blogs in teaching. However, this indicator also has the highest standard deviation, which means there are still teachers who have never used blogspot or even do not know about blogspot.

- Integration of Local Wisdom in Geography Learning Using Geo Explorer Blogspot

Data shows that the integration of local wisdom in geography learning using Geo Explorer is often overlooked by most teachers. Studies conducted in various secondary schools indicate that only a few teachers consistently incorporate local wisdom content into their geography curriculum using platforms like Geo Explorer. This is reflected in the lack of representation of relevant local information, such as history, culture, or ecological diversity, in the learning materials presented through Geo Explorer. Teachers tend to focus more on general geographic concepts or topics deemed more "universal", without considering the importance of connecting learning to students' local contexts. As a result, students may feel less connected to the taught material and may struggle to understand the relevance of geography to their everyday lives. Special attention and further efforts are needed to help teachers recognize and integrate local wisdom into geography teaching using the Geo Explorer platform, thus enhancing students' understanding and engagement in their learning.

Innovation:

An example of an interesting innovation in using Geo Explorer Blogspot is the development of student research projects on environmental changes guided by local wisdom, involving local cultural experts in the learning process. In this project, teachers collaborate with the local community and local cultural experts to gain a deeper understanding of the local environment, including traditional knowledge about spatial planning, land use, or conservation practices. Students then use Geo Explorer Blogspot to publish data and to map and analyse the collected data, as well as to compare it with the traditional knowledge conveyed by cultural experts. Additionally, teachers can invite local cultural experts to give seminars or conduct visits to schools, where they can introduce local wisdom existing in the students' environment. Through this approach, students not only develop a better understanding of geography concepts but also appreciate the important role of local wisdom in preserving the environment and understanding the impact of globalization on their regions. This project enhances their awareness of environmental and cultural issues relevant to their community.

Geo Explorer Blogspot has great potential as a means to introduce the local wisdom culture of Toba in the Society 5.0 era. Through Geo Explorer Blogspot, users can access rich information about the history, culture, traditions, and practices of Toba's local wisdom, presented in multimedia content. Users can explore important locations, cultural sites, and natural heritage sites that have significant value for the Toba community, while also understanding their relationship with the current social, economic, and environmental conditions. By utilizing Geo Explorer Blogspot as an educational and cultural promotion tool, the Toba community can strengthen its cultural identity, introduce its heritage to a wider audience, and preserve its local wisdom amidst the currents of globalization and modernization. This will not only help promote cultural pluralism but also support the vision of Society 5.0, which emphasizes harmony between technological advancements and traditional cultural values.

- Uniqueness of Geography Lessons and Toba District

Some materials such as national culture, local wisdom, biosphere, natural resources, and Toba as a national tourism destination are excellent topics presented in the form of student project assignments in the form of blogs. It is noteworthy that Toba District is the venue for international events such as F1H20 which took place on March 1-3, 2024, recently. Therefore, the role of Geography Teachers is to document these events and present them in the form of blogs, which are a collection of geographic information about the Toba District. As a form of educational digitalization, Geo Explorer Blogspot has great potential as a means to introduce the local wisdom culture of Toba in the Society 5.0 era and to introduce



the cultural richness and local wisdom owned by the Toba community. Through Geo Explorer Blogspot, users can access rich information about the history, culture, traditions, and practices of Toba's local wisdom in the geography teacher's blogspot. Geo Explorer Blogspot can also serve as an educational and cultural promotion tool, enabling the Toba community to strengthen their cultural identity, introduce their heritage to a wider audience, and preserve their local wisdom amidst the currents of globalization and modernization.

3.2. Impact Study of Geo Explorer Blogspot Usage on Student Motivation and Learning Outcomes

Data shows that the use of Geo Explorer Blogspot significantly increases student motivation and learning outcomes in geography lessons (Figure 2). Studies conducted in several secondary schools indicate that students engaged in learning through Geo Explorer Blogspot tend to be more enthusiastic and actively participate in the learning process. They show greater interest in geography learning materials because this platform allows them to interact directly with geographic content through interactive maps, satellite images, and other geospatial resources. Not only that, but students' academic performance also significantly improves after implementing Geo Explorer Blogspot in geography learning. Research shows that the use of this technology helps students to understand geographic concepts more deeply and comprehensively. They can better connect theory with real-world contexts through the visual and interactive exploration provided by the platform. Additionally, students' ability to analyse geographic data and solve problems also improves as they are given opportunities to undertake challenging tasks through Geo Explorer Blogspot. Overall, the data confirms that the use of Geo Explorer Blogspot is effective in enhancing students' intrinsic motivation towards geography learning and their academic outcomes. This platform not only provides a more engaging and relevant learning experience for students but also facilitates a deeper and sustained understanding of complex geographic concepts.

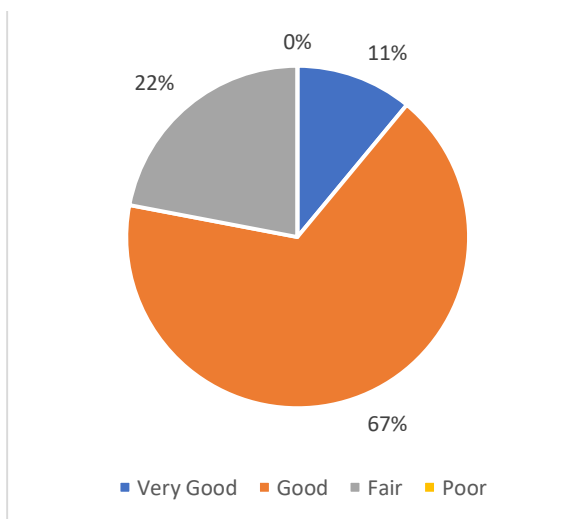


Figure 3. Impact of Geo Explorer Blogspot Usage on Student Motivation and Learning Outcomes

One interesting innovation in the use of Geo Explorer Blogspot is the development of collaborative projects among students focused on participatory mapping of the school environment. In this project, teachers collaborate with students to use Geo Explorer Blogspot to conduct surveys of the school environment, documenting various aspects such as air quality, land cover, or water flow patterns. Students use mobile devices or tablets to collect field data, which is then uploaded to Geo Explorer Blogspot for real-time mapping. Through this platform, students can access data collected by their peers, collaborate in analysing school environmental patterns and trends, and develop recommendations to



improve environmental sustainability. This project not only enables students to develop a deeper understanding of practical geographic concepts but also encourages active engagement, collaborative skills, and environmental awareness among students.

4. CONCLUSION AND RECOMENDATION

Most geography teachers have used and are familiar with Geo Explorer Blogspot in teaching. Furthermore, geography teachers also have good skills in using Blogspot and often use it. Unfortunately, teachers' skills are still minimal in exploring interesting features of using Blogspot. Additionally, teachers rarely, or even never, integrate local wisdom into teaching using Blogspot. However, Blogspot can be a medium to publish students' local wisdom. Therefore, teacher training is needed to explore the use of Blogspot. Moreover, most teachers agree that their experience using Blogspot can improve student motivation and learning outcomes. Further action from this research is needed, namely the creation of Geo Explorer Blogspot usage training, especially the introduction of interesting Blogspot features. The researcher proposes the ADDIE training method as an alternative to designing a Blogspot usage training.

The alternative improvement of teacher competence in creating, developing, and using Geo Explorer Blogspot can be done by applying the ADDIE training model, which stands for Analysis, Design, Development, Implementation, and Evaluation (Allen, 2006), as a guideline in designing effective and targeted training. Through this approach, it is hoped that teachers can be more prepared and skilled in integrating Geo Explorer Blogspot into their geography teaching, as well as utilizing the potential of the platform to enrich student learning experiences and strengthen the relationship between learning and their local context.

This is a framework commonly used in instructional development and learning design. Here's a brief explanation of each stage in the ADDIE framework:

- Analysis: The first stage in ADDIE is analysis. In this stage, an in-depth analysis of learning needs and student characteristics is necessary. The main goal is to identify learning problems to be solved and determine specific learning objectives.
- Design: After the analysis is done, the next step is to design the learning program. This involves developing a learning plan that includes organizing material, using appropriate learning methods, and developing instructional materials and resources.
- Development: The development stage involves creating learning materials according to the designed plan. This could include developing printed materials, video recordings, online modules, or developing learning software.
- Implementation: After the learning materials are developed, the next step is to implement them in the actual learning environment. This can be done through training sessions, regular classes, or through online learning platforms.
- Evaluation: The final stage in ADDIE is evaluation. In this stage, the effectiveness of the learning program is evaluated. Evaluation can be done through tests, questionnaires, observations, or other evaluation methods. The evaluation results are used to assess the success of the learning program and to identify areas for improvement.

The context of "Geo Explorer Blogspot" used as an alternative strategy to improve the quality of Geography learning in SMA at Toba district is carried out by integrating aspects of local wisdom. This platform can contain various types of content, such as articles, videos, images, and other interactive resources that support Geography learning. The use of this platform is expected to improve teachers' ability to improve teaching by utilizing content relevant to the local wisdom of Toba district, as well as preparing students to face changes in the Society 5.0 era. Examples of the types of content that may be available on the "Geo Explorer Blogspot" platform to support Geography learning in SMA at Toba district are as follows:



- (a) Articles: Articles on Geography topics relevant to Toba district, such as history, culture, geology, and ecology. These articles can provide an in-depth understanding of important aspects of the region.
- (b) Videos: Short videos explaining geographic concepts using examples from Toba district. Videos can include visits to important locations, interviews with experts, or documentation of environmental changes occurring in the region.
- (c) Images and Infographics: Images and infographics displaying important data and information about Kabupaten Toba, such as maps, diagrams, or graphs explaining relevant geographic or social phenomena.
- (d) Interactive Resources: Interactive resources, such as interactive maps, simulations, or educational games allow students to explore geographic concepts engagingly and interact with lesson materials.
- (e) Local Stories: Stories or narratives about daily life, culture, and traditions of the local community in Kabupaten Toba. These stories can help students understand the social and cultural context of where they live.
- (f) Assignments and Quizzes: Assignments or quizzes designed to test students' understanding of lesson materials and motivate them to actively engage in learning.
- (g) Discussion Forums: Discussion forums or comment sections where students can share opinions, ask questions, or discuss Geography topics covered on the platform.

By providing various types of content like this, "Geo Explorer Blogspot" can become a rich and diverse resource to support Geography learning in SMA Toba district with a local wisdom-based approach.

5. ACKNOWLEDGMENTS

Thank you to the Almighty God and the supervising lecturers who contributed to the making of this article. May the researcher be even more enthusiastic in future research.

REFERENCES

- Allen, W. C. (2006). Overview and Evolution of the ADDIE Training System. *Advances in Developing Human Resources*, 8(4), 430–441.
- Azwandi, Y. (2007). *Media Pembelajaran Anak Berkebutuhan Khusus*. Jakarta: Departemen Pendidikan Nasional Direktorat Jendral Pendidikan Tinggi Direktorat Ketenagaan.
- Hasanah, U., & Nulhakim, L. (2015). *Pengembangan media pembelajaran film animasi sebagai media pembelajaran konsep fotosintesis*. *Jurnal Penelitian dan Pembelajaran IPA* 1(1), 91–106.
- Nurdyansyah & Andiek, W. (2015). *Inovasi teknologi pembelajaran*. Sidoarjo: Nizamia Learning Center.
- Panjaitan. (2013). *Mengelola Blog Sebagai Media Pembelajaran Online*. Yogyakarta: Leutikaprio
- Sanjaya, W. (2009). *Kurikulum dan Pembelajaran: Teori dan Praktik Pengembangan Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Bandung: Kencana Prenada Media Group.
- Sartono. (2016). Pemanfaatan Blog Sebagai Media Pembelajaran Alternatif di Sekolah. *Transformatika*, 12(1), 120-134.
- Sugiyono. 2009. *Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R&D*. Alfabeta. Bandung.



PROCEEDINGS OF INTERNATIONAL CONFERENCE ON EDUCATION
TEACHER TRAINING & EDUCATION FACULTY
UNIVERSITAS SERAMBI MEKKAH
NO. ISSN 2987-4564



THE IMPORTANCE OF ETHNOMATHEMATICS IN EDUCATION: A SYSTEMATIC LITERATURE REVIEW

Muhammad Iqbal Nst^{1*}, Nanda Khairani Batubara²

^{1,2}Medan State University, Medan, Indonesia

*muhammadiqbalnst1299@gmail.com

ABSTRACT

Culture-based mathematics learning is one way to make mathematics learning meaningful and contextual which is closely related to society's culture. Ethnomathematics is his field of study. The goal of this field is to reveal the structure of analysis. Ethnomathematics can also be considered a course that teaches students how to understand, express, think about, and ultimately apply mathematical ideas, concepts, and procedures to situations related to their daily lives. For educators who develop an ethnomathematics-based educational approach, it is important to consider the problem concepts discussed above that can be found and developed in ethnomathematics-based problems. Ethnomathematics is an important approach to apply in learning. In various studies, it was found that ethnomathematics can increase positive feelings and increase students' motivation levels. achievement and retention of students.

Keywords: *Ethnomathematics, Education, Society's Culture, Literature Review.*

1. INTRODUCTION

In the 21st century, society is already using technology based on mathematics. But unfortunately, people only think about mathematics at school when studying mathematics. Even at school, this is a common thing, students feel unable to complete mathematics assignments. Finally, students hate mathematics and get trapped in it. But mathematics education must solve these problems. Mathematics education must increase understanding of the application of mathematics in a world where there has been a lot of technological progress.

Furthermore, the mathematical concepts that exist in human minds sometimes differ from the mathematics that exists in reality. This is in line with Hiebert & Carpenter, who found many differences between mathematics learning at school and mathematics in children's daily lives. Bishop emphasized that mathematics is a form of culture and has been integrated into all aspects of people's lives wherever they are (Zaenuri and Dwidayati, 2018).

Ethnomathematics is an approach where mathematics is explained using the culture that exists in a society. With this approach, mathematics can be understood more easily because mathematics is explained based on what happens in students' daily lives.

2. METHOD

2.1 Research Participants/Sample

This research was focused on providing readers with more knowledge about ethnomathematics in education in Indonesia. This is based on the lack of discussion about ethnomathematics in Indonesia.

2.2 Research Instrument

In this research, the author used several library materials related to the fundamentals of ethnomathematics, including research conducted by Gerdes and Barton.

2.3 Data Collection and Data Analysis



This research uses a systematic literature review method. Systematic literature review is a research method that identifies and evaluates findings on a research topic to answer previously determined questions (Kitchenham & Charters, 2007). The systematic literature review includes 3 stages, namely planning, conducting, and reporting. Planning, including preparing a systematic literature review protocol. At this stage, the researcher determines the research topic, namely ethnomathematics: Introduction to Education. Next, set the article search criteria. The article search criteria are based on sources such as the National Library or *Google Scholar* from the period 2003 to 2023. The keywords used are ethnomathematics and ethnomathematics in education. Conducting is an implementation of a systematic literature review. This stage begins with searching for articles based on the criteria that have been determined in the Planning stage. Article searches are carried out with the help of the application *Publish or Perish*. Next is article selection. The selected articles are articles that match the research topic. Reporting is the final stage of the research. This stage includes writing the results of the systematic literature review in written form according to a predetermined format.

2.4 Ethical Considerations

Ethnomathematics brings out cultural wisdom so that it can motivate students to learn mathematics.

2.5 Study Limitations

Research also has limitations in terms of the author's knowledge and experience in ethnomathematics including concepts, principles, and mathematical skills that exist in groups, nations, tribes, customs, or other groups.

3. RESULTS AND DISCUSSION

One of the worlds of students is culture which is the teacher's territory. One of the mathematics learning lessons that uses a culture-based approach in delivering mathematics learning is ethnomathematics. In ethnomathematics, it discusses how mathematics is taught using a learner-centered cultural perspective. Looking back historically we may see that ethnomathematics has been defined at different levels. Defined as the cultural anthropology of mathematics and mathematics education, it is a relatively new field of interest. Because the view of mathematics as "culture-free", as "a universal, essentially aprioristic form of knowledge" has been dominant, ethnomathematics emerged later than other ethnosciences (Gerdes, 1994). Ethnomathematics is a field of study. The object of this field is to reveal the structure of analysis. Ethnomathematics achieves this by investigating the mathematical activities of particular cultural groups, and hence their mathematical concepts (Barton, 1996). Ethnomathematics can also be considered as a course that teaches students how to understand, express, think about, and ultimately apply mathematical ideas, concepts, and procedures to situations related to their daily lives. Culture-based mathematics learning is one way that is felt to make mathematics learning meaningful and contextual which is closely related to the culture of society, where mathematics is studied and will be applied later.

3.1 Ethnomathematics and Philosophy

Ethnomathematicians must be able to discuss the possibility of the simultaneous existence of culturally different mathematics. The challenge for anyone attempting a philosophical basis for ethnomathematics is to ensure that there is an account of the way mathematics is structured, understood and communicated that is consistent with sociological and anthropological descriptions of how mathematics is deployed and used. Moreover, any explanation must explain how one mathematical culture became dominant and became highly developed compared to other mathematical cultures.

So, mathematics had to be explained in a new way: alternative philosophical positions had to be established – positions that had to be argued in conventional terms. Moreover, part of the task is to show why



previous philosophical positions are reasonable and firmly held. It is not enough to simply say that mathematics is culturally determined and continue to act as if this is the case simply because we believe so. We have to convince other people, especially mathematicians.

An important feature of realism that makes it unsuitable as a philosophical basis for understanding mathematical culture is the requirement of a universal, a priori basis for truth, namely a pre-existing mathematical world. It could be argued that it is not necessary for a cultural conception of mathematics that realism be rejected. It could be that mathematical objects are absolute, but can only be known through human abilities which depend on various factors, including culture. Therefore, the cultural view of mathematics is an expression of the inadequacy of human understanding of this ideal world.

However, the idea that cultural relativity in mathematics results from imperfections in culture does not help explain the problem that gave rise to ethnomathematics: namely, the failure of culture-based mathematics. That would allow us to say that some cultures "see" mathematics as more correct than others, and hegemony would continue.

It is suggested that a philosophy based on Wittgenstein can provide ethnomathematics with the position needed to describe mathematical objects correctly. The idea referred to here is the Wittgensteinian idea that we speak mathematics into existence (Barton, 1999).

For example, consider a circle. No one has ever seen or touched a circle; it is an ideal object. This prompted Plato to hypothesize about a world inhabited by such ideal objects, thus, there are circles. Wittgenstein argued that this is just a "way of talking": circles exist because – and only because – we talk about them. When we talk about them as if they were real objects then it makes sense to talk as if they had properties, but we must realize that this is just a convenient figure of speech - literally. When we don't talk about them, they don't exist. In languages where roundness is realized as an action, not as an object, circles do not exist.

Building a solid foundation for a conception of ethnomathematics gives us an exciting new direction to follow. This also encourages us to deepen our ethnomathematics concepts. This can be thought of in several ways. One way is to look at ethnomathematics investigations going on beneath the surface. The language examples above encourage us to look, not at different number words, but at the way they function in the language.

Similarly, with weaving patterns, it is interesting to analyze patterns attested in the arts and crafts of different cultures (and this may have some educational use although the author considers that to be an open question), but it is also important to examine the concept of symmetry used by the weavers – a concept that may be different from those we are familiar with.

Whether "below the surface" or "what if", I am sure of one thing: 'ethnomathematics research will continue to surprise us, and at the least expected times, of course. If we understand mathematics in a consistent relativist way, then we may be better able to "see" the hidden valleys between our mathematics'.

3.2 Ethnomathematics, Education, and Ideology

For educators to develop an ethnomathematics-based educational approach, it is important to consider the problem concepts discussed above so that ethnomathematics-based problems can be found and developed, thereby avoiding the use of pseudo-problems. their pedagogical program, as proposed by Freire: "The educational content for critical consciousness must be developed by seeking experiences with students that give meaning to their lives."

Learner ethnicity is a resource for mathematics teachers at all levels. This approach includes not only the cultural background of learners but also their cultural foreground as their life experiences and future hopes are taken into account (Presmeg, 1998).



A mechanical view of the dialogic educational process should be avoided; one should not expect an eleven-year-old boy or girl to develop a sophisticated understanding of the contradictions of political-economic systems. Children do develop an awareness of relationships in their world from their reflections on the way they play. Pedagogy with students as partners with the teacher does not mean that the educational process is value-free. The incorporation of socio-cultural aspects in mathematics education and the dialogical way of doing it each have a role to play Dialogue in which the teacher speaks through his ethnomathematics (usually developed in universities) and the participants learn to talk to them.

Pedagogy with students as partners with the teacher does not mean that the educational process is value-free. The incorporation of socio-cultural aspects in mathematics education and the dialogical way of doing it each have a role to play Dialogue in which the teacher speaks through his ethnomathematics (usually developed in universities) and the participants learn to talk to them.

3.3 The Importance of Ethnomathematics

Ethnomathematics is a form of approach that has many positive impacts on students. This can be seen in several studies. The following research shows the importance of ethnomathematics in learning.

In research conducted by Amit, Fried, & Abu-Naja (in Fouze, 2023), the findings show that participants consider this type of learning as a meaningful experience that is different from other learning methods, increasing their positive feelings towards other students and teachers and contributing to on the lively discourse between them and increase their motivation level. Studies show that knowledge based on belief and affiliation to a group leads to cultural coexistence and inner peace.

Other research reveals the impact of applying ethnomathematics in increasing understanding of arithmetic material. Students taught using an ethnomathematics approach have very good performance compared to students taught using a traditional approach. Analysis of existing teacher practices shows that the use of traditional lecture approaches is dominant in the teaching and learning of consumer arithmetic, which contributes to poor performance and leads to learner boredom. However, teachers appreciate the use of an ethnomathematics approach in teaching not only consumer arithmetic but also other mathematical topics because the approach keeps students motivated, actively involved, and interested in learning mathematical concepts. Teachers also reported that the ethnomathematics approach improved students' understanding and retention of arithmetic concepts. Therefore, it is recommended that mathematics teaching and learning be linked to the cultural background and experiences of learners through workshops for in-service teachers and mathematics methods training courses at teacher training institutions for pre-service teachers (Sunzuma, 2021).

Furthermore, in a study conducted in the Maldives, it was found that there were indications of success that could be associated with the ethnomathematics curriculum model, although whether this success could be achieved by all teachers and students was still an open question. Two contributing factors may be that the unit is new and thus interesting and stimulating, or that teachers and learners report what they consider to be appropriate responses to the research. However, the details of the responses show that an understanding of ethnomathematics and socio-cultural aspects of mathematics is beginning to emerge (Adam, 2004).

In (Achor, 2009), it was also found that students were affected. *Ethnomathematics Teaching Approach* (ETA) is superior in achievement and retention to those exposed to conventional teaching methods. Overall, ETA has proven to be the right choice in promoting meaningful learning at Locus. Therefore, it is recommended that mathematics teachers be trained in the use of ethnomathematics teaching approaches in their teaching.

In short, it is time for ethnomathematics to be integrated into every mathematics class. Ethnomathematics fits with constructivist theory which asks students to build understanding and knowledge through what they have



learned and experienced previously. Ethnomathematics has the potential to help students feel accepted, become more accepting of others, and even help in the fight against racism. While there are several issues that need to be addressed (namely, concerns about promoting primitivism or romanticizing foreign cultures), these can easily be overcome by educators who think critically and creatively about the material they share with students and how it is delivered. Bringing ethnomathematics into the classroom in the future has the potential to change the way students view themselves, each other, and their place in the world and students may even enjoy it (Brandt, 2014).

4. CONCLUSION

In understanding the culture of mathematics, it is necessary to apply alternative philosophical positions, which must be discussed consistently with sociological and anthropological descriptions of how mathematics is used in various cultures. The Wittgensteinian approach, which emphasizes that mathematical objects exist because of talk about them, can be used as a relevant philosophical basis for ethnomathematics. Ethnomathematics allows for deeper research and understanding of mathematical concepts and different cultures' understanding of mathematics. In an educational context, ethnomathematics can be used to develop a culture-based educational approach, taking into account the cultural background of students, and avoiding the use of pseudo-problems in educational programs. An effective mathematics education approach requires dialogue between teachers and students by incorporating socio-cultural aspects, without expecting students to develop sophisticated understanding mechanically. A mathematics education approach that involves dialogue between teachers and students can enable students to develop their understanding of mathematics through reflection on their life experiences and participation in meaningful learning. Ethnomathematics offers a different theoretical and practical basis for understanding mathematics in a cultural context, as well as for enriching mathematics education approaches by integrating social and cultural aspects, making students partners in the learning process, and avoiding mechanical approaches. This approach helps us understand how mathematics is accessed and used by various cultures and communities around the world.

REFERENCES

- Achor, E.E., Imoko, B.I., Uloko, E.S. (2009). Effect of ethnomathematics teaching approach on senior secondary students' achievement and retention in locus. *Educational Research and Review*, 4(8), 385-390.
- Adam, S. (2004). Ethnomathematical Ideas in the Curriculum. *Mathematics Education Research Journal*, 16(2), 49-68.
- Barton, B. (1999). Ethnomathematics and Philosophy. *ZDM Mathematics Education*, 31, 54-58.
- Barton, W.D. (1996). Ethnomathematics: Exploring Cultural Diversity in Mathematics. (Dissertation, The University of Auckland).
- Brandt, A., Chernoff, E.J. (2014). The Importance of Ethnomathematics in the Math Class. *Ohio Journal of School Mathematics*, 71, 31-36.
- Fouze, A.Q., Amit, M. (2023). The Importance of Ethnomathematics Education. *Creative Education*, 14(4), 729-740.
- Gerdes, P. (1994). Reflections on Ethnomathematics. *For the Learning of Mathematics*, 14(2), 19-22.
- Kitchenham, B. dan Charters, S. (2007). Guidelines for Performing Systematis Literature Review in Software Engineering. *Technical Report EBSE 2007-001*, Keele University and Durham University Joint Report.
- Presmeg N.C. (1998). Ethnomathematics In Teacher Education. *Journal of Mathematics Teacher Education*, 1, 317-339.



- Sunzuma, G., Zezekwa, N., Gwizangwe, I., Zinyeka, G. (2021). A Comparison of the Effectiveness of Ethnomathematics and Traditional Lecture Approaches in Teaching Consumer Arithmetic: Learners' Achievement and Teachers' Views. *Pedagogical Research*. 6(4), em0103(1-8).
- Zaenuri, and Dwidayati, N. (2018). Menggali Etnomatematika: Matematika sebagai Produk Budaya. *PRISMA: Prosiding Seminar Nasional Matematika*, 1, 471-476.



LITERATURE STUDY DESIGN AND TESTING OF TEACHING MATERIALS THROUGH INTEGRATED INQUIRY TRAINING ON THE LOCAL POTENTIAL MOLOKU KIE RAHA TO INCREASE STUDENTS' CHEMICAL LITERACY

Nur Asbirayani Limatahu^{1,*}, Arismunandar², Darman Manda³, Chumidach Roini⁴, Iqbal Limatahu⁵

^{1,2,3}makassar State University, Indonesia

^{4,5}khairun University, Indonesia

*nurlimatahu29@gmail.com

ABSTRACT

This research aims to obtain an overview of the design and testing of teaching materials through integrated inquiry training on the local potential of Moloku Kie Raha to increase students' chemical literacy. The type of research used is a literature review. The literature review is carried out to collect and extract the essence of previous research and analyze several expert overviews written in the text. Based on the results literature review know that many local potential-based or environment-based teaching materials have been presented in the classroom. Module teaching materials based on local wisdom are one learning resource that can increase students' scientific literacy. Chemical literacy abilities include four aspects namely knowledge, context, competency, and attitude. In this way, lecturers or educators can utilize local potential as a learning resource for further research and development.

Keywords: *Teaching materials, local potential, chemical literacy, literature review.*

1. INTRODUCTION

Education has an important role in improving students' abilities to face the challenges of changing times, in line with the very rapid development of science and technology (IPTEK). Likewise, LPTK (Institute for Educational Personnel Education) in Higher Education has the task of preparing prospective professional teachers, in order to develop the competencies of quality students. Competencies or abilities, including chemical literacy skills, can be developed in chemistry learning.

Chemical literacy is the ability to understand chemistry and apply chemistry in everyday life (Witte and Beers, 2003). Aspects of chemical literacy (OECD, 2016), namely knowledge (knowledge), context, competency and attitude. Based on the results of the 2015 PISA assessment (Al Idrus & Hulwati, 2022), the chemistry literacy scores of students in Indonesia are still low. In line with research results from Nurhidayati & Khaeruman (2017) of 71.5%, it shows that students' chemical literacy abilities in the material of substances and their changes are still in the medium category. The low chemical literacy skills of students in Indonesia are because some students still cannot explain chemical reactions that occur in nature and cannot even apply chemical concepts in everyday life.

In connection with the problem of chemical literacy skills, one solution for learning chemistry is the development of teaching materials that integrate the local potential of Moloku Kie Raha. This teaching material can play a role in facilitating students as prospective teachers to master chemical concepts, especially colloid material, and improve chemical literacy skills. Because lecturers are expected to be able to apply learning supported by integrated chemistry learning resources to everyday life students. Lecturers can also present the real world in the classroom to encourage students to make connections between the knowledge they have and apply it in everyday life so that chemistry learning objectives can be achieved through constructivism-based learning practices. Constructivist learning theory, namely the knowledge and experience, gained by students is the result of construction that has been carried out through the active involvement of students, both physically and mentally, to gain new knowledge and experience (Huitt & Dawson, 2011; Sumardi, *et al.*, 2020).



This teaching material is one way to improve learning in the classroom because it is designed as a learning resource whose activities are implemented through a learning model. The learning model used is an inquiry training learning model with the following syntax: confronting/facing the problem; collecting data to verify until problems arise and determine hypotheses; collecting data through experimental activities; processing data/ information, and analysis of the inquiry process Joyce, *et al.* (2011). The activities in the teaching materials implemented through inquiry exercises begin with problems/questions that require students to carry out investigations so that students can discover knowledge independently or in groups in learning and chemical literacy skills can be improved.

This is in line with research on the application of the inquiry training learning model Widodo & Nursanti (2013), which can improve student learning outcomes. Therefore, the literature study from this article aims to obtain an initial overview of the design and testing of teaching materials through integrated inquiry training on the local potential of Moloku Kie Raha to increase students' chemical literacy.

2. METHODS

The type of research used is a literature review. The literature review is a research methodology that aims to collect and extract the essence of previous research and analyze several expert overviews written in the text (Snyder, 2019). In line with Zed (2008), it explains that the literature study method is a series of activities related to methods of collecting library data, reading data, taking notes, and managing writing materials. Stages literature review which the author uses refers to Snyder (2019) namely 1) designing a review, 2) conducting a review, 3) analyzing, and 4) writing a review.

3. RESULTS & DISCUSSION

Based on a search for articles related to the design and testing of teaching materials through integrated inquiry training on the local potential of Moloku Kie Raha to increase students' chemical literacy, the following results were obtained:

- 1) Research by Riza, *et al.* (2020), resulted in the chemistry module that had been developed being declared valid by material experts (mean 85.30%) and media experts (mean 87.32%) and obtained a positive response from students which could be seen from the achievement of learning outcomes and his motivation. Thus, it can be concluded that the chemistry module based on local wisdom regarding acid and base solutions is suitable for use in learning.
- 2) Research by Permataningsih, *et al.* (2021), shows that from the results of validation by five experts to determine the validity of the module, the data obtained on the assessment aspects of content, presentation, language, graphics, and scientific literacy in the module received a validity value > 0.80 with a very valid category. The results of this research show that the module developed meets the validity criteria and the module's teaching materials can be used to support students' scientific literacy in schools.
- 3) The results of research by Siregar (2021), show that the chemistry learning module on material on the periodic system of elements based on literacy culture is suitable for use as teaching material. The increase in chemistry learning results from three meetings, the average pre-test score was 69 and after using the module the post-test results became 91.97., n-Gain the average is 0.81 in the high category.
- 4) The profile of student responses to the use of integrated science teaching materials regarding processing sugar cane as renewable energy obtained a result of 87.83%. Shows that using integrated science teaching materials can improve students' scientific attitudes and environmental awareness (Nuraini & Supeno, 2017).
- 5) Research Eralita & Setiawan (2022) obtained a result of 71.5%, showing that students' chemical literacy abilities in the material of substances and their changes are still in the medium category. With each aspect, the percentage obtained was: knowledge (72%), context (69%), competence (70%), and attitude (75%).



- 6) Development of biotechnology teaching materials based on local potential. It has been identified that there is a lot of local potential that can be utilized as a biotechnology learning resource to increase students' understanding and make their learning more meaningful (Nurhidayati, & Khaeruman, 2017).

4. CONCLUSION

Based on the results literature review, it is known that teaching materials based on local potential or environment-based ones to be presented in the classroom have been widely used. Module teaching materials based on local wisdom are one learning resource that can increase students' scientific literacy. Apart from that, the chemistry learning module on the periodic system of elements based on literacy culture as teaching material can improve learning outcomes. Chemical literacy abilities include four aspects namely knowledge, context, competency, and attitude.

5. ACKNOWLEDGMENTS

The author would like to thank all parties, the Makassar State University and Chemistry Education Study Program FKIP Khairun University, who have assisted in completing this research.

REFERENCES

- Huitt, W., & Dawson, C. (2011). Social Development: Why It Is Important and How to Impact It. In Educational Psychology Interactive. Valdosta, GA: Valdosta State University.
- Joyce, B., Weil, M., and Calhoun, E. (2011). Models of Teaching, Eighth Edition, Boston: Pearson Education, Inc.
- Nuraini, L., & Supeno. (2017). Profil Respon Mahasiswa Terhadap Penggunaan Bahan Ajar Ipa Terpadu Tentang Pengolahan Tebu Sebagai Energi Terbarukan. *Saintifika: Jurnal Ilmu Pendidikan MIPA dan MIPA*, 19(2), 64-73.
- Eralita, N. & Setiawan, Y.A. (2022). Studi Literasi Kimia Siswa Sekolah Menengah Kejuruan pada Materi Zat dan Perubahan. *Jurnal Eduscience*, 9(3), 792-801.
- Nurhidayati, S. & Khaeruman (2017). Pengembangan Bahan Ajar Bioteknologi Berbasis Potensi Lokal. *JUPE*, 2(2), 87-91.
- OECD (2016). Assessment and analytical framework: Science, reading, mathematics, and financial literacy. Paris: OECD Publishing.
- Permataningsih, I., Istyadi, M., & Hafizah, E. (2021). Pengembangan Bahan Ajar IPA SMP Topik Klasifikasi Materi dan Perubahannya Untuk Menunjang Literasi Sains. *Vidya Karya*, 36(1), 49-60.
- Al Idrus, S. W. & Hulwati, S. (2022). Science Literacy Skill of Chemistry Education Students on Waste Management Materials. *International Journal of Science Academic Research*, 3(9), 4409-4413.
- Riza, M., Firmansyah R. A., Zammi, M., & Djuniadi D. (2020). Pengembangan Modul Kimia Berbasis Kearifan Lokal Kota Semarang pada Materi Larutan Asam dan Basa. *Jurnal Pendidikan IPA Veteran*, 4(1), 25-38.
- Snyder, H. (2019). Literature Review as a Research Methodology: An Overview and Guidelines. *Journal of Business Research*, 104, 333-339.
- Sumardi, L., Rohman, A., & Wahyudiati, D. (2020). Does the Teaching and Learning Process in Primary Schools Correspond to the Characteristics of the 21st Century Learning. *International Journal of Instruction*, 13(3), 357-370.



- Siregar, TS. (2021). Pengembangan Modul Kimia Pada Materi Sistem Periodik Unsur Berbasis Budaya Literasi. *Jurnal Ilmu Pendidikan Indonesia*. 9(1), 27-33.
- Witte, D. & Beers, K. (2003). Testing of chemical literacy (chemistry in context in the Dutch national examination), *Chem. Educ. Int.*, 4(1), 1–3.
- Widodo & Nursanti, D. (2013). Penerapan Model Pembelajaran Latihan Inkuiri untuk Meningkatkan Keaktifan Lisan dan Hasil Belajar dalam Pembelajaran Fisika Pada Siswa Kelas VII SMPN 2 Pandak Bantul. *Indonesian Journal of Applied Physics*, 3(2), 150–157.
- Zed, Mestika. (2008). Metode Penelitian Kepustakaan. Jakarta: Yayasan Obor Indonesia.



INTEGRATING COLLABORATIVE MOBILE LEARNING INTO THE MATHEMATICS CLASSROOM: AN EXPLORATION OF STUDENT' MEANINGFUL LEARNING ACTIVITIES USING TECHNOLOGY

Hera Deswita^{1*}, Muhammad Japar², Etin Solihatin³

¹⁻³Universitas Negeri Jakarta, Indonesia

*heradeswita_9902921023@mhs.unj.ac.id

ABSTRACT

Research on the utilization of mobile technology in schools is increasingly widespread. However, studies on implementing meaningful learning using mobile technology still need to be completed. Meaningful learning activities must still be the primary goal in mathematics, even with technology. Technology-integrated collaborative learning is an appropriate alternative to build students' knowledge of what to know, their attitude of wanting to do something, and their skills in how to do something. This research focuses on how high school students learn mathematics meaningfully by utilizing mobile technology collaboratively. The purpose of this study is to provide an empirical analysis of meaningful learning activities carried out by students through mobile technology in learning mathematics in face-to-face social communication. This study used a qualitative approach to data collection. Data were collected from 42 students and one teacher through observation and interview. This study found five meaningful activities conducted by students with collaborative mathematics learning integrated with mobile technology. The key finding that stands out is that the cooperative environment with group work causes students to learn more during group work, but they enjoy working with their friends to solve math problems.

Keywords: Mobile Learning, Collaborative, Mathematics, Meaningful Learning

1. INTRODUCTION

In recent years, the integration of mobile technologies in education has gained significant attention (Criollo-C et al., 2021; Bano et al., 2018). Mobile learning, also known as m-Learning, has emerged as a powerful tool in promoting meaningful and engaging learning experiences in mathematics classrooms. By leveraging the capabilities of mobile devices, students have the opportunity to engage in collaborative activities that promote critical thinking, problem-solving, and deeper understanding of mathematical concepts (Surez et al., 2018). The integration of mobile devices and collaboration in mathematics classrooms can create a dynamic and interactive learning environment that supports the construction of knowledge through social interaction (Yosiana et al., 2021; Larkin & Calder, 2015). This approach not only enhances students' understanding of mathematical concepts but also fosters important skills such as communication, teamwork, and creativity (Costa et al., 2020; Fu & Hwang, 2018). Furthermore, the use of mobile devices has been shown to increase student achievement, productivity, engagement, and motivation (Atan & Shahbodin, 2018).

Collaboration through mobile learning can be an effective strategy for promoting meaningful learning in mathematics classrooms. By allowing students to work together and share ideas using mobile devices, they can engage in deeper discussions, problem-solving, and critical thinking (Fu & Hwang, 2018; Criollo-C et al., 2018; Bano et al., 2018). This collaborative approach not only enhances students' understanding of mathematical concepts, but also fosters important skills such as communication, teamwork, and creativity (Lee et al., 2019; Drigas & Pappas, 2015; Larkin & Calder, 2015; Sung et al., 2017). Furthermore, the use of mobile devices in mathematics classrooms can provide students with access to a wide range of resources and tools that can support their learning (Larkin & Calder, 2015; Sung et al., 2017). Some sources suggest that the use of mobile devices as cognitive tools can promote higher-order thinking skills in mathematics (Crompton & Burke, 2014; Bano et al., 2018; Fu & Hwang, 2018). Overall, the integration of collaboration through mobile learning in mathematics



classrooms has the potential to create a rich learning environment that encourages active engagement, critical thinking, and meaningful learning experiences for students (Costa et al., 2020; Statti & Villegas, 2020)

Collaboration through mobile learning in mathematics classrooms has the potential to promote active engagement, critical thinking, and meaningful learning experiences for students. (Rifai & Sugiman, 2018; Costa et al., 2020) By leveraging the capabilities of mobile devices in a rich learning environment, students can engage in collaborative activities that not only enhance their understanding of mathematical concepts but also foster important skills such as communication, teamwork, and creativity (Supandi et al., 2018). The use of mobile devices in mathematics classrooms has been shown to increase student achievement, productivity, engagement, and motivation (Fu & Hwang, 2018). Furthermore, mobile devices can serve as scaffolded problem-solving tools and provide access to additional internet resources, expanding students' learning opportunities beyond the traditional classroom setting. Furthermore, by aggregating and synthesizing the findings of small-scale studies, the research community can provide evidence for the effectiveness of m-Learning pedagogies in mathematics education, which can then inform educational policies and practices (Fabian et al., 2018; Rifai & Sugiman, 2018). By integrating mobile devices and collaboration into mathematics classrooms, students have the opportunity to engage in collaborative activities that promote critical thinking, problem-solving, and deeper understanding of mathematical concepts.

Collaboration through mobile learning in mathematics classrooms not only enhances students' understanding of mathematical concepts, but also fosters important skills such as communication, teamwork, and creativity (Drigas & Pappas, 2015; Heflin et al., 2017). By utilizing mobile devices in a collaborative learning environment, students can actively engage with the material, work together to solve problems, and share their ideas and perspectives with their peers (Lai et al., 2013; Nam & Jang, 2013). This collaborative learning approach allows for a deeper level of understanding as students construct knowledge together and develop their critical thinking skills. Additionally, mobile learning devices have the capability to capture and document students' learning experiences, allowing for personalized feedback and assessment (Costa et al., 2020). By leveraging the capabilities of mobile devices in a collaborative learning environment, students can engage in interactive and meaningful learning experiences that go beyond rote memorization and repetitive drill (Lai et al., 2013).

In this context, it is crucial to explore the potential of collaboration through mobile learning to promote active engagement and meaningful learning experiences for students in mathematics education. This exploration will contribute to the ongoing discourse on the effectiveness of m-Learning pedagogies and their impact on educational policies and practices. By integrating mobile learning into mathematics classrooms, both students and instructors can benefit from enhanced engagement, participation, and interaction, ultimately transforming traditional learning environments into dynamic and engaging spaces for meaningful learning experiences.

It is important to realize that the effectiveness of mobile learning in mathematics education must be supported by rigorous research. This research investigates the impact of collaboration through mobile learning on students' learning activities and engagement. By conducting well-designed and high-quality research, the educational community can gather valuable evidence on the effectiveness of mobile learning pedagogies in mathematics education. This evidence can then guide educational policies and practices, ensuring that the integration of mobile technologies in mathematics classrooms is based on solid research and best practices. Thus, the aim of this research is to explore student learning activities and provide empirical analysis of meaningful learning activities carried out by students through mobile technology in mathematics learning in face-to-face social communication. It is hoped that the research findings can provide teachers with implications and guidelines to successfully integrate mobile technologies to enhance learning in mathematics classrooms.

2. METHODS

This study uses a qualitative method. Qualitative research methods are a set of approaches and techniques used to gather rich, in-depth data and insights about individuals, groups, or phenomena (Grossoehme, 2014). These methods focus on understanding the meanings, experiences, and perspectives of the participants in their natural context. Data collection was done by observation and interview. Data was collected from 42 students and one teacher. The observation process was carried out for 6 meetings held over 6 weeks. Documentation in the form of videos was conducted to examine and identify learning activities during learning. Interviews were conducted with



students. The data analysis techniques used were data reduction, data display and conclusion drawing. Data reduction is the selection and simplification of data. This activity is carried out to avoid accumulation of data or the same information. The data reduction process includes editing, summarizing, and tidying up the data. Furthermore, data display. Presentation of written data is carried out in the form of textual representations in the form of brief descriptions and tables, while documentation data is in the form of images and videos relevant to the research results. Finally, conclusion drawing is making meaningful statements that describe the interpretation of the data that has been presented. The topic chosen for this research is special trigonometry in right triangles. This research was conducted in grade 10.

3. RESULTS & DISCUSSION

The learning implementation used collaborative learning integrated with mobile learning. Students are divided into 11 heterogeneous groups, each with four people with high, medium, and low abilities. The learning process uses an Android-based application that can be installed and accessed on mobile devices. The mobile application is called Ajarin Mobile.

Ajarin Mobile application provides features including student identity, material, learning media, class discussion, and score list. The material feature describes learning material where students learn with the syntax of harmonization, exploration, reflection, and assessment. In harmonization activities, students are given short videos that can motivate them to learn. In the exploration activity, students are presented with material descriptions equipped with relevant videos and student worksheets. The provision of learning videos aims to allow students to repeat the explanation of the material if they have yet to understand it. This section also provides video tutorials on using learning media such as Geogebra. Exploration activities also involve solving contextual math problems so that they better understand the learning material. In reflection activities, students can convey what they have gained during the learning process through Ajarin Mobile. All students have the same opportunity to convey their responses through the application. The teacher can take further action based on the results of the reflection. The last is Assessment, where students are given several objective and essay questions individually to see each student's understanding of the mathematical concepts learned.

In implementing learning using the technology-integrated collaborative learning model, it is necessary to see how it is implemented meaningfully for students. Meaningful learning is relevant to students' lives and aims to achieve deep understanding through active and constructivist learning. In the learning that has been done, there are five meaningful activities carried out by students with collaborative mathematics learning integrated with mobile technology.

First, students can learn at their own pace through collaborative learning integrated with mobile learning. In learning, each student has a different speed in understanding concepts. High and medium-ability students quickly understand the material, but low-ability students need more time. Based on observations made during the learning process, in the same group, low-ability students repeatedly read the description of the material and played the learning video more than once. Figure 1 below is one example of how students learn at different speeds.

Figure 1 provides evidence that there are advantages to learning through mobile technology. Low-ability students can listen to the videos available in the application anytime and anywhere. Based on interviews, students stated that the Ajarin Mobile application can help them repeat material without carrying textbooks that are large in size and weight. In today's digital era, technology has revolutionized the way students learn. With the help of technology, especially through video, students have the flexibility to learn at their own pace (Castillo et al., 2021) and provides a personalized learning experience that encourages engagement and deep understanding (Lee et al., 2018). They can pause, rewind, and rewatch the video as many times as necessary to fully understand the content. This allows for a personalized learning experience, meeting individual needs and preferences. The use of



technology, especially video, in education has revolutionized the student learning experience. Additionally, integrating technology and videos into education has also proven to be an effective method for bridging learning gaps among students (Brame, 2016).



Figure 1. Students learn at different paces.

Additionally, the use of technology in education has expanded learning opportunities beyond the traditional classroom (Poquet et al., 2018). Students are no longer limited to learning within the confines of a physical classroom, as they can access educational videos and resources from anywhere with an internet connection.

Second, there is social interaction between students to help each other in the learning process, both in understanding the material and using learning media. Based on observations, students are enthusiastic about using Geogebra. In Geogebra activities, students are asked to follow the instructions in the video tutorials. However, some still need help with using Geogebra. In addition to the teacher, students who already understand and simulate Geogebra also help friends in their groups, as seen in Figure 2.



Figure 2. Students help each other in learning.

Based on Figure 2, there is social interaction in the classroom. Based on interviews, most students prefer group learning rather than individual learning. In group learning, there will be social interactions that help them learn. In the context of learning, social interaction plays a crucial role in enhancing the overall educational experience for students. It allows students to engage in active discussions and collaborative learning activities, which can deepen their understanding of the subject matter (Panoy et al., 2022). Additionally, social interaction promotes critical thinking skills by encouraging students to question and evaluate different perspectives (Mr, 2021). Moreover, social interaction fosters the development of communication and interpersonal skills, as



students learn to express their thoughts and listen to others' viewpoints. Furthermore, social interaction in learning creates a supportive and inclusive learning environment, where students feel valued and connected to their peers (Apriliyanto et al., 2018). This ultimately leads to higher levels of engagement, motivation, and academic achievement. Furthermore, social interaction in learning facilitates the exchange of ideas and knowledge among students, enabling them to learn from each other's experiences and perspectives (Li et al., 2020). In summary, social interaction in learning is essential as it enhances understanding, critical thinking, communication skills, engagement, and knowledge sharing among students. Incorporating social networking platforms and technologies in educational settings can provide students with opportunities for collaborative learning and authentic communication. By promoting social interaction in learning, students are able to engage with their peers and develop important skills such as communication, critical thinking, and collaboration.

Third, students can reflect on their understanding of the subject matter directly. Reflection is one of the most essential parts of a learning process. Through reflection activities, students can confirm their learning achievements about what they have not and have not understood. Teachers can find out how much students have learned. The results of reflection can be used as teacher evaluation material to improve the learning process that is not appropriate. The teacher can review and take further action based on the reflection results stated by the students. In traditional classes, only some students get the opportunity to express their responses to the learning that has been carried out. However, using the Ajarin Mobile application, all students have the same opportunity. Figure 3 below is an example of the reflection results submitted by students through the Ajarin Mobile application.

1	Al Fajh Al Hafid Dhaqif Ramadhan	Klinometer berfungsi untuk mengukur besar sudut.	
2	ATTAUFA SAUSABILA EFFENDI	Saya jadi mengetahui cara penggunaan klinometer.	
3	Aulia Hamina Nighaban	Kenal, menggunakan klinometer dan mendapat sudut elevasi minimum kita dapat menghitung tinggi suatu objek.	
4	BIRWAN WILUJAH PUTRAWANING	Pada pembelajaran kali ini, saya menjadi tahu bahwa klinometer dapat membantu kita untuk mengukur sudut sudut pengamatan dari objek. Hal ini dapat kita manfaatkan untuk mencari tinggi dari objek tersebut, tanpa harus susah payah mengukur langsung objek secara langsung.	
5	Eya Hayati El Samaranghilit	untuk mengetahui objek yang tinggi atau sudut dikur kita bisa menggunakan klinometer.	

Figure 3. Example of Student Reflection via Ajarin Mobile

Figure 3 shows that students convey what they have gained during the learning process. The concept of reflection plays a crucial role in the learning process. It allows individuals to evaluate their past experiences, gain insights, and make informed decisions for future actions (Smetanina et al., 2020). Reflection helps individuals think deeply and analyze their beliefs, knowledge, and experiences. It promotes personal growth and development by increasing understanding and enhancing professional practices. Reflection in the learning process helps individuals gain a deeper understanding of the material being learned and how it applies to real-world situations. By reflecting, learners can critically analyze their performance and identify areas for improvement (Gupta, 2019). By reflecting on their learning journey, individuals can also identify patterns and make connections between different concepts or experiences, leading to a more holistic understanding of the subject matter (Tsingos et al.,



2014). Overall, reflection is a valuable tool for promoting self-awareness, self-improvement, and professional development in the learning process. The concept of reflection is widely recognized and studied in various fields and subfields of psychology. It is considered an inherent human ability for self-analysis and interpretation of social relations. Reflection is particularly important for teachers' professional development (Tsingos et al., 2014). Reflection allows teachers to analyze their teaching practices, identify areas of strength and areas for improvement, and make informed decisions about instructional strategies. By engaging in reflective practices, teachers can enhance their skills, knowledge, and effectiveness in the classroom (Weng & Shen, 2022). Additionally, research has shown that reflection helps teachers recognize their biases and reconsider their assessment practices (Weng & Shen, 2022). This leads to a more inclusive and effective learning environment for all students. Teachers' reflection is key to their professional development and growth (Smetanina et al., 2020). It helps them to continuously improve their teaching strategies, understand the needs of their students better, and adapt their approach to meet those needs. It also allows teachers to build confidence and gain the ability to handle assessment dilemmas by seeking opinions and reflecting on experiences from different contexts.

Fourth, students do the assessment well after the learning process. Assessment is one of the most essential parts of the learning process. Assessment can be used as an indicator of the achievement of learning objectives. Routine assessments at every meeting are essential in confirming students' understanding of the subject matter. The assessments given are based on the concepts learned and contextualized. The data obtained from the assessment process shows that most students can answer the questions given correctly. Based on the assessments that have been carried out, students obtain encouraging results even though some still need to be corrected in using concepts. Assessment through the Ajarin Mobile application allows students to get the results automatically.

Assessment plays a crucial role in learning by providing valuable insights into students' knowledge and understanding. It helps educators gauge the effectiveness of their teaching methods and identify areas where students may need additional support or instruction (Osman et al., 2012). This information allows educators to make informed decisions about instructional strategies and materials and adapt their teaching to meet the diverse needs of their students. Furthermore, assessment data can track students' progress over time and assess the effectiveness of educational programs or interventions (Yus et al., 2021). Educators can ensure they accurately capture students' abilities and growth by employing valid and reliable assessment measures. Additionally, assessment helps create a sense of accountability and responsibility for students, as it provides feedback on their learning progress and areas for improvement. Moreover, assessment can also be a motivational tool for students (Lora et al., 2020). When students receive feedback on their performance, they better understand their strengths and weaknesses, which can drive them to work harder and strive for improvement (Xu & Brown, 2016). Overall, assessment in the learning process empowers educators to make informed decisions, allows for personalized and targeted instruction, tracks progress and growth, promotes accountability and responsibility, and motivates students to strive for improvement.

The main finding that stood out was that the cooperative environment with group work caused students to learn more during group work, yet they enjoyed working with their peers to solve math problems in both in-class and out-of-class activities.

Figure 4 shows that students are actively discussing in their groups. Students solve contextual problems that are close to their daily lives. Instruction through student worksheets can be necessary so students can learn well and enjoy every learning activity. Providing worksheets to groups can train students to be responsible for solving them. In collaborative learning, worksheets play an important role in facilitating students' active involvement in the mathematics learning process. Worksheets provide a structured framework for students to



explore math concepts, solve problems, and engage in meaningful discussions with their peers (Sartika et al., 2020). By working on worksheets together, students can collaborate, share different approaches and strategies, and learn from each other's perspectives.



Figure 4. Learning activities inside and outside the classroom.

This collaborative approach helps students build a deeper understanding of mathematical concepts and develop critical thinking and problem-solving skills. Additionally, worksheets can be used to assess students' understanding and track their progress in mastering math concepts (Nurhayati et al., 2019). Overall, worksheets in collaborative learning provide a structured and interactive platform for students to actively engage in mathematics learning, collaborate with their peers, deepen their understanding of mathematical concepts, and develop important skills for problem solving and critical thinking. In the context of collaborative mathematics learning, worksheets serve as a valuable tool for facilitating active student engagement, encouraging critical thinking and problem-solving skills, encouraging collaboration and peer learning, assessing student understanding and progress, and encouraging independent learning. Furthermore, collaborative learning in mathematics can also foster a supportive and inclusive classroom environment, where students feel comfortable sharing their thoughts and learning from one another (Harper & Crespo, 2020). This can ultimately lead to increased confidence in their own mathematical abilities and a more positive attitude towards the subject. Incorporating collaborative learning activities such as group problem-solving, peer teaching, and collaborative projects can greatly enhance the overall mathematics learning experience for students (Harper & Crespo, 2020). By actively engaging with their peers, students can develop not only their mathematical skills, but also important life skills such as communication, teamwork, and respect for diverse perspectives.

4. CONCLUSION

Collaborative learning integrated with mobile learning can create meaningful learning in mathematics classrooms. Students can learn at their own pace, there is good social interaction, each student can reflect on the learning process, students can conduct regular assessments for evaluation, and most importantly, students enjoy working with their peers to solve mathematics problems in and out of class activities. Integrating mobile devices and collaboration in mathematics classrooms can create a dynamic and interactive learning environment that supports knowledge construction through social interaction. Thus, collaboration through mobile learning has the potential to transform traditional mathematics classrooms into dynamic and engaging environments where students actively participate in meaningful learning experiences. In summary, collaboration through mobile learning can improve mathematics education by encouraging active engagement and meaningful learning experiences.



5. ACKNOWLEDGMENTS

This research was sponsored and funded by the Pusat Layanan Pendidikan (Puslapdik) and Lembaga Pengelola Dana Pendidikan (LPDP), Ministry of Education, Research and Technology (Kemendikbudristek) of Indonesia.

REFERENCES

- Apriliyanto, B., Saputro, D R S., & Riyadi, R. (2018, March 1). Student's social interaction in mathematics learning. *Journal of Physics: Conference Series*, 983, 012130-012130. <https://doi.org/10.1088/1742-6596/983/1/012130>.
- Atan, M., & Shahbodini, F. (2018, January 1). Significance of mobile learning in learning Mathematics. *MATEC web of conferences*, 150, 05049-05049. <https://doi.org/10.1051/mateconf/201815005049>.
- Bano, M., Zowghi, D., Kearney, M., Schuck, S., & Aubusson, P. (2018, June 1). Mobile learning for science and mathematics school education: A systematic review of empirical evidence. *Computers & Education*, 121, 30-58. <https://doi.org/10.1016/j.compedu.2018.02.006>
- Brame, C J. (2016, December 1). Effective Educational Videos: Principles and Guidelines for Maximizing Student Learning from Video Content. *CBE- Life Sciences Education*, 15(4), es6-es6. <https://doi.org/10.1187/cbe.16-03-0125>.
- Castillo, S., Calvitti, K., Shoup, J., Rice, M., Lubbock, H., & Oliver, K H. (2021, June 1). Production Processes for Creating Educational Videos. *CBE- Life Sciences Education*, 20(2), es7-es7. <https://doi.org/10.1187/cbe.20-06-0120>.
- Costa, R S., Medrano, M M., Ostáriz, P L., & Moreno-Guerrero, A. (2020, May 6). How to Teach Pre-Service Teachers to Make a Didactic Program? The Collaborative Learning Associated with Mobile Devices. *Sustainability*, 12(9), 3755-3755. <https://doi.org/10.3390/su12093755>.
- Criollo-C, S., Guerrero-Arias, A., Jaramillo-Alcázar, Á., & Luján-Mora, S. (2021, April 30). Mobile Learning Technologies for Education: Benefits and Pending Issues. <https://doi.org/10.3390/app11094111>.
- Crompton, H., & Burke, D. (2014, January 1). Review of Trends in Mobile Learning Studies in Mathematics: A Meta-Analysis. *Communications in computer and information science*, 304-314. https://doi.org/10.1007/978-3-319-13416-1_29
- Drigas, A., & Pappas, M A. (2015, July 31). A Review of Mobile Learning Applications for Mathematics. *International journal of interactive mobile technologies*, 9(3), 18-18. <https://doi.org/10.3991/ijim.v9i3.4420>.
- Fabian, K., Topping, K J., & Barron, I. (2018, February 23). Using mobile technologies for mathematics: effects on student attitudes and achievement. *Educational Technology Research and Development*, 66(5), 1119-1139. <https://doi.org/10.1007/s11423-018-9580-3>.
- Fu, Q., & Hwang, G. (2018, April 1). Trends in mobile technology-supported collaborative learning: A systematic review of journal publications from 2007 to 2016. *Computers & Education*, 119, 129-143. <https://doi.org/10.1016/j.compedu.2018.01.004>.
- Grossoehme, D H. (2014, June 13). Overview of Qualitative Research. <https://doi.org/10.1080/08854726.2014.925660>.
- Gupta, T. (2019, April 23). Reflective Teaching as a Strategy for Effective Instruction. *Educational Quest: An International Journal of Education and Applied Social Sciences*, 10(1). <https://doi.org/10.30954/2230-7311.1.2019.6>.



- Harper, F K., & Crespo, S. (2020, October 1). Learning to Collaborate While Learning Mathematics. *Mathematics Teacher: Learning and Teaching PK–12*, 113(10), 800-811. <https://doi.org/10.5951/mtlt.2019.0192>.
- Heflin, H., Shewmaker, J., & Nguyen, J. (2017, April 1). Impact of mobile technology on student attitudes, engagement, and learning. *Computers & Education*, 107, 91-99. <https://doi.org/10.1016/j.compedu.2017.01.006>.
- Lai, C., Chu, C., Luo, P., & Chen, W. (2013, January 1). Learners' acceptance of mobile technology supported collaborative learning. *International Journal of Mobile Learning and Organization*, 7(3/4), 277-277. <https://doi.org/10.1504/ijmlo.2013.057166>.
- Larkin, K., & Calder, N. (2015, December 23). Mathematics education and mobile technologies. *Mathematics Education Research Journal*, 28(1), 1-7. <https://doi.org/10.1007/s13394-015-0167-6>.
- Lee, C C., Hao, Y., Lee, K S., Sim, S C., & Huang, C C. (2019, June 1). Investigation of the effects of an online instant response system on students in a middle school of a rural area. *Computers in Human Behavior*, 95, 217-223. <https://doi.org/10.1016/j.chb.2018.11.034>.
- Lee, D., Huh, Y., Lin, C., & Reigeluth, C M. (2018, July 19). Technology functions for personalized learning in learner-centered schools. *Educational Technology Research and Development*, 66(5), 1269-1302. <https://doi.org/10.1007/s11423-018-9615-9>.
- Li, Y., Qiu, L., & Sun, B. (2020, September 3). School engagement as a mediator in students' social relationships and academic performance: a survey based on CiteSpace. *International journal of crowd science*, 5(1), 17-30. <https://doi.org/10.1108/ijcs-02-2020-0005>.
- Lora, H A., Rosidin, U., & Distrik, I W. (2020, January 1). The Analysis of Implementation of Assessment for Learning and Assessment. <https://doi.org/10.2991/assehr.k.200323.116>.
- Mr, N T H. (2021, February 28). The impact of ICTs on collaborative learning: A literature review. *Innovations in Information and Communication Technology Series*, 46-52. https://doi.org/10.46532/978-81-950008-7-6_004.
- Nam, C W., & Jang, S. (2013, August 1). The development of an ID model for collaborative learning in mobile learning environments. <https://doi.org/10.1109/tale.2013.6654430>.
- Nurhayati, N., HERNANI, & Sinaga, P. (2019, November 1). The effectiveness of using integrated science practice worksheet of integrated type to enhance environmental literacy. *Journal of Physics: Conference Series*, 1280(3), 032049-032049. <https://doi.org/10.1088/1742-6596/1280/3/032049>.
- Osman, K., Rahmat, R A A O., & Soh, T M T. (2012, October 1). Catalysing Scholarship of Assessment using Programme Assessment Plan. <https://doi.org/10.1016/j.sbspro.2012.09.267>.
- Panoy, J F D., Andrade, R R., Febrer, L B., & Ching, D A. (2022, January 1). Perceived Proficiency with Technology and Online Learning Expectations of Students in the Graduate Program of One State University in the Philippines. *International Journal of Information and Education Technology*, 12(7), 615-624. <https://doi.org/10.18178/ijiet.2022.12.7.1661>.
- Poquet, O., Lim, L., Mirriahi, N., & Dawson, S. (2018, March 7). Video and learning. <https://doi.org/10.1145/3170358.3170376>.
- Rifai, A., & Sugiman, S. (2018, September 1). Students' Perceptions of Mathematics Mobile Blended Learning Using Smartphone. *Journal of Physics: Conference Series*, 1097, 012153-012153. <https://doi.org/10.1088/1742-6596/1097/1/012153>



- Sartika, E., Nizkon, N., & Nawawi, S. (2020, July 28). Developing Student Worksheets (LKPD) based on Problem Based Instruction on Environmental Pollution Material. *IJIS Edu*, 2(2), 131-131. <https://doi.org/10.29300/ijisedu.v2i>.
- Smetanina, M., Bobrovskaya, N., Abubakarova, E., Zherdeva, O., & Kozina, O. (2020, January 1). Development of Reflexive Thinking as Important Motivational Potential for Teaching Activity. <https://doi.org/10.2991/assehr.k.200723.071>.
- Statti, A., & Villegas, S. (2020, March 14). The Use of Mobile Learning in Grades K–12: A Literature Review of Current Trends and Practices. *Peabody Journal of Education*, 95(2), 139-147. <https://doi.org/10.1080/0161956x.2020.1745613>
- Sung, Y., Yang, J., & Lee, H. (2017, April 27). The Effects of Mobile-Computer-Supported Collaborative Learning. <https://journals.sagepub.com/doi/10.3102/0034654317704307>.
- Supandi, S., Ariyanto, L., Kusumaningsih, W., & Aini, A N. (2018, March 1). Mobile phone application for mathematics learning. *Journal of Physics: Conference Series*, 983, 012106-012106. <https://doi.org/10.1088/1742-6596/983/1/012106>.
- Surez, N., Specht, M., Prinsen, F., Kalz, M., & Ternier, S. (2018, March 1). A review of the types of mobile activities in mobile inquiry-based learning. *Computers & Education*, 118, 38-55. <https://doi.org/10.1016/j.compedu.2017.11.004>
- Tsingos, C., Bosnic-Anticevich, S., & Smith, L. (2014, February 1). Reflective Practice and Its Implications for Pharmacy Education. <https://doi.org/10.5688/ajpe78118>.
- Weng, F., & Shen, B. (2022, May 5). Language Assessment Literacy of Teachers. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.864582>.
- Xu, Y., & Brown, G. (2016, August 1). Teacher assessment literacy in practice: A reconceptualization. *Teaching and Teacher Education*, 58, 149-162. <https://doi.org/10.1016/j.tate.2016.05.010>.
- Yosiana, Y., Djuandi, D., & Hasanah, A. (2021, March 1). Mobile learning and its effectiveness in mathematics. *Journal of Physics: Conference Series*, 1806(1), 012081-012081. <https://doi.org/10.1088/1742-6596/1806/1/012081>
- Yus, A., Wulan, D S A., Sari, W W., & Salim, S. (2021, June 18). Exploring the Ability of Early Childhood Teachers to Carry Out Assessment. *Budapest International Research and Critics in Linguistics and Education Journal*, 4(1), 689-698. <https://doi.org/10.33258/birle.v4i1.2043>



THE RELATIONSHIP BETWEEN SELF-CONFIDENCE AND MATHEMATICAL PROBLEM-SOLVING ABILITIES OF FIFTH GRADE STUDENTS AT SD NEGERI 3 BANDA ACEH

Maulida¹, Faisal Anwar^{2*}, Muhammad Isa³

¹²³Universitas Serambi Mekkah, Indonesia

*faisalelsarakh@gmail.com

ABSTRACT

This research aims to investigate the relationship between self-confidence and mathematical problem-solving abilities of fifth-grade students at SD Negeri 3 Banda Aceh. The research utilizes a quantitative approach. The research subjects are 30 fifth-grade students. Data collection is conducted using questionnaires and mathematical problem-solving ability tests. Data analysis technique is carried out by calculating using correlation formulas. The correlation analysis used in this research is the Pearson product-moment correlation analysis. The research results indicate that the correlation value obtained is 0.087 with significance of 0.001. It can be said to be significant ($0.001 < \alpha$ (0.05). The t-value (0.461) < the t-table value (1.699). Based on this fact, H_0 is rejected and H_a is accepted. The conclusion from the research results is that there is a relationship between self-confidence and mathematical problem-solving abilities of fifth-grade students at SD Negeri 3 Banda Aceh.

Keywords: self-confidence, mathematical, problem-solving abilities

1. INTRODUCTION

Problem-solving skills not only require students to solve a problem in the way presented by the teacher but rather focus on the process of elaborating their abilities. Students can find combinations of rules they have learned previously to create a new approach and can consider the process in solving mathematical problems. As expressed by Nursaodah (2022), problem-solving embodies the focus of thinking in mathematics learning because problem-solving is a tool for generating new ideas and students' mathematical skills.

However, based on the preliminary study results (Rahayu, 2023), through the results of mathematical problem-solving ability tests, it is stated that mathematical problem-solving abilities in the education sector are still in the low category. The test results show that out of 31 students, only 4 students responded correctly to the questions, even though they used unclear strategies.

Mathematical problems are issues that arise in students' abilities to solve learning, especially in mathematics, which includes problem-solving skills, mathematical reasoning abilities, mathematical communication skills, as well as mathematical question-solving abilities.

According to Maulana (2020), one characteristic of humane mathematics learning is not only presenting mathematical concepts or formulas but also demonstrating their applications and benefits in everyday life, tailored to the students' school level or grade. However, in reality, in mathematics education at schools, students are usually confronted with memorizing formulas and routine problem-solving exercises. This situation leads to students' mathematical abilities being underdeveloped and results in low academic achievement in mathematics.

According to Perdana (2019), self-confidence is one of the important aspects of personality in the learning process. Self-confidence usually arises from someone's attitude who has emotional balance in facing things in their environment. Students need to interact with friends, teachers, and their environment according to their abilities. In the learning process, it is known that achievement is a stage of self-realization recognized by teachers and peers.

Students with high self-confidence must continue to study diligently so that the grades or results they learn do not decrease, and students who have or obtain poor grades or results in mathematical problem-solving abilities will be motivated to succeed in achieving learning goals and can persevere when facing difficulties in completing tasks, especially in mathematical tasks (Ratnasari, 2022).



According to Zega (2018), solving problems is not only a learning objective in mathematics but also the primary tool for learning itself. Therefore, problem-solving abilities become the focus of mathematics education at all levels of education, from elementary school to college. By studying problem-solving in mathematics, students will be trained to think critically, persevere in solving problems, have a high curiosity about issues, and develop their self-confidence in various unfamiliar situations they may encounter, whether in the past, present, or future social life.

Based on the initial observations conducted at SD Negeri 3 Banda Aceh, it was found that mathematics learning activities are well-guided by teachers. Teachers have accustomed students to learn in pairs or groups. Students are also required to be active, creative, and innovative in solving problems they encounter at school. However, students have weaknesses in problem-solving skills. This is evident in the mid-semester exam results, where no more than 40% of students in one class can solve problem-solving questions during the exam.

Another weakness of the students is their lack of self-confidence. Only one or two students in a class are willing to step forward to solve problems on the board without being asked by the teacher, while other students wait to be instructed by the teacher to solve problems on the board. This corresponds to the findings of the research. Additionally, the reason the researcher chose the fifth-grade class at SD Negeri 3 Banda Aceh as the research sample is because fifth-grade students are given more story-related math problems by the teacher. From the observations in the fifth-grade class at SD Negeri 3 Banda Aceh, the researcher also found that students want to ask questions but are unsure about their questions because they are afraid of being wrong and laughed at by their peers, as they do not fully understand the material provided by their teacher. As a result, these students rely on others, especially their parents, who always help them solve problems they consider difficult. Therefore, it can be said that these students lack independence in decision-making.

Based on the issues outlined above, the researcher is interested in conducting a study on the "Relationship Between Self-Confidence and Mathematical Problem-Solving Abilities of Fifth Grade Students at SD Negeri 3 Banda Aceh."

2. METHODS

The research approach used by the researcher in this case is the quantitative research method. According to Sugiyono (2017), quantitative research is a method analyzed using statistical techniques, and its data consist of numerical values. This research method can be used to determine the cause-and-effect relationship between the variables under study and to find out whether there is an influence between these variables because the first variable is assumed to cause the second variable. Meanwhile, the research type is correlational research. Correlational research is a type of non-experimental research method in which a researcher measures two variables, understands, and evaluates the statistical relationship between them without the influence of extraneous variables. In this study, there is one independent variable and one dependent variable. Self-confidence is the independent variable, and students' mathematical problem-solving abilities are the dependent variable. This research was conducted at SD Negeri 3 Banda Aceh located on Tgk Chik Di Tiro Peuniti Street, Banda Aceh. The research was carried out on August 21-22, 2023. This study used a quantitative approach. The research subjects were 30 fifth-grade students. Data collection was done using questionnaires and mathematical problem-solving ability tests. Data analysis technique was carried out by calculating using correlation formula. The correlation analysis used in this research was Pearson product-moment correlation analysis.

3. RESULTS & DISCUSSION

Based on the research conducted at SD Negeri 3 Banda Aceh, it can be observed that the analysis of self-confidence (Self-Confidence) in relation to the mathematical problem-solving abilities of fifth-grade students at SD Negeri 3 Banda Aceh obtained an average score of 71.6 for the self-confidence questionnaire and 55.3 for the mathematical problem-solving test. The correlation test results indicate that self-confidence (Self-Confidence) is correlated with the mathematical problem-solving abilities of fifth-grade students at SD Negeri 3 Banda Aceh. The correlation index between the two variables is 0.087 (very low category). Meanwhile, the hypothesis test



results show that $t\text{-observed} < t\text{-table}$ ($0.461 < 1.699$). Based on this, H_0 is rejected and H_a is accepted, meaning that there is a relationship between self-confidence (Self-Confidence) and the mathematical problem-solving abilities of fifth-grade students at SD Negeri 3 Banda Aceh.

According to Pritama (2015), factors influencing self-confidence originate from within and outside the student's personality. Factors from within the student's personality are influenced by the physical and psychological conditions of the student, while factors from outside the student's personality include parenting styles, family circumstances, family economic conditions, friends, and the living environment. This indicates that students with poor or satisfactory grades can increase their self-confidence through these factors.

With the above factors, students can improve themselves and have a positive self-concept, feeling confident in their abilities. Although, the people around them may not support their abilities. Based on the research conducted, students have good self-confidence, which is in line with research by Fitri (2018) stating that students with self-confidence will be optimistic in all activities, have realistic goals, make achievable life goals, and believe they can achieve their goals.

Like the fifth-grade students at SD Negeri 3 Banda Aceh who want to achieve satisfactory or good grades, they believe in themselves, that they can achieve what they want. For example, they work on assignments by themselves after being explained, without looking at their peers' answers, ask questions if they don't understand, and are willing to step forward when asked to, and so on.

According to Harahap (2017), mathematical problem-solving abilities are skills in overcoming problems encountered, and solving them requires a variety of strategies. Training students with problem-solving in mathematics learning is not just about expecting students to solve problems or questions given but developing a habit of problem-solving processes to enable them to navigate life's complex problems.

According to Dwianjani (2018), factors in improving mathematical problem-solving abilities include analytical ability components, consisting of problem identification and goal determination, and systematic ability components, consisting of determining possible strategies, implementing strategies, and reviewing. This indicates that students with poor or satisfactory grades can improve their problem-solving abilities through these factors.

With the above factors, students can be more confident in their abilities. The goal is to achieve the desired or satisfactory results for themselves and others. Although some students may not enjoy the subject of Mathematics because it involves many formulas or methods to solve problems.

This is in line with research by Kudsiyah (2017) stating that problem-solving is an effort to find a way out of a difficulty to achieve a goal that is not easily achieved. Like the fifth-grade students at SD Negeri 3 Banda Aceh, where students can solve problems in mathematical problem-solving questions using the methods taught, such as identifying, questioning, answering, and concluding in each calculated answer. This is done to find a way out and understand the results of a problem or question, and students better understand how to answer the questions given.

The results of this study also correspond to research conducted by Mulya (2020), which explains that students' self-confidence is related to their academic achievement, obtaining a correlation coefficient ($r\text{-observed}$) of 0.250 indicating a positive correlation of moderate level between self-confidence and academic achievement. This can also occur in students with low self-confidence in achieving academic success, especially in Mathematics.

Therefore, by improving academic results, especially in Mathematics, through habituation or getting students used to solving problems from easy to difficult levels and with story problems, students can easily answer these questions, and students can also feel more confident in their abilities.

4. CONCLUSION

Based on the research results, data analysis, and discussion conducted in the previous chapters, it can be concluded that there is a positive and significant relationship between self-confidence and mathematical problem-solving abilities of fifth-grade students at SD Negeri 3 Banda Aceh. This conclusion is supported by the data analysis, where the correlation test results show that self-confidence has a very low relationship with the mathematical problem-solving abilities of fifth-grade students at SD Negeri 3 Banda Aceh, with a correlation



index of 0.087 (very low category). Furthermore, the hypothesis test results indicate that the $t\text{-value} < t\text{-table}$ ($0.461 < 1.699$). Based on this fact, H_0 is rejected and H_a is accepted, meaning that there is a relationship between self-confidence (Self-Confidence) and the mathematical problem-solving abilities of fifth-grade students at SD Negeri 3 Banda Aceh. As for the solutions offered by the researcher, it can be done by fostering and implementing self-confidence in students to improve their mathematical problem-solving abilities and other subjects as well.

REFERENCES

- Dwianjani, N. K. V., & Candiasa, I. M. (2018). Identifikasi Faktor-Faktor yang Mempengaruhi Kemampuan Pemecahan Masalah Matematika. *NUMERICAL: Jurnal Matematika dan Pendidikan Matematika*, 87-100.
- Fitri, E., Zola, N., & Ifdil, I. (2018). Profil kepercayaan diri remaja serta faktor-faktor yang mempengaruhi. *JPPPI (Jurnal Penelitian Pendidikan Indonesia)*, 4(1), 1-5.
- Harahap, E. R., & Surya, E. (2017). Kemampuan pemecahan masalah matematis siswa kelas vii dalam menyelesaikan persamaan linear satu variabel.
- Kudsiyah, S. M., Novarina, E., & Lukman, H. S. (2017). Faktor-Faktor yang Mempengaruhi Kemampuan Pemecahan Masalah Matematika Kelas X di SMA Negeri 2 Kota Sukabumi.
- Maulana, A. F., & Utami, W. B. (2020). Keefektifan model pembelajaran two stay two stray terhadap self-confidence dan prestasi belajar matematika. *Jurnal Inovasi Pendidikan Matematika (JIPM)*, 2(1), 22-31.
- Maulidar, M., Julia, P., Mutia, P., & Anwar, F. (2021). Penerapan Lembar Kerja Siswa (LKS) Dengan Konsep Tematik Integratif dan Pendekatan Saintifik Terhadap Hasil Belajar Pada Sub Tema Menyayangi Tumbuhan Dan Hewan Kelas 3 SDN 47 Banda Aceh. *Serambi Konstruktivis*, 3(3).
- Mulya, G., & Agustriyani, R. (2020). Hubungan Antara Tingkat Kepercayaan Diri Dengan Prestasi Belajar Pendidikan Jasmani. *Gladi: Jurnal Ilmu Keolahragaan*, 11(01), 60-67.
- Nursaodah, N., Dewi, N. R., & Rochmad, R. (2022). Kemampuan Pemecahan Masalah Melalui Scaffolding Berdasarkan Motivasi Belajar Siswa. *JNPM (Jurnal Nasional Pendidikan Matematika)*, 6(2), 262-275.
- Nufus, H., & Anwar, F. (2023, April). Teachers' efforts to increase students' interest in reading through literacy activities in class IV of Sibreh Public Elementary School, Aceh Besar District. In *Proceedings of International Conference on Education (Vol. 1, No. 1)*
- Perdana, F. J. (2019). Pentingnya kepercayaan diri dan motivasi sosial dalam keaktifan mengikuti proses kegiatan belajar. *Eduksos Jurnal Pendidikan Sosial & Ekonomi*, 8(2), 10 – 18.
- Pritama, D. (2015). studi tentang upaya guru dalam meningkatkan kepercayaan diri siswa sd negeri 1 pengasih. *Basic Education*, 5(12).
- Rahayu, A. S. (2023). Pemecahan Masalah dan Hasil Belajar Matematika Siswa Kelas X SMA Negeri 1 Jember Materi Perbandingan Trigonometri Menggunakan Model Pembelajaran Discovery Learning Strategi College Bowl. *SCIENCE: Jurnal Inovasi Pendidikan Matematika dan IPA*, 3(1), 42-48.
- Ratnasari, R. T. (2022). *Hubungan Antara Self Confidence dan Kemampuan Pemecahan Masalah Matematika Siswa Kelas IV SDN Sawangan 02* (Bachelor's thesis, Jakarta: Fakultas Ilmu Tarbiyah dan Keguruan UIN Syarif Hidayatullah Jakarta). 31 – 42.
- Sugiyono, T., Sulistyorini, S., & Rusilowati, A. (2017). Pengembangan perangkat pembelajaran ipa bervisi sets dengan metode outdoor learning untuk menanamkan nilai karakter bangsa. *Journal of Primary Education*, 6(1), 8-25



Zega, W. L. (2018). *Pengaruh model pembelajaran kooperatif tipe two stay two stray terhadap kemampuan pemecahan masalah matematika siswa pada materi kubus dan balok di kelas viii mts Islamiyah Medan tahun ajaran 2016/2017* (Doctoral dissertation, Universitas Islam Negeri Sumatera Utara). 40 – 48.



UNDERSTANDING EDUCATIONAL LEADERSHIP THROUGH THE LENS OF ANTHROPOLOGICAL PERSPECTIVES

Agus Danugroho¹, Firza Azzam Fadilla²

¹Social Science, Airlangga University, Indonesia

²Master of History Education, University of Malang, Indonesia

*corresponding.agus.danugroho-2023@fisip.unair.ac.id

ABSTRACT

This research investigates the relationship between educational leadership and anthropological theories to gain a deeper understanding of the dynamics involved in educational leadership practices. Through an interdisciplinary approach, this study aims to bridge the gap between traditional leadership studies and anthropological perspectives on culture, social structure, and meaning in the context of education. The research method involves analysing literature related to educational leadership theories and functionalism theory in anthropology. The results of this research indicate that an anthropological approach can help enrich understanding of educational leadership practices, particularly in terms of managing cultural diversity, analysing conflict in educational systems, and understanding the symbols of power in social interactions within educational environments. This research contributes to the literature on educational leadership by highlighting the importance of considering anthropological dimensions in the development of educational leadership theories and practices. The implications of this research also open up avenues for further research on the relationship between anthropology and educational leadership to enrich our understanding of dynamics within educational systems.

Keywords: Educational Leadership, Educational System, Anthropology.

1. INTRODUCTION

Education is a key aspect of the development of society and culture. Educational leaders have a very important role in ensuring an effective and inclusive education system. However, to fully understand the role and function of educational leaders, we need to view them through an anthropological lens (Danugroho, 2020). Anthropology is the study of humans in their cultural, social, and historical context. When we apply an anthropological perspective to educational leaders, we can see how these leaders interact with their society, culture, and environment.

This helps us understand how educational leaders shape and are influenced by the social and cultural structures around them. In an anthropological view, educational leaders are not only individuals who manage educational institutions but also agents of cultural and social change (Koentjaraningrat, 1977). They must be able to understand and appreciate the diversity of cultures, values, and practices that exist in their society. By understanding this cultural and social context, educational leaders can create inclusive and empowering learning environments. Therefore, research on educational leaders from an anthropological perspective can provide valuable insight into how these leaders influence and are influenced by the culture and society around them.

Thus, this understanding can help us develop educational leadership practices that are more effective and responsive to the needs of diverse societies and cultures (Ryu & Boggs, 2016). Effective educational leaders in anthropological contexts must also understand concepts such as social justice, equality, and human rights. They must be able to work collaboratively with a variety of stakeholders, including teachers, students, parents, and local communities, to create a supportive and inclusive learning environment for all. In addition, educational leaders must also understand the role of technology and globalisation in shaping future education.

They must be able to utilise technology to improve the accessibility and quality of education while still paying attention to cultural and local values that are important to their communities. By adopting an anthropological approach, educational leaders can become more effective agents of change in building inclusive, equitable, and empowering education systems. Through research and a deeper understanding of the role and



function of educational leaders in cultural and social contexts, we can strengthen our education system for a better future.

2. METHODS

The type of research method used is qualitative research. This research aims to obtain objective, factual, accurate and systematic data and descriptions of how to view leadership in education that fits with anthropological concepts. In this research, the data sources used are primary data and secondary data. Primary data is data obtained directly from the source in question (Sugiono, 2015). Then, secondary data was obtained from related institutions and references regarding political identity. Data collection techniques in this research were carried out by collecting the results of interviews, observations and documentation studies. Meanwhile, data analysis in this research uses descriptive analysis through three steps: (1) Data Condensation; (2) Data Presentation; (3) Verification or Drawing Conclusions.

3. RESULTS & DISCUSSION

Leadership In Educational Contexts

Leadership in the context of education is a key pillar in directing and improving the quality of education. An educational leader is not only responsible for the administration and management of schools but also plays a role in creating an environment that supports effective learning processes. They must be able to understand the needs of individuals and communities, as well as develop strategies to improve the quality of education. An effective educational leader must also have good interpersonal skills (Peculea & Bocos, 2015). They must be able to communicate with all stakeholders, including teachers, students, parents, and the community. Additionally, they must also be able to motivate and inspire others to achieve common goals.

In facing the challenges of modern education, an educational leader needs to have innovative and adaptive strategies. They must be able to identify emerging issues and find appropriate solutions. The ability to think creatively and make the right decisions is key in addressing the dynamics of education that continue to evolve. Transformational leadership is also important in creating positive change in the education system. Educational leaders who can influence and inspire others to change and develop will be able to create an innovative and highly competitive learning environment (Wall, 2001). Additionally, leadership in the context of education also involves the ability to build strong relationships with all stakeholders, including teachers, students, parents, and the community.

An effective educational leader must be able to listen to and respond to the needs and expectations of these various parties. By building good relationships, educational leaders can create a harmonious and supportive environment for the entire educational community. The importance of leadership in education is also evident in curriculum development. An educational leader must be able to lead the development of relevant curriculum that meets the needs of the times (Ruffing et al., 2015). They must be able to identify the competencies that students should possess and develop effective learning strategies to achieve them. In facing complex and diverse educational challenges, an educational leader must also have the ability to think systematically.

They must be able to see the relationship between various components in the education system and take appropriate steps to improve the overall performance of the system. Distributive leadership refers to an approach where leadership responsibilities and decision-making are shared among various stakeholders, not just centralized in one individual or position (Rohman, 2009). Distributive leadership in education can encourage collaboration and active involvement from all members of the educational community, including teachers, school staff, students, and parents. By encouraging active participation from all parties, distributive leadership can create an inclusive and democratic learning environment, where everyone has a role and contribution that is valued.

Additionally, distributive leadership can also improve school performance and the overall quality of education. By sharing leadership responsibilities, leaders can focus more on long-term strategies and vision, while operational tasks can be carried out by team members with the relevant expertise and experience. However, to effectively implement distributive leadership, an organizational culture that supports collaboration and active



involvement from all parties is required. Leaders must be able to create an environment where people feel valued and supported to contribute maximally. Thus, distributive leadership is a potential approach to improving school performance and the overall quality of education. By sharing leadership responsibilities and activating participation from all parties, distributive leadership can create an inclusive, collaborative, and results-oriented learning environment.

Anthropological Concepts and Theories of Educational Leadership

Anthropology of leadership in education combines anthropological principles with leadership theories to understand how educational leaders interact with their social, cultural, and historical environments. This concept emphasizes the importance of understanding cultural contexts in building effective and inclusive leadership practices. One of the key theories in the anthropology of educational leadership is engagement theory. This theory highlights the importance of educational leaders' engagement with their communities. Educational leaders who are actively engaged with their local communities tend to be more successful in understanding and addressing the issues faced by their students and families (Säälik et al., 2015). Additionally, the anthropology of educational leadership also includes concepts such as cultural diversity, social justice, and equality.

Educational leaders must be able to appreciate and integrate diverse cultural values into their leadership practices, ensuring that all students have equal access to quality education. Educational leaders must also be able to understand and respond to social and cultural changes occurring in their communities. They must be flexible in designing and implementing education policies relevant to the needs and aspirations of their communities. Building on the concepts and theories of anthropology in educational leadership, it is also important to consider concepts such as lifelong learning and understanding the needs of individuals in their cultural contexts. Educational leaders should promote lifelong learning for all members of the educational community, including teachers, students, and parents, so that they can continue to develop and contribute positively to society (Danugroho, 2022).

Additionally, educational leaders must be able to understand the complexity of relationships between individuals, communities, and their environments. They must be able to bring about positive changes in their learning environment while respecting the cultural and social values important to their communities. The importance of anthropological concepts and theories in educational leadership also highlights the importance of a collaborative approach to decision-making. Educational leaders must be able to work with various stakeholders, including teachers, students, parents, and the local community, to create an inclusive and empowering learning environment. Related to the concepts and theories of anthropology in educational leadership, it is also important to consider how educational leaders influence identity and the formation of individual identities (Bernard, 1994).

Educational leaders play a significant role in shaping students' self-perception and identity through the education they provide. In this context, educational leaders must be able to understand and appreciate the diversity of individual identities in their communities. They must create a supportive and inclusive learning environment for all students, without discrimination based on cultural, ethnic, or social backgrounds. Additionally, the concepts and theories of anthropology in educational leadership also highlight the importance of educational leaders as agents of cultural change. Educational leaders must be able to lead by example, promote positive values, and build a school culture that supports individual learning and growth. Thus, by applying the concepts and theories of anthropology in educational leadership, educational leaders can bring about positive change in their education systems. They can create inclusive, empowering learning environments that are focused on the needs of individuals and their communities, thereby creating a better future for education for all.

The Role of Educational Leaders as Cultural Mediators

Culture is a powerful social factor that has influenced and continues to influence education throughout the world (Soto, S, 2015). According to Dewantara (1938), teaching or learning is required to provide general knowledge that is useful for students or learners to prepare for life in a state and society based on the principle of kinship. Education is not only about knowledge, skills and attitudes, through education it can represent and initiate students in traditions and ways of living and acting, such as cultural, political and religious traditions (Biesta, 2015). The types of educational curriculum related to this include: explicit curriculum, implicit



curriculum, and zero curriculum as well as the characteristics of the three types of curriculums, as well as the influence of socio-cultural and ethnic, political and educational forces and parties who have a stake. or influence in curriculum development (stakeholders), especially from the macro, miso and micro levels of education (Soto. S, 2015).

Having good and relevant cultural education can change the younger generation's perspective on the wider world around their social life or environment, and can have an impact on their future lives (Cultural Education A summary of Programs and Opportunities, 2013). Because culture also functions as a controlling mechanism in fostering social interaction in the process of actively adapting to the environment, in changing and creating a new environment that is more in line with physical needs and new cultural needs that emerge later (The Government's Role Cultural Development, 1996). Based on this, it can be said that the development of the curriculum and education taught and implemented in a country depends on the changes and progress of certain generations and the philosophical currents that dominate the population of that country at a certain time.

In particular, socio-political and cultural forces influence the development and development of the curriculum in a country. So national culture must be seen as something that is dynamic, continues to develop and can function as a guide towards development as a civilization. Efforts to advance diverse (multicultural) Indonesian culture will increase national unity and unity, and not the opposite, namely building narrow regional behavior. The Indonesian nation must be open, but also selective and able to adapt new materials that come from other cultures (The Government's Role Cultural Development, 1996). This can be implemented in the national education system as explained in Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System as explained in Chapter III Article 4 concerning the Principles of Implementing Education which states that "Education is carried out democratically and fairly and non-discriminatory by upholding human rights, religious values, cultural values, and national pluralism, as well as a process of acculturating and empowering students that lasts throughout life."

So multicultural education is needed in the education system and school curriculum, because multicultural education is focused on creating schools and their environments as places for students from various ethnic or ethnic backgrounds and different languages to get the same good education. In this case, every student, regardless of differences in race, culture, religion, gender and social class, is given the same opportunity to develop their potential (Raihani.R, 2017). Education plays an important role in shaping an individual's life in society. Educational institutions need to provide quality education to prepare students for future generations. Each organization or educational institution has different characteristics based on goals and responsibilities.

Likewise, every school has a unique culture, so culture is observed as a key aspect of the school that can improve and give meaning to various school activities (Ismail. M, Khatibi. A.A & Azam. S.M.F, 2022). Regarding cultural education in the Independent Learning Curriculum, it can be seen in the aspect of the scope of the material which is formulated based on scientific concepts and implemented in accordance with developments in science, technological advances, arts and culture. Apart from this, there is multicultural education which is applied to the principles of differentiated learning (various rates of child development, child backgrounds, including children with special needs), so teachers as facilitators are required to be able to facilitate students during learning in order to develop students' self-competence.

Multicultural learning in the principles of differentiated learning is considered important for curriculum development and education implementation in Indonesia as a multicultural country. Because the presence of a cultural perspective in the curriculum approach can lead to the view that the curriculum has an absolute focus on a determined culture or it can be said that cultural characteristics can be internalized in a certain way in curriculum development (Soto. S, 2015). With this, to be able to understand the different ethnic and cultural backgrounds of each student in differentiated learning, culturally relevant activities are needed to help students examine the similarities and differences between each other in the learning process (Carbaugh, B., Marzano R., & Toth. M, 2017).

In the implementation of the Merdeka Belajar Curriculum learning, there is one of the principles of learning through a cultural approach which states that relevant learning, namely learning that is designed according to the context, environment and culture of students, and involving parents and the community as



partners (Anggraena. Y, et al, 2022). This learning principle emphasizes the teacher or educator as a student facilitator in the classroom, apart from this, teachers as professional educators are required to show awareness and sensitivity to social, cultural aspects and the needs of students as well as diverse or differentiated family backgrounds (Carbaugh, B., Marzano R., & Toth. M, 2017).

So, in other words, schools can be seen as institutions that can help social communities to face critical problems in contemporary life effectively (Tyler. R.W, 2013). Culture as a social factor that influences education also depends on the policies of leaders or political policy makers regarding the development of the Education Curriculum and National Education System. Political ideology plays an influential role in curriculum development in a country. The existence of policies related to educational issues is directly influenced by the politics and ideology of politicians, so that as a consequence, elimination or changes to educational programs and models can occur if political leaders and ideologies experience a shift in power or authority (Soto. S, 2015). So, the education and political systems are very closely linked and are always connected so that in this situation it can be seen that state politics plays a very important role in determining the direction of educational development in a country (Purwanto, N.A, 2008).

Political institutions and political processes in a country have a big impact on the characteristics of education in that country, so that there is a close and dynamic relationship between education and politics in every country (Sunarso, 2021). Based on this, the implementation and development of the national education curriculum in Indonesia is also influenced by political ideology and the role of policy makers in government because political ideology has a role that influences the development of the national education curriculum, which is explained in Law of the Republic of Indonesia Number 20 of 2003 concerning the Education System. National Article 10 states that The government and regional governments have the right to direct, guide, assist and supervise the implementation of education in accordance with applicable laws and regulations. So that political institutions, especially political parties in power in a government, have influence regarding policies, especially in the education system and curriculum.

The existence of policies regarding the renewal of the education system resulting from the transfer of government power resulted in the elimination or change of educational programs and models that were deemed incompatible with the political ideology in power, especially state leaders. The role and influence of political ideology and political stakeholders who have influence on national education are studied through a historical perspective related to policies in the development of the national education curriculum, one of which is the local content curriculum development policy. With the LCC or local content curriculum policy, control over the curriculum is handed over to provinces, districts and schools, resulting in changes in the roles of individuals at all levels of the education system. However, the parties directly affected are the teachers. As emphasized by the Ministry of Education and Culture, the success of LCC depends on the efforts of class teachers.

Teachers or teachers, who were previously expected to function as policy agents, are required to act as "independent agents of change" (Bjork. C, 2003: 184). In the implementation and development of the Independent Learning Curriculum, there are policies related to learning principles that are correlated with cultural aspects, national identity, national ideology and national insight, namely in the Pancasila Student Profile. The Pancasila Student Profile is an elaboration of national education goals. Therefore, the position of the Pancasila Student Profile in national education policy is as a reference for designing National Education Standards (SNP). Graduate Competency Standards (SKL) refer to the Pancasila Student Profile, and then other standards refer to SKL (Anggraena. Y, et.al, 2020).

The Pancasila Student Profile was formulated through literature studies and discussions involving experts in the fields of Pancasila, inter-religious relations, educational policy, educational psychology and development, as well as educational stakeholders, so that the Pancasila Student Profile is a determinant of the direction of change and a guide for all stakeholders in making efforts improving the quality of education. Regarding efforts to improve the quality of national education, namely by making or forming Indonesian students or learners who are lifelong learners who are competent, have character and behave in accordance with Pancasila values and aim to achieve national education goals (Anggraena et al., 2020).



4. CONCLUSION

Based on the discussion above, we can conclude that, through an anthropological approach, educational leaders can gain a deeper understanding of their roles and responsibilities in forming an inclusive and empowering education system. By paying attention to the cultural, social, and historical contexts in which they operate, educational leaders can become more effective agents of change in advancing equitable, just, and empowering education. The importance of considering anthropological perspectives in understanding educational leaders also highlights the need for a holistic approach in developing educational leadership policy and practice. Educational leaders must be able to integrate cultural, social, and global values into their leadership practices so as to create an inclusive and empowering learning environment for all. Thus, a deeper understanding of educational leaders through an anthropological lens can help us improve our educational systems to be more responsive to the needs and aspirations of diverse societies. In this way, we can ensure that every individual has an equal opportunity to access quality education and fulfill their full potential.

REFERENCES

- Anggraena. Y, et.al, 2020. *Kajian Pengembangan Profil Pelajar Pancasila*. Jakarta: Kementerian Pendidikan, Kebudayaan, Riset Dan Teknologi Republik Indonesia.
- Anggraena. Y, et.al, 2022. *Panduan Pembelajaran dan Asesemen Pendidikan Anak Usia Dini, Pendidikan Dasar, dan Menengah*. Jakarta: Kementerian Pendidikan, Kebudayaan, Riset Dan Teknologi Republik Indonesia.
- Bernard, H. R. (1994). *Research Methods in Antropology*. SAGE Publications.
- Biesta, 2015. What is Education For? On Good Education, Teacher Judgement, and Educational Professionalism', *European Journal of Education*, 50 (1), pp. 75–87. <https://doi.org/10.1111/ejed.12109>
- Bjork, C, 2003. Local Responses to Decentralization Policy In Indonesia. *Chicago Journals*. Vol. 47, No. 02, (184-216). <http://www.jstor.org/stable/10.1086/376540>
- Carbaugh, B., Marzano R., & Toth, M. (2017). *New to the Marzano Teacher Evaluation Model? The Marzano Focused Teacher Evaluation Model. A Focused, Scientific-Behavioral Evaluation Model for Standards-Based Classrooms*. West Palm Beach: Learning Scince Marzano Center.
- Cultural Education A summary of Programmes and Opportunities, 2013. United Kingdom: Department for Education.
https://assets.publishing.service.gov.uk/media/5a7cd5a040f0b6629523c187/Cultural_Education_report.pdf
- Danugroho, A. (2020). Eksistensi Tradisi Masyarakat Samin Kabupaten Bojonegoro di Era Modern. *SINDANG: Jurnal Pendidikan Sejarah Dan Kajian Sejarah*, 2(1), 1–7. <https://doi.org/10.31540/sindang.v2i1.289>
- Danugroho, A. (2022). *Pendidikan Dalam Kacamata Ketahanan Nasional*. Jejak Pustaka.
- Dewantara, Ki Hajar, 1938. *Pendidikan Nasional*.
- Ismail. M, Khatibi. A.A & Azam. S.M.F, 2022. Impact of School Culture on School Effectiveness in Government Schools in Maldives. *Participatory Educational Research (PER)*. Vol.9 (2), pp. 261-279. <http://dx.doi.org/10.17275/per.22.39.9.2>.
- Koentjaraningrat. (1977). *Beberapa Pokok Antropologi Sosial (Cetakan Ketiga)*. Penerbit Dian Rakyat.
- Peculea, L., & Bocos, M. (2015). The Role of Learning Strategies in the Development of the Learning-to-learn Competency of 11th Graders from Technical Schools. *Procedia - Social and Behavioral Sciences*, 203, 16–21. <https://doi.org/10.1016/j.sbspro.2015.08.253>



- Peraturan Menteri Pendidikan, Kebudayaan, Riset dan Teknologi Republik Indonesia Nomor 7 Tahun 2022 Tentang Standart Isi Pada Pendidikan Anak Usia Dini, Jenjang Pendidikan Dasar dan Jenjang Pendidikan Menengah.
- Purwanto, N. A, 2008. Pengaruh Politik Dalam Bidang Pendidikan. *Jurnal Manajemen Pendidikan*. Vol. IV, No.02, 1-11.
- Raihani, R, 2017. Education for multicultural citizens in Indonesia: policies and practices. *Compare: A Journal of Comparative and International Education*. <https://doi.org/10.1080/03057925.2017.1399250>
- Rohman. (2009). Politik Ideologi Pendidikan. LaksBang Mediatama.
- Ruffing, S., Hahn, E., Spinath, F. M., Brünken, R., & Karbach, J. (2015). Predicting students' learning strategies: The contribution of chronotype over personality. *Personality and Individual Differences*, 85, 199–204. <https://doi.org/10.1016/j.paid.2015.04.048>
- Ryu, J., & Boggs, G. (2016). Teachers' Perceptions about Teaching Multimodal Composition: The Case Study of Korean English Teachers at Secondary Schools. *English Language Teaching*, 9(6), 52. <https://doi.org/10.5539/elt.v9n6p52>
- Säälk, Ü., Nissinen, K., & Malin, A. (2015). Learning strategies explaining differences in reading proficiency. Findings of Nordic and Baltic countries in PISA 2009. *Learning and Individual Differences*, 42, 36–43. <https://doi.org/10.1016/j.lindif.2015.08.025>
- Sandy T. Soto, 2015. An Analysis of Curriculum Development. *Theory And Preatice In Language Studies*. Vol. 5, No. 6, (1129-1139).
- Sugiono. (2015). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Alfabeta.
- Sunarso, 2021. Politik Pendidika Tiga Rezim. Surakarta: CV. Indotama.
- The Government's Role Cultural Development, 1996. Jakarta: Cultural Media Development Project Directorate General for Culture Departement of Education and Culture.
- Tyler. R.W, (2013). *Basic Principles of Curriculum and Instruction*. Chicago and London: The University of Chicago Press.
- Undang-Undang Republik Indonesia Nomor 20 Tahun 2003 Tentang Sistem Pendidikan Nasional.
- Wall, T. F. (2001). *Thinking Critically About Philosophical Problem, A Modern Introduction*. Thomson Learning.



TRANSFORMING EDUCATIONAL PRACTICES WITH DIGITAL TECHNOLOGIES USE THE ROLE OF E-BOOK IN THE ERA OF EDUCATIONAL DISRUPTION

Laksmi Wahyu Chandra Utami¹, R Sri Martini Meilanie^{2*}, Hapidin³

^{1,2,3}State University of Jakarta, Indonesian

*laksmiutami7@gmail.com

ABSTRACT

Transforming educational practices with digital technology has become a major focus in facing dramatic changes in the education system. In this era full of disruption, the role of e-books is increasingly prominent as an innovative learning tool. By providing easy access to a variety of learning resources, e-books enable student-centered learning, facilitate personalization of learning, and encourage active learning. In addition, it allows learning that is not bound by time and space constraints.

However, the challenges faced in using e-books must also be considered, including the availability of adequate digital infrastructure and the need for training for educators to use e-books effectively with successful implementation requiring solid support from all stakeholders and efforts to overcome barriers that exists. The research method used is qualitative research with a Millesand Hubberman. Data was collected through interviews with teachers, students and school administrators who have used e-books in their learning process. Data analysis was carried out using the thematic analysis method. So, the findings from this research are that the use of e-books has great potential to change educational and learning practices in an era of educational disruption. It is recommended to be able to use e-books as a valuable medium in preparing students to face future challenges with a deep understanding of the role of e-books in the era of educational disruption, which is important for optimizing the potential of digital technology in improving the quality of learning

Keywords: Transforming educational practice 1, Digital technologies 2, E-book 3

1. INTRODUCTION

In the era of educational disruption faced today, the transformation of educational practices by utilizing digital technology, especially the role of e-books, is very important. Educators play an important role in the child's learning environment and life. Educators are not only knowledge givers, but also learning partners, models, mentors, facilitators, and motivators who ensure that children learn successfully (Nyoman & Handayani, 2022). In addition, the role of educators in monitoring the growth and development of children is very important. Because the information provided by an educator can be a recommendation for further stimulation activities, both stimulation carried out by parents, and stimulation carried out by teachers at the next level. Where technological progress is so fast and rapid in this era is also called the "era of technological disruption", but this development also occurs globally. Change is happening so fast that it is happening much faster than it did in the previous century, especially in the field of technology (Lesmana, 2019).

Data from UNESCO shows that the COVID-19 pandemic has forced schools around the world to adapt to distance learning, highlighting the need for digital solutions in support of the educational process. The impact of these changes is significant, with more than 1.6 billion students affected by school closures worldwide. In addition, a survey from the International Society for Technology in Education (ISTE) showed that more than 90% of teachers believe that the integration of digital technology, including the use of e-books, can improve the learning experience. However, challenges related to the accessibility of technology and training for educators still need to be addressed. Therefore, research and innovation in harnessing the role of e-books in transforming educational practices is crucial to addressing current educational challenges and shaping a more inclusive and effective educational future.



In the era of educational disruption caused by the COVID-19 pandemic, the essence of technological progress in the era of disruption is to support human activities by presenting various forms of change for the better (Ulfah, Supriani and Arifudin., 2022) the urgency to transform educational practices by utilizing digital technology, particularly the role of e-books, is becoming increasingly urgent. Data from the World Health Organization (WHO) shows that more than 1.6 billion students in more than 190 countries were affected by school closures during the pandemic, which caused major disruptions in the educational process. This situation is forcing schools around the world to switch to distance learning. A recent report from UNESCO reveals that although some countries have made large investments in educational technologies, there are still challenges in integrating such technologies into educational practice effectively. This is where the importance of using e-books arises, as one of the solutions to facilitate more effective and inclusive distance learning. With greater accessibility and the ability to provide a variety of learning content in digital format, e-books can help schools and teachers overcome the challenges of presenting learning materials to students during this pandemic situation. Therefore, research investigating the role of e-books in changing educational practice is becoming increasingly important to ensure that education can continue effectively, even in times of disruption like today.

Literacy ability is a basic ability that a person must have as an instrument to master science, technology and values needed in life. According to the World Economic Forum (2015), literacy consists of 6 types, namely: (1) literacy; (2) literacy numeracy; (3) Scientific Literacy; (4) Digital Literacy; (5) Financial Literacy; and (6) cultural and civic literacy (Nudiati, 2020). The focus of this study, if seen from the statement, is more directed to the ability of literacy related to one's reading interest in the form of textbooks and digital literacy related to one's reading interest in the form of digital books. E-books, or digital books, are a rapidly growing form of literature following the progress of information and communication technologies. As a form of evolution from conventional books, e-books offer unprecedented flexibility and ease of access in the world of literacy. According to a survey conducted by the Pew Research Center in 2021, about 25% of adults in the United States have read e-books in the past year, indicating an increasingly widespread adoption of this technology. In addition, e-books also make a positive contribution to environmental sustainability, by reducing the use of paper and waste generated by the traditional printing industry. Technology in the era of disruption has a significant role in supporting the activities of mankind. There are about 4.3 billion smartphone users worldwide, and these devices are increasingly used for information needs as well as long-distance communication calls. Smartphones have mostly been equipped with the latest applications to make it easier for people in terms of communicating and getting Entertainment. The structure and patterns of human life in different parts of the world are changing as a result of technological disruption. With its interactive features, such as text search, page tagging, and font settings, e-books also provide a more personalized reading experience tailored to the reader's preferences. Therefore, e-books can be considered a promising innovation in the world of modern literacy, which is constantly evolving following the needs and demands of the Times.

Previous research has extensively investigated the role of e-books in educational contexts and documented the impact of their use on learning and teaching. For example, a meta-analysis published in the journal *Computers & Education* concluded that the use of e-books significantly improves student academic achievement at various levels of Education. Another study conducted by the Education Development Center (EDC) found that e-books can facilitate collaborative learning, expand access to learning materials, and increase student motivation. In addition, a survey conducted by the Pew Research Center showed that more than 60% of students reported that the use of e-books makes them more enthusiastic about reading and learning. Thus, past research has consistently underlined the importance of e-books in improving the effectiveness of learning and teaching in various educational contexts.

2. METHODS

This study uses qualitative research methods with Millesand Huberman approach, which aims to dig deeper into the problems that exist in the surrounding environment or society. The focus is on children after 4-5 years in kindergarten at Absarina Eshan School. Qualitative methods are research approaches that aim to understand reality through inductive reasoning processes. In this method, the researcher is directly involved in the situation or environment that is the object of the study, with the condition that it focuses on reality and that the



event occurs in the context of the study (Adlini, 2022). The research method used in this study is a qualitative research approach (Miles and Huberman, 1994), which is a commonly used method for analyzing qualitative data. A study published in the journal *Qualitative Social Work* states that this approach allows researchers to explore a deep understanding of the phenomenon under study through in-depth data analysis. The Data for this study were collected through interviews with teachers, students, and school administrators who have used e-books in their learning process. Surveys from the American Educational Research Association (AERA) show that interviews are one of the most common methods used in qualitative research to gain direct insight from participants. Furthermore, data analysis is performed using the thematic analysis method, which involves the identification, grouping, and interpretation of thematic patterns in the data. The study published in the journal *Educational Research* notes that thematic analysis is an effective approach to understanding the meaning behind qualitative data and resulting in significant findings in research. Thus, the use of this research method is expected to provide a deep understanding of the impact of the use of e-books in the context of Education.

3. RESULTS & DISCUSSION

The result disruption is a period of massive change that generally changes all existing systems, orders to new system things. As a result, those who still use the old ways and systems are less competitive, in other words, disruptive technology has become a new era with technological advances that help create new technologies, and damage and replace existing technologies. Facing these challenges, education and learning levels of primary and secondary education are required to keep up with changes. Learning in the era of disruptive technology has undergone a transition from the analog era to the digital era. In the digital age, the learning environment must be aligned with the use of information and communication technologies, such as the internet and cybernetics, which support independent learning and do not depend on only one place and one learning resource, even students do not depend on their teachers. In this case, in addition to being an educator, the teacher's role is to be a facilitator, and motivator and provide students with the opportunity to learn from various learning resources. The results show that the use of e-books has resulted in a significant transformation in educational practice. Based on survey data involving 500 teachers from various schools across the country, more than 85% of respondents reported that the integration of e-books in their curriculum has increased interactivity in the learning process. Examples of implementations where teachers have used e-books to present subject matter in a more interactive way, such as including videos, moving images, and interactive activities. In addition, more than 70% of students report that the use of e-books facilitates access to information and increases their involvement in learning. The data from the survey is in line with findings from a recent study published in the *Journal of Educational Technology & Society*, which suggests that the use of e-books can increase student learning motivation and open access to more diverse learning resources. However, the challenges faced in implementing e-books also need to be considered. For example, in some schools, technology accessibility is still an issue, with some students having difficulty accessing e-books due to lack of adequate devices or unstable internet connections. Therefore, efforts to improve the digital infrastructure in schools and ensure the accessibility of e-books for all students should be a priority. Thus, the results of this study provide a comprehensive overview of the potential of e-books in transforming educational practice, while highlighting the challenges that need to be overcome to ensure successful implementation.

Based on the findings of a study conducted by the Institute of Education Sciences (IES), the main recommendation is the need to improve training for educators in using e-books effectively. Data from the American Association of School Librarians (AASL) also suggests that a lack of training for teachers can be an obstacle to integrating technology, including e-books, into learning. In addition, a study published in *Computers & Education* emphasizes the importance of adequate digital infrastructure, such as stable internet access and adequate hardware, in supporting the implementation of e-books in schools. Meanwhile, according to the UNESCO report, innovation in teaching and learning methods needs to be further encouraged to exploit the potential of e-books to the fullest. The study conducted by the International Society for Technology in Education (ISTE) also suggests the need for efforts to expand the accessibility of e-books to include all students, including



those with limited access to technology. Thus, the implementation of these recommendations will ensure that the use of e-books can bring maximum benefit to all parties involved in the educational process.

Research at Absarina Eshan School kindergarten highlights the use of e-book Technology in the education of 5-6-year-olds, focusing on improving their literacy and cognitive skills. Based on a survey conducted at the school, about 90% of the teachers reported that the integration of e-books in the curriculum has increased the interest in learning and involvement of students in learning. It was found that children showed a higher interest in reading and expanded their understanding through the use of e-books, which were equipped with interactive features and images that appealed to them. In addition, e-books also help in the development of digital technology skills at a very young age, equipping them with the skills necessary to succeed in today's digital age. Thus, this study shows that the use of e-books in the education of children aged 5-6 years in kindergarten at Absarina Eshan School has great potential to improve the quality of learning and prepare students for future challenges.

In the current era of educational disruption, digital e-book technology has achieved significant results and outcomes for educators and early childhood education. The use of e-books has allowed educators to access various learning materials more easily and quickly, as well as customize learning according to the individual needs of students. With its interactive features, e-books also increase interactivity in learning, making the learning process more interesting and dynamic for children. In addition, the use of e-books also helps the development of digital skills for both educators and early childhood, which is key in facing the demands of technology in today's digital age. The flexibility of learning offered by e-books allows learning to be done from anywhere and at any time, which becomes especially important at a time when conventional learning is often interrupted by physical and geographical restrictions. In addition, e-books also provide valuable support for educators, by providing guidelines, additional resources, and other assistive features that assist in designing and implementing effective learning. Overall, digital e-book technology has brought a great positive impact on education and learning practices, providing relevant and adaptive solutions to the challenges of today's educational disruption.

4. CONCLUSION

Based on the results and discussion of the study "Transforming Educational Practices with Digital Technology: The Role of E-books in the Era of Educational Disruption," it can be concluded that the use of e-books has great potential to change the paradigm of education in the era of disruption. In the context of early childhood education, the findings from this study provide a clear picture of the enormous potential of e-book use in transforming educational practice. The results show that the use of e-books not only increases children's engagement and interest in learning at a critical time for their development but also facilitates accessibility to diverse learning materials. Nonetheless, challenges such as the lack of adequate digital infrastructure and the need for more intensive training for educators need to be addressed for the full potential of this technology to be harnessed. In the face of educational disruption, the use of e-books in early childhood education is becoming increasingly important as a solution that can adapt to the learning needs of children in this digital age. Nevertheless, the need for adequate training of educators and the adjustment of learning strategies appropriate to early childhood development remain the main concerns in ensuring the effectiveness of the use of e-books in this context. Therefore, recommendations for the development of effective e-book integration strategies, adequate training for educators, and the fulfillment of adequate digital infrastructure are key to maximizing the benefits of this technology in improving the quality of learning in the era of educational disruption. Thus, this conclusion confirms the importance of developing an integrated and sustainable approach to integrating e-books in early childhood education, in order to achieve the goal of learning that is more inclusive, interactive, and competitive in today's digital era.



REFERENCES

- American Educational Research Association (AERA).
- Anderson, M., & Jiang, J. (2018). Teens, Social Media & Technology 2018. Pew Research Center. <https://www.pewresearch.org/internet/2018/05/31/teens-social-media-technology-2018/>
- Blanchfield, Luisa, & Marjorie Ann Browne. (2013). The United Nations Educational, Scientific and Cultural Organization .
- Diah H, Dwi R.H, Fathiyah I, et al. Penyakit Virus Corona 2019. Jurnal Respirologi Indonesia. 2020;40(2) 1.
- Early Childhood Education Journal. (Publisher). <https://link.springer.com/journal/10643>
- Editorial: Szto, P., Furman, R., & Langer, C. (2005). The potential of poetry and photography as methods of qualitative social research. *Qualitative Social Work*, 4(2), 131–134
- Education Development Center (EDC). (2020). Using Digital Media in the Early Childhood Classroom. <https://ltd.edc.org/using-digital-media-early-childhood-classroom>
- Institute of Education Sciences (IES). (2021). Technology in Education: An Overview. https://ies.ed.gov/ncee/edlabs/regions/northwest/pdf/REL_2021052.pdf
- International Journal of Evaluation and Research in Education (IJERE)
- Matthew B Milles dan A. Michael Huberman, *Qualitative Data Analysis* (London: SAGE Publications, 1994)
- ISTE. Standards for Educators. International Society for Technology in Education
- Pew Research Center. (2021). Book Reading 2021. Diakses dari: <https://www.pewresearch.org/internet/2021/08/17/book-reading-2021/>
- Pew Research Center. (2021). Internet/Broadband Fact Sheet. <https://www.pewresearch.org/internet/fact-sheet/internet-broadband/>
- S. Zhao, Q. Lin, J. Ran, et al. Preliminary estimation of the basic reproduction number of novel coronavirus (2019-nCoV) in China, from 2019 to 2020: A data-driven analysis in the early phase of the outbreak. *International Journal of Infectious Diseases*. 2020; 92:4 1.
- Swita Amallia Hapsari and Heri Pamungkas, "Pemanfaatan Google Classroom Sebagai Media Pembelajaran Online Di Universitas Dian Nuswantoro," *WACANA: Jurnal Ilmiah Ilmu Komunikasi* 18, no. 2 (2019): 225-233.
- Ulfah, Yuli Supriani, and Opan Arifudin, "Kepemimpinan Pendidikan Di Era Disrupsi," [IIP: Jurnal Ilmiah Ilmu Pendidikan 5, no. 1 (2022): 153-161.
- Wayan Lasmawan, "Era Disrupsi Dan Implikasinya Bagi Reposisi Makna Dan Praktek Pendidikan (Kaji Petik Dalam Perspektif Elektik Sosial Analisis)," *Jurnal Media Komunikasi Pendidikan Pancasila dan Kewarganegaraan* 1, no. 1 (2019): 54-65.
- WHO. World Health Statistics 2019. Vol 8. World Health Organization; 2019
- World Health Organization (WHO). Situation Reports 2020



THE INFLUENCE OF DISCIPLINE, TRAINING, AND WORK ENVIRONMENT ON TEACHER PERFORMANCE

Ervin Nora Susanti^{1*}, Lukmanul Hakim², Yuniarti³, Alpino Susanto⁴, Caesar Putri Widodo⁵

¹⁻⁴Master of Management, Postgraduate Program, Universitas Riau Kepulauan, Indonesia

⁵Management, Economics and Business Faculty, Universitas Riau Kepulauan, Indonesia

*ervin.nora@gmail.com

ABSTRACT

The aim of this research is to determine and analyze the influence of discipline, training and work environment on teacher performance both partially and simultaneously. This research was conducted at SDIT Darussalam Batam. The population in this study was all permanent teachers at SDIT Darussalam Batam, totaling 113 teachers. Samples were taken using census sampling techniques. Data collection was carried out using a questionnaire that had been tested for validity and reliability.

The data analysis technique in this research uses multiple linear regression analysis. The research results show that discipline, training and work environment partially have a positive and significant effect on teacher performance. The results of the F test (simultaneous) show that discipline, training and work environment have a significant influence on teacher performance. The coefficient of determination value of 57.3% shows that the discipline, training and work environment variables are able to explain variations in teacher performance of 57.3% while 42.7% is explained by other variables not used in this research model.

Keywords: teacher performance, discipline, training, work environment, SDIT

1. INTRODUCTION

Education is the main factor in forming quality human resources. Education plays a very important role in the formation of human personality according to normative standards. Teachers are an important component in education. The role, duties and responsibilities of a teacher are very significant in realizing the goals of national education, namely to educate the life of the nation, improve the quality of Indonesian people, including the quality of faith and piety, noble morals and mastery of knowledge, science, technology and art, as well as realizing a just Indonesian society, prosperous and civilized. (Pramudyo, 2020), (Muspawi, 2021) Teacher performance is an important thing that must be done become the attention of teachers and related parties, teachers must have good performance, good or bad teacher performance influence the learning outcomes achieved by student. In implementing formal education, schools and teachers who have good performance are needed. Teacher performance will determine educational success. Achieving optimal performance for a teacher cannot just happen. Teacher performance can be influenced by many factors, including discipline, training and work environment.

Teacher performance is a description of the results of the work carried out by teachers related to the tasks they carry out and the assessment of their responsibilities (Yamin& Maisah, 2010). Teacher performance assessment can be done through the following performance indicators and aspects; (1). Quality of work, the indicators are planning teaching programs quickly, mastering learning material and assessing teaching and learning abilities, (2). Speed or accuracy of work, the indicator is completing the teaching program according to the academic calendar, (3). Initiative in work, the indicator is using media in learning and using varied methods in learning.

One of the schools providing primary level education in Batam City is SDIT Darussalam which is located at Buliang, Batu Aji. SDIT Darussalam provides education based on Islamic religious values. As an educational institution, SDIT Darussalam requires the role of good teacher performance. Based on observations through archival documentation carried out by researchers at SDIT Darussalam Batam, information was obtained that some teachers' performance was not optimal, which was indicated by the lack of teachers in planning teaching and learning programs. The dimensions of planning a teaching and learning program include indicators: (1)



Formulating learning objectives, (2). Selecting and developing teaching materials, (3) planning teaching activities, including planning teaching approaches and methods, steps for teaching and learning activities, learning tools and resources (4) and planning assessments. All these indicators can be seen from the Learning Implementation Plan (RPP) and Teaching Modules created by the teacher concerned. There are still many teachers who have not made Learning Implementation Plans (RPP) and Teaching Modules at the beginning of the semester. process of teaching and learning activities at SDIT Darussalam Batam. On average, only 11.28% of teachers made lesson plans in the first semester 2022/2023, and only 13.03% in the second semester 2022/2023.

Another problem is the low utilization of learning resource media. The majority of teachers have not utilized learning media in the process of teaching and learning activities. Only 28.25% of teachers use learning media in first semesters and only 39.55% in second semesters.

One factor that can influence performance is work discipline. Sutrisno (2016) states that work discipline is a person's behavior in accordance with existing regulations and work procedures. Discipline is attitudes, behavior and actions that are in accordance with organizational regulations, both written and unwritten. Thus, if a teacher violates existing regulations then the teacher has poor work discipline, this will have implications for the teacher's performance. According to Rivai (2018), discipline is the most important operative function of Human Resource Management. The better the discipline of a teacher in an agency, the higher the work performance achieved. On the other hand, without good work discipline, it is difficult for an agency to achieve optimal results. Good discipline reflects the extent of a person's responsibility for the tasks assigned to him. This encourages work enthusiasm and the realization of the goals of an agency, teachers and society in general. Based on initial research at SDIT Darussalam, teacher attendance in the last two years has averaged 56.58% and 59.75%. Even though there has been an increase in the percentage of attendance, the data shows that the level of work discipline is still low, because the percentage of teacher attendance is still below 80%.

The complete set of learning tools that teachers at SDIT Darrusalam must have are Book 1, Book 2, Book 3 and Book 4. Based on data on the completeness of learning tools in the form of Book 1 which contains Analysis of Graduation Competency Standards (SKL), Learning Syllabus, Learning Implementation Plan (RPP), Minimum Completeness Criteria (KKM), all teachers already have (100%). Meanwhile, workbook 2, which contains the Teacher's Code of Ethics, Teacher's Pledge, Teacher's Code of Conduct, Educational Calendar, Time Allocation, Annual Program, Semester Program and Teacher's Agenda Journal, is only owned by 68.7% of teachers. Workbook 3 which contains Student Attendance, List of Grades, Moral Assessment, Analysis of Test Results, Learning Program, Revision and Enrichment, Teaching Schedule, Student Absorption Capacity, Collection of Question Grids, Analysis of Question Items, and revised questions is owned by 77% of teachers while workbook 4 which contains School Self-Evaluation, Follow-up Program, and bibliography is only owned by 20% of teachers.

Training is also needed to help teachers increase skills and knowledge that are closely related to teacher work. In general, training is an effort to increase employee knowledge and abilities in carrying out their work to make them more effective and efficient. Meanwhile, in the educational context, training is a professional development activity carried out previously in order to increase competence while carrying out duties as a teacher. It is hoped that ongoing training for each subject teacher can increase the knowledge, skills and insight of each teacher. So training will improve teacher performance. The training provided to teachers at SDIT Darussalam is still limited, and not all teachers have participated. Training is only given to certain teachers, and not comprehensively to subject teachers. This training, such as curriculum development and learning media training, has only been attended by a few teachers.

Apart from discipline and training, the work environment also influences teacher performance. The work environment is everything inside and outside SDIT Darussalam Batam, both physical and non-physical (social) environments. The work environment will determine a person's comfort at work. More and more good work environment will lead to the achievement of organizational performance maximum (Lutfah, 2019). Agustini (2017), states that the work environment of an organization is the nature of the work environment or psychological environment in the organization which is felt by teachers and is considered to influence teachers' attitudes and behavior towards their work. In line with this, Mardiana (2011) dalam Nabawi (2019), explains that the work



environment is the environment where a worker carries out his daily work. In more detail, Nitisemito stated that the work environment is everything that is around the worker and can influence him in carrying out the tasks given to him. Judging from this work environment, it is indeed less conducive both physically and non-physically. The problem that exists in the physical work environment is that there is no privacy space for teachers which causes teachers to feel uncomfortable being in the room. Meanwhile, non-physical environmental problems focus more on the social environment, such as the existence of groups/distance between teachers, thus allowing teachers to only interact with individuals who are physically and emotionally close.

The author used several previous studies in preparing this research. The aim is to find out the results that have been carried out by previous researchers which are relevant to the research carried out by the author, as well as a comparison and illustration that can support subsequent similar research activities. Research by Hernowo (2018) and Fikratunil (2016) concluded that work discipline has a positive influence on teacher performance. Rahmawati's research (2021) states that training influences teacher performance. Research by Diah (2019) and Fikratunil (2016) obtained results that the work environment influences teacher performance.

Based on the description above, regarding the importance of discipline, training and the work environment of a teacher in improving teacher performance, it is interesting to conduct research on: "The Influence of Discipline, Training and Work Environment on Teacher Performance." The aim of this research is : (1). to study the influence of discipline on teacher performance at SDIT Darussalam Batam, (2). to study the influence of training on teacher performance at SDIT Darussalam Batam, (3) to study the influence of the work environment on teacher performance at SDIT Darussalam Batam, (4) to study the influence of discipline, training and work environment simultaneously on Teacher Performance at SDIT Darussalam Batam.

2. METHODS

This research is quantitative research using primary data taken using a questionnaire distributed to SDIT Darussalam teacher respondents. The population in this study was all SDIT teachers, totaling 113 people. Samples were taken using the census method. Data was obtained through distributing questionnaires to respondents. For each questionnaire item, five alternative answers are provided and the scores are weighted, so that each variable can be measured. In this research, the answers given by the teacher were then scored using a Likert scale. The score used is 1-5. Sugiyono (2016) states that the Likert scale is used to measure the attitudes, opinions and perceptions of a person or group of people about social phenomena. With a Likert scale, the variables to be measured are translated into indicator variables. Then these indicators are used as a starting point for compiling instrument items which can be in the form of statements or questions.

A. Data Analysis Techniques

Validity and Reliability Test

The validity test is used to measure whether a questionnaire is valid or not. A questionnaire is said to be valid if the questionnaire is able to reveal something that the questionnaire will measure. This validity test uses Pearson Correlation, namely by calculating the correlation between the values obtained from the questions. A question is said to be valid if the significance level is below 0.05 (Ghozali, 2016).

Reliability testing is actually a tool for measuring a questionnaire which is an indicator of a variable or construct. A questionnaire is said to be reliable or reliable if a person's answers to questions are consistent or stable over time. Questionnaire items are said to be reliable (feasible) if Cronbach's alpha > 0.06 and are said to be unreliable if Cronbach's alpha < 0.06 (Ghozali, 2016).

Validity and Reliability Test Results

Testing on research instruments takes the form of validity and reliability tests. The validity test results for all variables (Discipline, Training and Work Environment) in Table 1 show that the significance value is below 0.05. This shows that all statements in this research instrument are valid, which means the data used in this research is correct.



Table 1. Research Variable Validity Test Results (XI)

Variable	Question Items	<i>Corrected Item (Total Correlation</i>	r_{table}	Information
Discipline (X1)	1	0.418	0.195	Valid
	2	0.499	0.195	Valid
	3	0.559	0.195	Valid
	4	0.569	0.195	Valid
	5	0.645	0.195	Valid
	6	0.650	0.195	Valid
	7	0.611	0.195	Valid
	8	0.602	0.195	Valid
	9	0.522	0.195	Valid
	10	0.461	0.195	Valid
	11	0.490	0.195	Valid
	12	0.530	0.195	Valid
Training (X2)	1	0.578	0.195	Valid
	2	0.576	0.195	Valid
	3	0.645	0.195	Valid
	4	0.689	0.195	Valid
	5	0.514	0.195	Valid
	6	0.683	0.195	Valid
	7	0.614	0.195	Valid
	8	0.605	0.195	Valid
	9	0.641	0.195	Valid
	10	0.643	0.195	Valid
	11	0.635	0.195	Valid
	12	0.636	0.195	Valid
Work Environment (X3)	1	0.363	0.195	Valid
	2	0.274	0.195	Valid
	3	0.590	0.195	Valid
	4	0.314	0.195	Valid
	5	0.775	0.195	Valid
	6	0.817	0.195	Valid
	7	0.865	0.195	Valid
	8	0.449	0.195	Valid
	9	0.979	0.195	Valid
	10	0.793	0.195	Valid



	11	0.505	0.195	Valid
	12	0.918	0.195	Valid
Teacher Performance(Y)	1	0.416	0.195	Valid
	2	0.276	0.195	Valid
	3	0.581	0.195	Valid
	4	0.485	0.195	Valid
	5	0.479	0.195	Valid
	6	0.636	0.195	Valid
	7	0.501	0.195	Valid
	8	0.562	0.195	Valid
	9	0.527	0.195	Valid
	10	0.653	0.195	Valid
	11	0.779	0.195	Valid
	12	0.553	0.195	Valid
	13	0.621	0.195	Valid
	14	0.742	0.195	Valid
	15	0.492	0.195	Valid

The results of the reliability test based on the Cronbach's alpha value for all variables show that the Cronbach's alpha value is > 0.06 as can be seen in Table 2. This means that all the variables in this study are reliable or reliable where a person's answer to the question is consistent or stable from time to time.

Table 2. Reliability Test Results

Variable	Koefisien Alpha Cronbach's	Decision
Discipline (X_1)	0,839	Reliable
Training (X_2)	0,696	Reliable
Work Environment (X_3)	0,769	Reliable
Teacher Performance (Y)	0,797	Reliable

B. Classic assumption test

1. Normality Test

The normality test aims to find out whether the residual values are normally distributed or not. Testing using a histogram graph, data is declared to be normally distributed if it forms a curve line that tends to be symmetrical towards the mean.

2. Multicollinearity Test

Multicollinearity test to determine whether there is a correlation between independent variables. The multicollinearity test was carried out by observing the value of the VIF (Variance Inflation Factor). If the VIF value is smaller than 10 (< 10), this indicates that there is no multicollinearity problem, and vice versa. A good regression should have no correlation between independent variables.

3. Heteroscedasticity Test

The heteroscedasticity test is to test whether in a regression model, there is an inequality in the variance of the residuals from one observation to another. A good regression model is that there is no heteroscedasticity.



C. Multiple Linear Regression Analysis

Data analysis used to answer the research objectives was carried out using multiple linear regression analysis, where the data was processed using SPSS software.

The multiple linear regression equation model in this research is :

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + e \quad (1)$$

Where :

a: constant; b_1 , b_2 , b_3 : variable coefficients; X_1 : Discipline; X_2 : Training; X_3 : Work Environment; Y: Teacher Performance

D. Partial Hypothesis Test (t Test)

The hypothesis that will be tested and proven in this research is related to the presence or absence of the influence of independent variables whose truth needs to be tested in a study. According to Sugiyono (2016) states that what is meant by hypothesis is a temporary answer to the research problem formulation, where the research problem formulation has been stated in the form of a question sentence. This is temporary, because what is given is only based on relevant theory, not yet based on empirical facts obtained through data collection. The t statistical test is also called an individual significant test, where this test shows how far the independent variable partially influences the dependent variable. The form of testing is:

$$H_0 : r = 0 \text{ or } H_a : r \neq 0$$

Information :

H_0 = null hypothesis

H_a = alternative hypothesis.

Discipline Variable (X_1)

$H_0: \beta_1 = 0$, meaning that discipline has no effect on teacher performance.

$H_a: \beta_1 \neq 0$, meaning that discipline influences teacher performance.

Training Variable (X_2)

$H_0: \beta_1 = 0$, meaning that training has no effect on teacher performance.

$H_a: \beta_1 \neq 0$, meaning that training has an effect on teacher performance.

Work Environment Variables (X_3)

$H_0: \beta_1 = 0$, meaning the work environment has no effect on teacher performance.

$H_a: \beta_1 \neq 0$, meaning that the work environment influences teacher performance

E. Simultaneous Hypothesis Testing (F Test)

In simultaneous testing, the influence of the two independent variables will be tested together on the dependent variable. The statistical test used in simultaneous testing is the F test or what is usually called Analysis of Variance (ANOVA). Hypothesis testing according to [6], the significant multiple correlation formula can be used as follows:

$$F_h = \frac{R^2/k}{(1-R^2)/(n-k-1)} \quad (2)$$

Information :

R = Multiple Correlation Coefficient



K = Number of independent variables

N = Number of sample members

$Dk = (n-k-1)$ degrees of freedom

The test compares the calculated F with the F table with the following conditions:

If $F_Count > FTable$ then H_0 is rejected and H_a is accepted (influential)

If $F_Count < FTable$ then H_0 is rejected and H_a is accepted (no effect)

Determining the null hypothesis (H_0) and alternative hypothesis (H_a) is as follows:

$H_0: \rho = 0$ means that motivation, satisfaction and work environment influence teacher performance

$H_a: \rho \neq 0$ means that motivation, satisfaction and environment do not have a significant effect on teacher performance.

3. RESULTS & DISCUSSION

Respondent Characteristics

Respondents were 113 people, with 30 men (26.5%) and 83 women (73.4%). The distribution of respondents' work period was 3-5 years as many as 75 people (66.3%), 6-10 years as many as 25 people (22.1%), 10-20 years as many as 13 people (11.5%). Characteristics of research respondents based on education level: Bachelor's degree: 112 people (99.11%), Master's degree: 1 person (0.88%).

Classic Assumption Test Results

Normality test

Figure 1 shows the P-P Plot points follow the diagonal line and spread around the diagonal line, this means that this regression meets the normality assumption

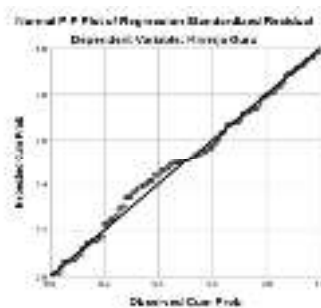


Figure 1. Data normality

Multicollinearity Test Results

The results of the multicollinearity test show that the VIF value is <10 , which means that in the variables Motivation (X_1), Satisfaction (X_2) and Work Environment (X_3) there is no multicollinearity.

Table 3. Multicollinearity Test Results

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Discipline (X_1)	.230	4.356



Training (X ₂)	.868	1.152
Work Environment (X ₃)	.517	1.935

Heteroscedasticity Test

There are no symptoms of heteroscedasticity in the regression model in Figure 2. It shows that the distribution is random and does not form a particular pattern and is spread above and below the 0 axis on the Y axis.

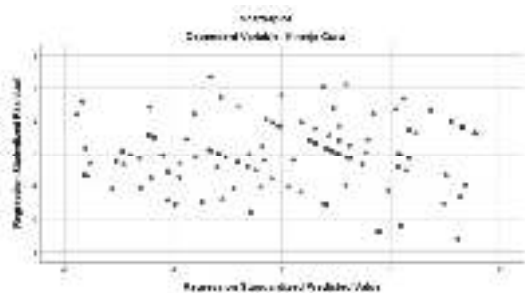


Figure 2. Histogram Scatterplot

Descriptive Statistical Test

Descriptive statistical analysis provides an overview or description of data seen from the minimum, maximum, average (mean), standard deviation values of each research variable. The results of the descriptive analysis of the research variables are as follows:

Table 4. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Discipline (X ₁)	113	30	65	48.79	5.306
Training (X ₂)	113	30	50	45.49	4.238
Work Environment (X ₃)	113	30	60	48.96	7.558
Teacher Performance (Y)	113	45	75	63.35	5.818

The results of the analysis above show that the number of observations (N) is 113. Discipline (X₁) has an average of 48.79 with a standard deviation of 5,306. Training (X₂) has an average of 45.49 with a standard deviation of 4.238. Work Environment has an average of 48.96 with a standard deviation of 7.558. The dependent variable Teacher Performance (Y) has an average of 63.35 with a standard deviation of 5,818.

Multiple Regression Analysis

Multiple linear regression was used to determine the magnitude of the influence of discipline, training and work environment on the performance of SDIT Darussalam Batam teachers. Through SPSS calculations, the formulation of the regression analysis can be seen in table 5

Table 5. Results of Multiple Regression Analysis

Model	Unstandardized Coefficients	t	Sig.
-------	-----------------------------	---	------



		B	Std. Error		
1	(Constant)	27.524	5.267	5.404	0.000
	Discipline	0.275	0.081	3.235	0.002
	Training	0.188	0.069	2.752	0.007
	Work Environment	0.687	0.128	6.393	0.000

Based on the results, the multiple linear regression formula equation is obtained as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

$$Y = 27.524 + 0.275X_1 + 0.188X_2 + 0.687X_3 + e$$

The explanation of the regression equation is: (1) The constant value is 27,524, which means that if discipline, training and work environment are 0 then teacher performance is 27,524; (2) For the discipline variable (X1) the regression coefficient is positive (0.275). This can be interpreted as if discipline (X1) increases by one unit then teacher performance (Y) also increases by 0.275; (3) For the training variable (X2) the regression coefficient is positive (0.188). This can be interpreted as if training (X2) increases by one unit then teacher performance (Y) also increases by 0.188; (4) For the work environment variable (X3) the regression coefficient is positive (0.687). This can be interpreted as if the work environment (X3) increases by one unit, then teacher performance (Y) also increases by 0.687.

Hypothesis Test Results

t Test (Partial)

Based on the results of partial hypothesis testing as presented in Table 5, it can be explained as follows: (1) The calculated t value of disciplin is 3.235 with a significance value of $0.002 < 0.05$, which means that discipline partially has a positive and significant effect on teacher performance. The higher the teacher's discipline, the higher the teacher's performance will be. The research results that discipline has a significant effect on employee performance in this research are in line with the results of research conducted by Irpani (2021), Arif *et al* (2020), and Ariesni (2021). (2) The calculated t value of training is 2,752 with a significance value of $0.007 < 0.05$, which means that training partially has a positive and significant effect on SDIT Teacher Performance. The higher the teacher training, the higher the teacher's performance will be. The research results that training has a significant effect on teacher performance in this study are in line with research conducted by Rahmawati (2021), which states that training has a positive and significant effect on teacher performance. (3) The calculated t value for the work environment is 6,393 with a significance value of $0.000 < 0.05$, which means that the work environment partially has a positive and significant effect on the performance of SDIT teachers. The higher the work environment, the higher the teacher's performance will be. The results of this research are in line with those conducted by Diah (2022), Rahman (2020), Rahmawati (2021), Fitriani (2023), and Mujib (2013) which stated that the work environment has a positive and significant effect on teacher performance.

F Test (Simultaneous)

Based on the F test as the results presented in Table 6, it is known that the calculated F value is 26,816 with a significance value of $0.000 < 0.05$, so H_0 is rejected, H_a is accepted. It can be concluded that simultaneously Discipline (X1), Training (X2), and Work Environment (X3) have a significant effect on SDIT Teacher Performance.

Model	Sum of Squares	df	Mean Square	F	Sig.
-------	----------------	----	-------------	---	------



**Table 6. F
Results**

1	Regression	1436.801	3	478.933	26.816	.000
	Residual	2056.231	109	18.864		
	Total	3493.032	112			

Test

Coefficient of Determination Test

The Adjusted R-square multiple determination coefficient value obtained in this study was 0.573 or 57.3%. This value shows that 57.3% of teacher performance variables can be explained by discipline, training and work environment variables. Meanwhile, the remaining 42.7% can be explained by other variables not included in this research model

Table 7. Coefficient of Determination Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.768	.589	.573	4.368

4. CONCLUSION

The conclusions obtained from this research are: Discipline has a positive and significant effect on teacher performance at SDIT (2) Training has a positive and significant effect on SDIT teacher performance (3). The work environment has a positive and significant effect on teacher performance at SDIT. (4). Together, discipline, training and work environment have a significant effect on SDIT teacher performance

5. ACKNOWLEDGMENTS

Thank you to the Darussalam Foundation, the Principal of SDIT and the teachers who agreed to be respondents in this research.

REFERENCES

- Agustini, F., (2011). *Manajemen Sumber Daya Manusia Lanjutan: Pendekatan Pengelolaan Sumberdaya Manusia Sebagai Kompetensi Inti Dalam Suatu Organisasi*, Madenatera, Medan.
- Arif, M., Maulana, T., & Lesmana, M. T. (2020). Pengaruh Disiplin Kerja dan Kemampuan Kerja Terhadap Prestasi Kerja Karyawan. *Jurnal Humaniora*, 4(1), 106–119. <https://doi.org/10.30601/humaniora.v4i1.515>.
- Ariesni, S., Lise Asnur. (2021). Disiplin Kerja terhadap Kinerja Karyawan 2021. *Jurnal Penelitian dan Pengembangan Sains dan Humaniora*, Vol. 5, No. 3, 2021, pp. 363-369
- Amaliyyah (2017). *Pengaruh Motivasi Kerja dan Disiplin Kerja Terhadap Kinerja Guru Yayasan Swadipa Natar TP. 2015/2016*. [Tesis]. Lampung: Universitas Lampung.
- Ainamulyana. (2018). Indikator dan Faktor Yang Mempengaruhi Kinerja Guru.



- Diah Puji Alfiah, Sri Nawatmi. (2022). Pengaruh Lingkungan Kerja, Kepuasan Kerja, dan Beban Kerja terhadap Kinerja Karyawan BLU UPTD Trans Semarang. *SEIKO: Journal of Management & Business*, 5(2), 2022
- Eliyanto. (2018). Pengaruh Motivasi Kerja dan Lingkungan Kerja Terhadap Kinerja Guru SMA Muhammadiyah di Kabupaten Kebumen. *Jurnal Pendidikan Madrasah*.
- Fikratunil Khasifah, Rini Nugraheni. (2016). Pengaruh Disiplin Kerja, Beban Kerja Dan Lingkungan Kerja Terhadap Kinerja Pegawai (Studi Pada Balai Besar Wilayah Sungai Pemali Juana). *Diponegoro Journal Of Management Volume 5, Nomor 1, Tahun 2016, Halaman 1-7*
- Fitrianis, Sudarno, Agus Joko Purwanto. (2023). Pengaruh Lingkungan Kerja dan Budaya Organisasi Terhadap Kinerja Guru Sekolah Dasar Negeri di Kecamatan Marpoyan Damai Kota Pekanbaru. *Aksara Jurnal Pendidikan Non Formal Vol 9 No 3*.
- Ghozali. (2016). *Aplikasi Analisis Multivariate dengan Program SPSS*. Semarang: Badan Penerbit Universitas Diponegoro.
- Hernowo Narmodo dan Farid Wajdi. (2009). *Pengaruh Motivasi dan Disiplin terhadap Kinerja Pegawai Badan Kepegawaian Daerah Kabupaten Wonogiri*. Wonogiri: Tesis, Program Magister Sains.
- Irpanti, I, Suprayitno, Sutarno. (2021). Pengaruh Kemampuan Kerja, Lingkungan Kerja Dan Disiplin Kerja Terhadap Kinerja Pegawai Dinas Kesehatan Kabupaten Karanganyar. *Jurnal Ekonomi Dan Kewirausahaan Vol. 21 No. 1*
- Lutfah, A., Hariyati, N., Hand ayaningrum, W. (2019). Improved Teacher Performance Through Work Culture And Environment. *International Journal for Educational and Vocational Studies, Vol. 1, No. 8, December 2019, pp. 859-863*
- Mardiana, M. (2011). *Manajemen Produksi*. Jakarta: Badan Penerbit IPWI.
- Mujib, M.K. (2013). *Pengaruh Lingkungan Kerja terhadap Motivasi Kerja Pegawai Perpustakaan Di Universitas Negeri Yogyakarta*. Fakultas Ilmu Pendidikan Universitas Negeri Yogyakarta.
- Muspawi, M. (2021). Strategi Peningkatan Kinerja Guru. *Jurnal Ilmiah Universitas Batanghari Jambi, 21(1), Februari 2021, 101-106* Lembaga Penelitian dan Pengabdian kepada Masyarakat Universitas Batanghari Jambi ISSN 1411-8939 (Online), ISSN 2549-4236
- Nitisemito, Alex S. (2010). *Manajemen Personalia, Manajemen Sumber Daya Manusia*. Jakarta: Ghalia Indonesia.
- Nabawi, R (2019). Pengaruh Lingkungan Kerja, Kepuasan Kerja dan Beban Kerja Terhadap Kinerja Pegawai. *Jurnal Ilmiah Magister Manajemen: Vol 2, No. 2, September 2019, 170-183*
- Pramudyo, A. (2010). Analisis Faktor-Faktor yang Mempengaruhi Kinerja Dosen Negeri Dipekerjakan pada Kopertis Wilayah V Yogyakarta, *Jurnal Manajemen Sumberdaya Manusia, Vol 1(1)*.
- Rivai (2018). *Manajemen Sumber Daya Manusia Untuk Perusahaan*. Bandung: Aditama
- Rahmawati, E., Kholid, I., Riyuzen. (2021). The Effect of Training and Teaching Experiences on the Performance of Elementary School Teachers (Pengaruh Pelatihan Dan Pengalaman Mengajar Terhadap Kinerja Guru Sekolah Dasar). *Journal of Contemporary Islamic Education (Journal CIE) Vol.1, No.2, pp. 154-164*.
- Rahman, A., Fakhruddin, Burhanuddin, Firman (2020). Pengaruh Motivasi Dan Lingkungan Kerja Terhadap Kinerja Guru Dan Pegawai Pada SMP Negeri 2 Balaesang Kabupaten Donggala. *Jurnal Sinar Manajemen) Artikel 1 Volume 07, Nomor 02, Agustus 2020*
- Sutrisno, E. (2016). *Manajemen Sumber Daya Manusia*. Kencana Prenada Media Group.



- Suryana, D.I dan Eddy M.S. (2018). Hubungan Lingkungan Kerja, Disiplin Kerja, dan Kinerja Karyawan. *Jurnal Manajemen dan Kewirausahaan*, Vol 17(2). 2018.
- Suwardi dan Joko Utomo, (2017), Pengaruh Motivasi Kerja, Kepuasan Kerja dan Komitmen Organisasional Terhadap Kinerja, *Jurnal Analisis Manajemen Vol. 5(1)*.
- Sugiyono. (2016) *Metode penelitian kuantitatif, kualitatif dan R&D*. Bandung: Alfabeta.
- Suprayitno. (2017). Pengaruh disiplin kerja, lingkungan kerja dan motivasi kerja terhadap kinerja karyawan". *Jurnal Manajemen Sumberdaya Manusia, Vol 2(1)*
- Yamin, Martinis & Maisah. (2010). *Standarisasi Kinerja Guru*. Jakarta: Gaung Persada.



THE INFLUENCE OF KI HAJAR DEWANTARA'S EDUCATIONAL LEADERSHIP IN CIVIC EDUCATION LEARNING

Ahsyabila Fazira¹, Dasim Budimansyah^{2*}, Sapriya³

¹Magister Student of Indonesia University Of Education, Bandung, Jawa Barat.

^{2,3}Lecturer Profesor of Indonesia University Of Education, Bandung, Jawa Barat

*ahsyafazira@upi.edu

ABSTRACT

This research, based on a survey by researchers, found that the Citizenship Education learning process has not achieved maximum results according to the expected goal, namely becoming a human being with noble character and noble character in accordance with the Pancasila ideology. Of course, there are many aspects that influence it, including internal and external students, personal educators, families and the community environment. Ki Hajar Dewantara is an educational hero who should be used as a role model for Indonesian educators. So this makes researchers want to analyze how Ki Hajar Dewantara's educational leadership through the Fatwa Ngandel Kandel Kendel Bandel which he put forward was for the legacy of Indonesian education. This research was conducted using a qualitative approach and analytical descriptive methods. So researchers themselves must analyze in depth the Educational Fatwa of Ki Hajar Dewantara Ngandel Kandel Kendel Bandel from a number of existing documents or literature, interviews with experts and triangulated data in detail, to see and ensure the relevance and new innovations for citizenship education. in terms of planning, implementation and evaluation of learning.

Keywords: *Ki Hajar Dewantara, Civic Education, Educational Leadership, Reinforcement of Learning, Development*

1. INTRODUCTION

As is known by the Indonesian people, the National Figure of Indonesian Education, Ki Hajar Dewantara, is a true warrior who pioneered the education of the Indonesian nation. Ki Hajar Dewantara's full name is Raden Mas Suwardi Suryaningrat, born in Yogyakarta on May 2 1889. Which was later commemorated as national education day for the Indonesian people as a national celebration. Apart from being involved in the field of education, he sparked ideas in the fields of politics and education (Rahardjo, 2020, hlm. 9). This idea paved the way for Indonesian education. Even though Indonesia has become independent, education will always be the main foundation in advancing and prospering the Indonesian nation. With good education, people will taste the sweet fruit of education. Good education starts from the family, because parents are a reflection for their children. So being a parent is not an easy thing (Wiryopranoto, Herlina, Marihandono, Tangkilisan, 2017, hal. 14). It takes a process to teach and educate children until the end of their lives. Because children will always imitate the behavior of their parents, therefore both parents need to be good figures for their children. According to Ki Hajar Dewantara's view, the boys and girls we educate in the future as the successors of the Indonesian nation, they all have their own nature of life, thus the role of the family is the main thing in supporting and guiding good education for their children (Dewantara, 2013). As is the case, the aim of Citizenship Education is so that Indonesian citizens can become good and intelligent citizens and understand their rights and obligations.

Based on the mandate in the 1945 Constitution, the second and fourth paragraphs state the ideals and hopes of the Indonesian people regarding independence. Then article 31 paragraph 1 states that every Indonesian citizen has the right to receive instruction. On the basis of the regulations of Law No. 20 of 2003 concerning the basis, functions and objectives of the national education system, the principles of implementing education, the rights and obligations of citizens, parents, society and government, students, pathways, levels and types of education, language of instruction, and compulsory education.

Thus, the influence of education is very important for people's lives. National education must be balanced with the nation's daily life. According to (Ki Hajar Dewantara, 2013) National Teaching must begin within the



nation's children so that they can survive and have a sense of love for their country and not be separated from their nation in order to prevent opposition from occurring in the life of their own nation. National education is the right and obligation of the government in Indonesia to provide for the needs of the Indonesian people, one of which is Citizenship Education. For example, the Indonesian nation is a nation that is known to be friendly and polite in its behavior or has good manners, ethics and morals. So, with education, the Indonesian people can preserve positive habits which are the characteristics or differences between the Indonesian nation and other nations. With a sense of politeness embedded in the Indonesian people, it will become a safety fence for the welfare of the Indonesian people. Therefore, good manners must be taught, taught from childhood to adulthood until they become parents.

It is not surprising that according to Ki Hajar Dewantara, Indonesian education should provide a full feeling of values and morals. People must be able to stand firm in their right to govern themselves, including the importance of education. In today's life, our nation has mixed with the cultures of other nations, the flow of globalization is a trigger for behavior and we are powerless to stop it (Macaryus, 2010, hal. 10). However, we must also have the courage to admit that cultural acculturation can have a good impact on Indonesian citizens. For example, in this modern era which has entered the digital era with the development of innovation in the fields of telecommunications and information which has an impact on socio-cultural changes in Indonesian society. People who usually often interact with their neighbors because they have been affected by the impact of modernization have seen a change in direct interaction which has shifted to social media found on smartphones. And this is an example of cultural acculturation. The negative impact is that the younger generation continues to follow foreign cultural styles such as Korean, Japanese or Western habits and people who increasingly have individualistic attitudes.

With good National Education, you can raise the status of the country and its people without separating religion, character, customs, arts, ethnicity, nation, religion, race and culture as the ancestral heritage of the archipelago. In this way, we should have the courage to face the challenges and threats that will occur in the future, including the new domination of the mixing of nations caused by globalization and modernization. So, to create a good future generation for the nation, that is by mastering oneself in education and character. If humans already have noble character, then their intelligent thinking will definitely adhere to good principles. Will not be deterred or easily swayed by circumstances or momentary pleasures. Education should be able to deliver people to have principles of life, stand up straight. As is meant by Ki Hajar Dewantara's fatwa Ngandel, Kandel, Kendel, Bandel. Because if a person is upright, he will undoubtedly be able to guide himself from activities that are not beneficial to his life. Education will lead someone to become brave and authoritative. Because an educated person is a person who is able to uphold honesty and justice consistently and well in facing all life's obstacles.

Ki Hajar Dewantara's fatwa, apart from being advice and teaching, is also a motivation for the Indonesian people to achieve success. The word stubborn often has a negative connotation, such as a nickname given to children who are disobedient and often violate rules and norms. However, the word Bandel has a positive meaning, namely someone who is stubborn has strong and solid principles in his life. The learning process does not only explore facts or concepts but also involves students' emotions or feelings. According to Muhammad Assori (2009, hlm. 6) In fact, in the field the learning process is not only based on the learning implementation plan but also involves experiences beyond full awareness consisting of five senses including: the senses of sight, hearing, smell, taste or taste and touch. In this way, the learning process will run interactively, effectively and participatively.

Considering the many cases of educational problems in Indonesia, globalization and modernization should not undermine the identity and moral reality of Indonesian children. The Indonesian nation is a nation known for its good morals. It is good to prioritize morality not only in school but also in implementing it in the daily lives of students.

Because the development of student morality is dynamic, Citizenship Education Learning should be the spearhead in developing student morality, this is the case with Ki Hajar Dewantara's fatwa "Ngandel, Kandel, Kendel, Bandel" researchers want to analyze this fatwa if it is realized whether it can answer education issues in Indonesia through contributions from the Citizenship Education subject. The researcher also wants to introduce Ki Hajar Dewantara's fatwa which is not yet known to the general public, and how it relates to the study of Citizenship Education which is expected to provide efforts in overcoming educational problems in Indonesia.



2. METHODS

Based on the aspects of the problem discussed, this research uses a qualitative approach with analytical descriptive methods. According to Arikunto (2019, hlm. 136) Research methods are the main method used by researchers to achieve goals and determine answers to the problems posed. According to Sugiyono (2018, p. 213) qualitative research methods are research methods based on the philosophy of postpositivism (phenomenology to be precise), which are used to research scientific conditions where the researcher himself is the instrument, qualitative data collection and analysis techniques place more emphasis on meaning. Qualitative research methodology aims to analyze and describe phenomena or research objects through social activities, attitudes and perceptions of people individually or in groups. Meanwhile, according to Nazir (2014, p. 26) states that the scientific research method can be said to be a pursuit of truth that is governed by logical considerations.

So it can be concluded that a research method is a systematic method or procedure carried out to obtain the truth, circumstances of, a reason for, consequences or phenomena that are regulated by logical considerations supported by sufficient data as concrete evidence that can be seen, observed and even experienced by everyone (objective; not a personal assumption). Because this research applies a non-interactive qualitative approach, namely the researcher is involved with the research subject continuously by using an analysis of Ki Hajar Dewantara Ngandel Kandel Kendel Bandel's educational fatwa through document analysis. In this research, information will be collected related to the works of Ki Hadjar Dewantara or the works of other people regarding the father of education. Therefore, the research method used in this research is library research.

Library research is a series of activities related to methods of collecting library data, reading and taking notes and processing research materials. The collected notes are selected and marked and then designated as research data. Next, the collected data is processed by separating and merging based on similarities and differences in the characteristics of the collected data, then analyzed and interpreted. The analysis technique used is content analysis. After analysis and interpretation, researchers held discussions with experts.

Researchers carried out data collection techniques using documentation methods (Sugiyono, 2015, p. 82). Regarding the data collection techniques used, the instrument of this research is the researcher himself (Sugiyono, 2015, p. 61) who collected as much data as possible from primary data sources, namely the book created by Ki Hajar Dewantara himself entitled "The Work of Ki Hajar Dewantara part I Education" and secondary data sources in the form of national journals that discuss Ki education theory. Beat Dewantara. Apart from that, researchers must also look for other sources related to the theory of Citizenship Education so that they can be used as comparisons to Ki Hajar Dewantara's theory, so that it will be easier to find whether there is a relevant relationship between the two concepts. After the data is found, because this research uses a qualitative approach, the next step is a data analysis activity with stages of carrying out data analysis before entering the field, and while in the field (Sugiyono, 2015, p. 90). The analysis carried out before coming to the field was carried out on the results of the preliminary study which was then used as the focus of the research. Furthermore, analysis while in the field was carried out in three stages, namely, (1) Data reduction; (2) Presentation of data, and: (3) Drawing conclusions.

Because this research is a character study, sufficient descriptive and analytical skills are required. This was done to answer a series of research problems that had been previously formulated. According to Arikunto (2019, p. 136) research methods are the main method used by researchers to achieve goals and determine answers to the problems posed. Meanwhile, according to Sugiyono (2018, p. 213) qualitative research methods are research methods based on the philosophy of postpositivism (phenomenology to be precise), which are used to research scientific conditions where the researcher himself is the instrument, qualitative data collection and analysis techniques are more pressing. on meaning.



3. RESULTS & DISCUSSION

Based on document analysis activities on research sources, namely the fatwa of Ki Hadjar Dewantara Ngandel Kandel Kendel Bandel in Citizenship Education Learning, various findings were obtained after going through a data reduction process and adjusted to research needs:

1. Ki Hajar Dewantara's Personality Image

Ki Hajar Dewantara appeared as a rebel figure for the Dutch colonialists. And that's true, he was a brave figure who questioned the colonialist government's policies, analyzed them sharply to find errors or truths, and even opposed them openly by writing correct and clever writings, speaking loudly and showing the authority of true leadership. As a result of this action, he often had dealings with the colonialists. His safety is also threatened. Despite this, his fighting spirit never faded. The flow of thoughts and ideas regarding how to shape human intelligence in Indonesia and awareness of their human rights has never faded. He is not too worried about the risks that could befall his safety. Apart from undergoing internment in the Netherlands, he even sharpened the focus of his struggle in and through the field of education. (Samho, 2013, p. 25)

Ki Hajar Dewantara demonstrated true leadership in fighting for Indonesian humanity in his daily life. In his life among his family, he was very close to all his family members, full of fatherhood, patient, caring, firm and authoritative. Friends and all members of his family praise him as a figurative head of the family who has different feelings, is responsible and merciful to everyone, and his wisdom in leading his family is recognized by many parties and shines through in his exemplary leadership in political organizations, especially at Taman Siswa College. (Samho, 2013, p. 26)

During the struggle to pioneer Indonesian independence and defend Indonesian humanity which was oppressed by the arbitrariness of the Colonial Government, Ki Hadjar Dewantara has demonstrated his quality, totality and integrity as a true Indonesian man. His influence in shaping the mentality and personality of the younger generation in Indonesia during the struggle and at the beginning of the independence period was recognized and praised by all figures in Indonesia. In his family, he is a father full of love and warmth. Meanwhile for his nation, he was a true leader, politician and educator who devoted himself totally. He is one of the true leaders and educators that the history of the Indonesian nation has. (Samho, 2013, p. 26)

2. Review of Ki Hajar Dewantara's Education Fatwa

To build a strong future for the nation, of course the important thing that must be done is to provide quality education for the nation's children. Without differentiating between lower and upper levels of society. Everyone has the right to education. Ki Hajar Dewantara (in Macaryus, 2009, p. 29), through good education, the Indonesian generation will be able to support themselves and their families, which will ultimately create strength for each individual and also the strength of the nation. Education must be pursued up to the level of higher education because the higher a person's education, the greater the influence on the life he will live throughout his life.

However, we know that the situation and conditions of education in Indonesia in the current era still prioritize intellectualism and lack of highlighting the perspective of improving personal character. Tarpin (in Samho, 2013, p. 13). The evidence encountered by the Indonesian people today is characterized by rampant violence, vertical and horizontal conflict, unable to control emotions, fanaticism, corruption, an attitude of not caring about each other, an attitude of injustice, an attitude that justifies any means, a pragmatic attitude, oppression of the weak by the weak. the strong one. As a result, a number of graduates have mere academic excellence, but are poor in character, blind in conscience, and have no sense of concern for what is happening in the local area so they are easily provoked, narrow-minded, and view other humans as enemies and rivals who must be destroyed. According to Tarpin in (Samho, 2013, p. 13). As is the case with our current Minister of Education, Mr. Nadiem Anwar Makarim, reviving the concept of education from the thoughts of Ki Hajar Dewantara, namely the independent learning policy program. The substance of freedom of thought must be initiated by teachers before they explain it to students. It is hoped that the Independent Learning Program policy will have a positive impact on aspects of life. Starting from physical, mental, bodily and spiritual in the world of education. In accordance with Permendikbud No. 1 of 2022 concerning the independent learning policy in



determining the graduation of students and the implementation of accepting new students, also No. 56 of 2022 concerning Guidelines for Implementing Curriculum in the Context of Learning Recovery (Kruikulum Merdeka), then which has already been preceded by universities with the stipulation Minister of Education and Culture Regulation Number 3 of 2020 concerning the Independent Campus Learning Policy regarding National Higher Education Standards. So, the policy regarding Freedom of Learning was planned and decided long ago in the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 22 of 2020 concerning the Strategic Plan of the Ministry of Education and Culture for 2020-2024. However, the task of educators is to be a facilitator and motivator for students without changing or violating the nature of students so that they can improve their behavior. This means that children's lives and development are beyond the capabilities of educators. So, according to him, children are human beings who live and grow based on their own nature. Ki Hajar Dewantara (in Joesoef, 2009, p. 3) He also stated in the Inauguration of Dr HC UGM 1956 (in Tan-Sri Zulfikar, 2015, p. 68) that national education is the location where the embryo of culture grows and resides in society nationality and culture are preserved so that elements of customs

Likewise with education, although it can only guide students, its benefits for students are enormous. According to Ki Hajar Dewantara, it is possible that a child who was initially good, due to the influence of bad conditions and situations, may become a bad person. For example, if a child lives in a situation where there is a lack of attention, poverty, and does not receive religious and moral teachings in the family, the child may be exposed to negative impacts.

In connection with the above, Ki Hajar Dewantara has 11 pieces of advice that must always be put into practice, reflected on and embodied in life, namely the Fatwa on the Joint of Independent Living because all knowledge, messages and ideals in life require understanding, awareness and steadfast implementation. Everyone must understand what they mean and where they want to go in life. He must understand what he means and where he wants to go in life.

The following are the highlights of the fatwa for living freely, namely:

1. Opposite Literature Ngesti Mulya, which means Through Knowledge We Approach Glory. This is what Ki Hajar Dewantara hopes for, namely the glory of the homeland, nation and people of Indonesia. Because knowledge is the path to the highest degree.

2. Herdjendrajuningrat Pangruwating Dyu Literature, which means Sublime Knowledge will Sustain the World and Destroy Savagery. This fatwa means that knowledge is a provision for oneself to survive in this world and in the afterlife. With knowledge we can avoid bad or evil actions.

3. Holy Tata Ngesti Tunggal, which means inner purity, inner peace, approaching perfection. This fatwa orders humans to always improve their inner purity and orderly outer life in order to live a perfect life.

4. Self's right to demand greetings and happiness.

Every human being has the same rights and obligations in obtaining happiness, physical and spiritual well-being as well as adhering to the religion he believes in, but in pursuing the external world he must be in harmony with seeking and cultivating inner happiness.

5. Greeting yourself for happiness must not violate the peace of society

What this means is advice for the Indonesian people, who include various ethnic groups, to always maintain tolerance in all matters. Individuals should not become apathetic or selfish without thinking about the rights of other people in need, we as an Indonesian nation should always uphold collective interests above personal and group interests.

6. Natural Nature is the Guide to a Perfect Life



This fatwa makes us aware that we as humans need guidance in life, without denying that we as humans are weak without God's strength, so we as humans must live according to nature which has become God's rule and power. Whether living as an individual, a nation or even a member of the realm of humanity.

7. The natural world of human life is a rounded nature

In this fatwa, it is explained that we as humans live side by side with various special natural environments, namely the self, national and human nature, which then mutually influence each other, including in our innermost sense of self, sense of nation and sense of humanity.

8. Free from all ties and pure heart dedicated to the child

This fatwa provides a warning and encouragement for educators to always be sincere and sincere in serving the nation and state, especially in educating students.

9. Stay Steady Antep

In this Fatwa, Tetep means heart and unshakable principles, antep means weight, quality and steady means sticking to one's choice. This is advice that must be followed in our lives so that we are always serious in choosing whatever we choose in life, such as work or making decisions, so that we are not easily hampered, held back or resisted by other people.

10. Ngandel Kandel Kendel Bandel

In this fatwa, Ngandel means trust, confidence in God and one's own strength, Kandel means thick trust or thick faith, Kendel means brave because it is right, not afraid, anxious or prejudiced, Bandel means enduring physical and mental tests, not easily giving up or giving up hope. trust. To fight for the ideals and goals of life as a human being. Because these four characteristics are interrelated with each other, whoever can believe in his own abilities and then believe in God will be brave in following and defending the truth, then will put his trust in or endure all the tests that befall him in life without giving up on God's grace.

11. Neng Ning Nung Nang

In this Fatwa, Neng means "Meneng: that is inner peace, Ning from the word "Wening" which means clear, clear mind, Nung from the word "Hanung" which means strong, peaceful, having will, Nang from the word "win" or authority" which means authority and power. regarding our business. These four characteristics are related to each other. Anyone who has a calm mind, is calm, is quiet, is not emotional, and has a strong will will win. With the fatwa delivered by Ki Hadjar Dewantara, it is clear that we as the nation's next generation should consistently remember and emulate this fatwa in our daily lives. So that we can optimize the perfection of life, namely a life in balance with nature and society. That's why we have to fight new influences that have an adverse impact on our survival. We must always be alert in determining what positive things add to the goodness of life and what hinders us by always reflecting that all developments in science and technology are God's gift to humans in the world, even though the destiny of each human being has been determined based on God's decree. However, the task of humans is not to give up on their grace because humans have been given reason and conscience for their survival in the world. Because we need to understand properly and correctly, people generally think that education is about the demands of human life and has nothing to do with inner happiness, whereas although everyone needs to fight for the safety of external life, the first thing is the happiness of human inner life.

3. Ki Hajar Dewantara's Learning Method

Self-control is a method for realizing humanistic education. When students are skilled at controlling themselves, people can consistently be firm in determining their attitudes and actions. In this way, an independent and mature attitude is ingrained. Ki Hadjar shows that the aim of realizing education is to support students to become independent human beings.

Education is a process that does not merely transfer knowledge, but also transfers values. "Education also aims to increase human potential and creativity so that they can survive in the future." (Noviani, Rajab and Hashifah, 2017, p. 160). Looking at the development of the nation's children, who are increasingly becoming the



concern of others because they have lost their original personality. As a result, there are many internal and external influences that make the nation's children not love their nation's culture.

Even though efforts to deal with current educational problems are not easy, it is the concepts, fatwas and methods of education and teaching that should not be ignored as a reference for our next generation. There are many suggestions, solutions and examples in dealing with educational problems, such as past educational ideas which are still relevant to serve as guidelines for Indonesian education today. If we compare ancient times and today, we will get the main differences.

The existence of new influences can originate from the association of one nation with another, which is basically the current social interaction that is very easy to be carried away by modernization. Thus, we should be wary of always sorting and choosing whatever things are good for gaining glory in life, and also whatever things will discredit us. Ki Hajar Dewantara (in Joesoef, 2009, p. 2010)

In this way, a teacher does not set a method of coercion, but instead provides support so that children can understand and understand what is important for themselves, their environment and society and provides role models so that students become individuals who can take responsibility for their duties inside and outside the classroom. Then educators can immediately jump in if the child's life is seen as being on the wrong or bad path. However, in principle it is not forced. The contribution of educators to children's lives is of course in the realm of coaching and based on the belief that children are individuals whose rights must be respected. So it can grow based on its nature.

In Ki Hajar Dewantara's view, education is an effort to mature humans using the among (megging) method without forgetting the three educational fatwas above. The process of maturing students physically and mentally is the origin or basis for them to prepare to live in society with a full sense of responsibility.

4. Citizenship Education Learning

Learning is an explanation of how information is obtained, processed in students' minds, which is expected to increase students' understanding as a result of learning. (Fajar, 2009, p. 9). According to Gagne (1985) for learning to occur requires internal and external conditions. So that learning outcomes are formed which consist of intellectual abilities, cognitive strategies, verbal communication, motor skills and good attitudes or behavior. With this, citizenship education learning in the classroom should be able to form morals or manners that are in accordance with the principles of citizenship which will be implemented in their lives in society (Sapriya, 2011). Therefore, citizens have a responsibility and are obliged to behave according to the applicable rules.

From this explanation, as we know, wherever we live and are in a place, we cannot be separated from the rules that have been set. Then as citizens we also have authority. Authority is power combined with the right to be able to use power" (Sapriya, 2011). For example, authority that can be felt in everyday life is in the roles of parents, teachers, police and government officials. For example, a teacher has the authority to lead the class and maintain order in the class.

5. Citizenship Education Learning Methods

In the learning method, Ki Hadjar Dewantara emphasized that the goal of education is self-control, because this is where education starts to humanize or humanize humans. Self-control is a method for realizing humanistic education. When students are skilled at controlling themselves, people can consistently be firm in determining their attitudes and actions. In this way, an independent and mature attitude is ingrained. Ki Hadjar shows that the aim of realizing education is to support students to become independent human beings. Therefore, a free human being means that he does not live under orders, stands tall with his own steadfastness, and is good at managing his life in an orderly manner. "In other words, education results in a person being obedient to the rules, but cannot be ordered as he pleases, but rather towards maturity in thinking in behavior and action, up to adhering to the values of justice, equality and the value of cultural, sensible and beneficial ties of brotherhood. good for himself, as well as others." (Tan-Sri Zulfikar, 2015, p. 174). Education is a process that does not merely transfer knowledge, but also transfers values. "Education also aims to increase human potential and creativity so that they can survive in the future." (Noviani, Rajab and Hashifah, 2017, p. 160). Looking at the development of the nation's children, who are increasingly becoming the concern of others because they have lost their original



personality. As a result, there are many internal and external influences that make the nation's children not love their nation's culture.

So Ki Hajar Dewantara's learning method (in Rahardjo, 2020, p. 82) even though it looks classic, is still very adequate today in accordance with the mandate and principles of Pancasila and also the 1945 Constitution. Ki Hajar rejects teaching and education styles that are not based on the basics of life. Indonesian nation. According to him, education and teaching must form the nation's next generation who are proud of their own culture, so that a sense of love for their identity as a unique, autonomous and one nation will grow.

This understanding shows that Ki Hajar Dewantara thinks and is determined and has the power to predict the future, futuristically. It is also clearly stated that education and teaching in Indonesia should always strive for improvement. Meanwhile, in his instructions as Minister of Education, Teaching and Culture addressed to school principals in Java, September 29 1945 in Jakarta (Macaryus, 2010, p. 28) he stated "Base all educational and teaching efforts on the basis of Indonesian nationality in the sense of which is broad, high and deep, and is only limited by the terms of Human Adab as intended by all religious teachings." This means that Ki Hajar Dewantara's thoughts have become a figure and image in the history of Indonesian education. Even though efforts to deal with current educational problems are not easy, it is the concepts, fatwas and methods of education and teaching that should not be ignored as a reference for our next generation. There are many suggestions, solutions and examples in dealing with educational problems, such as past educational ideas which are still relevant to serve as guidelines for Indonesian education today. If we compare ancient times and today, we will get the main differences. In the past, people prioritized knowledge, whereas now people are starting to prioritize children's needs. Apart from that, in ancient times, wisdom was the ultimate goal, whereas now it is only a tool to perfect life. Good education and teaching must have a natural nature, in order to know that natural nature, every human being must cultivate wisdom or cleanliness of mind, which must be applied to achieve the goal of thinking, refinement of feelings, and determination of the will, or in other words, perfection of creativity-feeling. intention.

Then, the aim of education is to ensure the integrity of human life so that it can cover all the physical and spiritual needs that are obtained from nature. All provisions, efforts and methods of education must be balanced with the nature of the situation. The nature of the situation is contained through the customs of each region with its diverse ethnic groups so that it becomes an Indonesian nation. With the different characteristics between one custom and another, this creates a mix of all forms of efforts to live in an orderly, peaceful manner. Customs are the nature of efforts to live in an orderly and peaceful manner, although they are not free from the influence of "time" and "nature". To interpret the permanent lifeline of a nation, we need to understand the past era, study it to identify that era, to predict it in the current era, in order to conclude the current era, and then be able to make us aware of the future era. The existence of new influences can originate from the association of one nation with another, which is basically the current social interaction that is very easy to be carried away by modernization. Thus, we should be wary of always sorting and choosing whatever things are good for gaining glory in life, and also whatever things will discredit us. Ki Hajar Dewantara (in Joesoef, 2009, p. 2010)

For this reason, Ki Hajar Dewantara's opinion is that the educational method that suits the personality and culture of Indonesian people is that there is no element of coercion. Because the Indonesian people are classified as an eastern nation, a nation that always lives by values consisting of refined tastes, a life full of compassion, loving peace, close brotherhood, orderliness, honesty and politeness in speaking and acting, and also respecting human equality. between each other. These values are fostered from early childhood education. This means that students are given a platform to explore their own potential and express themselves creatively, independently and responsibly. Meanwhile, educators or tutors are people who guide the procedures and realization of exploring students' self-potential so that it sticks and is not destructive for himself and each other.

Ki Hajar Dewantara believes that Indonesian education should be uniquely guided by Indonesian cultural values, so he created three educational mottos that show the uniqueness of Indonesia, namely, first, Ing Ngarsa Sang Tuladha, meaning an educator is always at the front to set an example, namely a leader who provides an example in terms of words and actions so that they are worthy of being emulated by their students. Second, Ing Madya Mangun Karsa, means that an educator is always in the midst of students and continuously initiates or motivates students to work, builds intention, enthusiasm and fosters ideas so that students can be productive in



their work. Third, Tut Wuri Handayani, means that an educator always supports and sustains (encourages) his students to work in the direction that is good and right for society. Educators accompany their students from behind, giving them freedom of movement and influencing them with their abilities, if necessary with firmness if the freedom given to students is used to distort and endanger their lives. Ki Hajar Dewantara (in Tauhid, 1963, pp. 36-37).

In line with the three educational mottos, educational methods that are appropriate for building the character and identity of the next generation of the Indonesian nation are those that are in line with the meaning of "pedagogic", namely Momong, Among and Ngemong, which means that education is actually nurturing, educating children to become independent human beings at heart. , freedom of thought, freedom of energy. Meanwhile, Ngemong anak means giving the child freedom to move according to his wishes, but the tutor will act, if necessary, with firmness, if the child's wishes become potentially dangerous for his safety. Meanwhile, educational efforts using the among method include:

1. Setting an Example: Educators provide good and moral examples to their students.
2. Habituation: Each student trains themselves to carry out their obligations as a student; members of society in balance with the rules of social life
3. Teaching: Educators provide teachings to increase students' knowledge so that they become a generation that is smart, intelligent, correct and has good morals.
4. Orders and punishments: Given to students if deemed necessary if students abuse their freedom which results in endangering their lives.
5. Behavior (behavior): related to being humble, honest and obedient to rules expressed in words and actions
6. Physical and spiritual experiences: daily life experiences that are absorbed and reflected on so that they reach the level of "taste" and become wealth and sources
7. inspiration to organize a happy life for yourself and others.

The six educational efforts in the among methods and in the construction of the three educational mottos can be concluded firmly that education and teaching are efforts to liberate students and ensure that their lives are protected from threats that have the ability to rob them of their existence individually and socially. Educational praxis from a "nurturing" perspective is gradual over the age of students which is believed to influence their intellectual level. Childhood (up to 7 years), intellectual period (7 – 14 years) and social mass (14-21 years). Education for Kindergarten (TK) and the beginning of Kindergarten (SD) prioritizes the habituation of children through order and maintaining behavior and birth rules, which is called the wiraga (ragawi) method. Meanwhile, for high classes or junior high schools, it is called Adult Park, which instills a period of character formation and prioritizes order and inner steadfastness, namely perfecting wirama. The lessons given to children are divided into two levels, namely first, which provides knowledge or intelligence that has an impact on inner progress (maturing thoughts, feelings and will). Second, lessons that provide provisions for children for their future life in the world of public relations, namely subjects that cover the cultural and social fields.

The breakdown is based on phases where each demands the role of educator with different content and values. The method of Ngemong, Momong, Among and the mottos Ing ngarsa sung tuludha, Ing Madya mangun karsa, and Tut wuri handayani did not originate from a separate idea of Ki Hajar Dewantara. Education is not only a matter of how to develop a noble mind but also the character (power) of Indonesian children, so that they will be able to become leaders of a nation that is loved and has Indonesian uniqueness.

An educational effort according to Ki Hajar Dewantara's method above assigns teachers to be like mature caregivers in exploring and actualizing Indonesian sociocultural and religious values. Therefore, education is an effort to nurture children so that they grow and develop into adult humans who are intellectual, moral, social and spiritual. In this way, a teacher does not set a method of coercion, but instead provides support so that children can understand and understand what is important for themselves, their environment and society and provides role models so that students become individuals who can take responsibility for their duties inside and outside the classroom. Then educators can immediately jump in if the child's life is seen as being on the wrong or bad path. However, in principle it is not forced. The contribution of educators to children's lives is of course in the realm of



coaching and based on the belief that children are individuals whose rights must be respected. So it can grow based on its nature.

How to practice the among methods to strengthen the differences between his educational methods and Dutch education, Ki Hajar Dewantara stated the importance of the "trinity" of educational fatwas for living freely, namely first, permanent, antep and steady. Which means, education is a conscious and planned effort to establish the determination of the mind and mind of students. For this reason, it is very important for students to grow up and be in a truly stable (solid) position. Second, education aims to build a mental or personality character that is ngandel, kandel, kendel, stubborn in students. This means that education that prioritizes cultivating inner maturity fosters a sense of self-confidence (ngandel) and builds a firm stance (kandel) in students so that they become individuals who are brave (kendel) and trusting, never give up (recalcitrant). Third, education is carried out to foster the conditions of neng, ning, nung, and nang in students' personal consciousness. The meaning is that educational efforts are an effort to build clarity of mind and inner self in students (neng). When this competency covers educational activities, students will find peace of mind (ning), which then makes them good at controlling themselves or having "power over themselves" (nung). When students If you have received these three pieces of advice, then you have actually arrived at your "victory" (nang), namely victory over your ego which leads to arrogance and arrogance and greed.

In Ki Hajar Dewantara's view, education is an effort to mature humans using the among (megging) method without forgetting the three educational fatwas above. The process of maturing students physically and mentally is the origin or basis for them to prepare to live in society with a full sense of responsibility.

4. CONCLUSION

Firstly, the Education Fatwa of Ki Hajar Dewantara Ngandel Kandel Kendel Bandel is very good if applied in the Planning, Implementation and Assessment of Citizenship Education Learning, especially the song of the Indonesian Minister of Education, Mr. Nadiem Anwar Makarim, who is realizing Ki Hajar Dewantara's educational concept, namely the Concept of Freedom of Learning. This synergizes in strengthening his teachings when applied in Civics learning because this fatwa has a good meaning to give enthusiasm, encouragement and strength to students in living a life full of challenges without fear, lack of confidence, uncertainty, despair. hopeless and easy to give up. The effort to implement Ki Hajar Dewantara's educational fatwa in civic education planning is to improve the Learning Implementation Plan (RPP) to be more focused on the needs and suitability of students in implementing learning. The RPP becomes a guide that can make it easier for teachers to actualize the learning process systematically. With RPP, a teacher is expected to be able to embody learning programmatically. The RPP must have quality loading capacity. Without mature planning, learning outcomes will be difficult to realize optimally.

Second, the results of Citizenship Education Learning not only prioritize the essence of intellectual learning but also all aspects of the attitude and behavior of each student's personality, so that the implementation of learning focuses on how students teach, not on what students learn. Because capabilities are not received by simply giving or transferring them to other people, but are "built and realized" by themselves, so that students are able to improve their integrity and personality to become much better. Therefore, teachers must always be role models for students, it all starts with the teacher, if an educator can be a role model or role model for his students, then the students will imitate and emulate the attitudes and behavior of their teachers, this is also in line with the Fatwa. Ki Hajar Dewantara Ngandel Kandel Kendel Bandel's education must start from a teacher to reflect his educational fatwa.

The three educational fatwas of Ki Hajar Dewantara Ngandel Kandel Kendel Bandel in the assessment of citizenship education, which focuses on assessing individual characteristics. Because assessing personality prioritizes the use of behavioral assessment techniques to review the development of affection in student behavior. This attitude assessment technique can be implemented through questionnaires, observation and self-



assessment. As a result, there is a change in the behavior of the students themselves from bad to better than before, although it does not just happen immediately but requires a continuous process that is instilled continuously. Because the assessment in the Civics field of study is a process to obtain information regarding student achievement or performance as an evaluation of the student's learning ability and the effectiveness of the Civics learning process.

Therefore, PKN teachers must be able to reflect their competence as closely as possible in order to create success for students in learning in class, deficiencies that are considered normal, actually become an improvement and enthusiasm to improve their pedagogical abilities. These weaknesses are identified for the Civics teacher to find solutions for.

With this, the researcher has the view that if you yourself apply high dedication in carrying out everything, you will definitely not be left behind by tests from Almighty God, then it is very closely related to the educational fatwa that the researcher is carrying out, namely Ngandel Kandel Kendel Bandel, namely that as a teacher you must have a high willingness to face changes in science and technology, without losing our nation's cultural identity. With that, we as prospective educators don't need to hesitate in overcoming it because every problem will definitely find a solution. This is very relevant in Ki Hajar Dewantara Ngandel Kandel Kendel Bandel's education fatwa. A Civics Teacher must always rely on or be more confident without doubting God Almighty in carrying out everything, including teaching and educating. Then Kandel is thick or strong in achieving and possessing and providing knowledge for preparation for life in this world and goodness in the afterlife. Then Kendel is brave and patriotic, as a Civics Teacher you must have that spirit within yourself because in accordance with the expectations or competency profile of a Civics teacher in learning, especially in terms of developing good students' personalities, they must always be role models in developing piety, good manners and discipline. , as well as student health. Next is Bandel, perhaps we know the word has a negative meaning, but Bandel here has a positive meaning, which means to withstand the trials and tribulations that are and will come your way without complaining or giving up in living your life. So today's Civics Teachers should be dedicated and have a broad perspective, namely those who have real intentions and want to serve the nation and state completely.

5. ACKNOWLEDGMENTS

1. Allah Subhanawata'ala, thanks to His blessings, the author was able to carry out this research with full strength and patience to complete this thesis on time.
2. Prophet Muhammad Shallallahu Alaihi Wasallam, the Messenger who is our lord, whom we love and long for his people as a savior and helper on the last day of eternal life.
3. The author's parents, Father Yosep Muchram Atoni and Mrs. Ellis, who always pray, educate, provide encouragement, motivate both morally and materially. Apart from that, the author would also like to express his thanks to the writer's grandfather H. O'Suparman, as well as the writer's grandmother Hj. Melina, who also prayed for and supported the author from the beginning of his lectures to completing this thesis. Also, thank you to all the Author's Uncles, Aunts and Cousins whose names cannot be mentioned one by one who always provide support and their laughter which is motivation and encouragement for the Author.

REFERENCES

- Ab Marisyah, Firman, & Rusdinal. (2019). Pemikiran Ki Hadjar Dewantara tentang Pendidikan. *Jurnal Pendidikan Tambusai*, halaman 1514-1519.
- Arikunto, S. (2010). *Prosedur Penelitian Suatu Pendekatan Praktik*. Jakarta: Rineka Cipta.
- Astuti, K. D., & Arif, M. (2021). Kontekstualisasi Nilai-nilai Pendidikan Ki Hajar Dewantara di Era COVID-19. *Jurnal Pendidikan Dasar Flobamorata*, halaman 202-207.
- Amri, S. (2013). *Pengembangan & Model Pembelajaran Dalam Kurikulum 2013*. Jakarta: Prestasi Pustaka.



- Budimansyah, D. (2012). Pendidikan Kewarganegaraan Dalam Perspektif Internasional. Bandung: Widya Aksara Press Kindarto, Asdani.
- Creswell, J. W. (2009). Research Design : Qualitative, quantitative, and mixed methods approaches. (edisi ketiga). Thousand Oaks: Sage.
- Dewantara, K. H. (2013). Karya Ki Hadjar Dewantara I (Pendidikan) Pemikiran, Konsepsi, Keteladanan, Sikap Merdeka . Yogyakarta: UST Press.
- Dewantara, K. H. (2013). Ki Hadjar Dewantara Pemikiran, Konsepsi, Keteladanan, Sikap Merdeka II (Kebudayaan). Yogyakarta: UST-Press.
- Dodi, N. (2016). Pentingnya Guru untuk Mempelajari Psikologi Pendidikan. Nusantara (Jurnal Ilmu Pengetahuan Sosial), halaman 59-63.
- Errika, D. S. (2015). Membaca Kearifan Lokal dalam Penggunaan Media Sosial. Jurnal Transformatika, 13(1).
- Ghozali. (2016). Aplikasi Analisis Multivariate dengan Program SPSS. Semarang: Badan Penerbit Universitas Diponegoro.
- Halimah, L. (2018). Pendidikan Kewarganegaraan dan Kosmopolitan. Yogyakarta: Goysen Publishing.
- Joesoef, D. (2009). Menuju Manusia Merdeka Ki Hadjar Dewantara. Yogyakarta: Leutika
- Khafifatul Fian, Muhammad Hananika Anugerah Yusuf. (2021). Relevansi Konsep Pendidikan Multikultural Berbasis Pendekatan Ki Hadjar Dewantara terhadap Pendidikan Islam di Indonesia. Journal of Islam and Muslim Society, 111 – 121
- Koni, S. M. (2016). Pengaruh Jejaring Sosial Terhadap Pendidikan Karakter Peserta Didik. TADBIR : Jurnal Manajemen Pendidikan Islam, Vol (4) pg 37.
- Komalasari, K. (2017). Pembelajaran kontekstual: konsep dan aplikasi. Bandung: Refika Aditama
- Kumalasari, D. (2010). Konsep Pemikiran Ki Hadjar Dewantara dalam Pendidikan Taman Siswa (Tinjauan Humanis-Religius). Istorita, halaman 47-59.
- Macaryus, S. (2010). Serpih - Serpih Pandangan Ki Hadjar Dewantara. Yogyakarta: Kepel Press.
- Maharati, C., & Patimah, H. (2021). Pengaruh Motivasi Kerja dan Lingkungan Kerja terhadap Kepuasan kerja Guru. FADZAT: Jurnal Ekonomi Syariah, 2(1).
- Maksum, H., & Anwar, F. (2016). The Model Citizen Project to Improve The Civic Education Skill in Developing Nationalistic Attitudes. Researchers World, 7(4 (1)), 173-176.
- Marwah, S. S., Syafe'i, M., & Sumarna, E. (2016). Relevansi Konsep Pendidikan Menurut Ki Hadjar Dewantara dengan Pendidikan Islam. Tarbawy: Indonesian Journal of Islamic Education, halaman 15-25.
- Moleong. (2005). Metodologi Kualitatif Edisi Revisi. Bandung: PT Remaja.
- Nora Nurhalita, Hudaidah. (2021). Relevansi Pemikiran Pendidikan Ki Hajar Dewantara pada Abad ke 21. Edukatif : Jurnal Ilmu Pendidikan , 299 – 302
- Rahardjo, S. (2020). Biografi Singkat 1889-1959 Ki Hajar Dewantara. Sleman Jogjakarta: GARASI.
- Rahmawati, F. (2011). Pengaruh pembelajaran Geometri dengan Pendekatan Induktif. Edumatica, 74-75.
- Samho, B. (2013). Emong Among Pamong Visi Pendidikan Ki Hadjar Dewantara Tantantangan dan Relevansi. Yogyakarta: Kanisius.



Sapriya. (2008). Perspektif Pemikiran Pakar tentang Pendidikan Kewarganegaraan dalam membangun Karakter Bangsa (Sebuah Kajian Konseptual-Filosofis Pendidikan Kewarganegaraan dalam Konteks Pendidikan IPS). *Jurnal Acta Civicus* , Vol 1 No 2.

Sapriya. (2009). *Pembelajaran Pendidikan Kewarganegaraan*. Jakarta: Direktorat Jenderal Pendidikan Islam Departemen Agama Republik Indonesia

Sapriya, Rahmat, Dadang Sundawa, Darmawan. (2011). *Konsep Dasar Pendidikan Kewarganegaraan*. Bandung: Laboratorium PKn UPI.

Sherlyanita, A. &. (2016). pengaruh dan pola aktivitas penggunaan internet serta media sosial pada Siswa SMPN 52 Surabaya. . *Journal of Information System Engineering and Business Intelligence*, 2(1), pp.17-22.

Soliha, S. (2015). Tingkat ketergantungan pengguna media sosial dan kecemasan sosial.. *Jurnal Interaksi*, 4(1), pp. 1-10.

Sukri, Handayani, T., & Tinus, A. (2016). Analisis Konsep Pemikiran Ki Hajar Dewantara dalam Perspektif Pendidikan Karakter. J



EDUCATION FOR YOUNG CITIZENS TO STRENGTHEN CITIZEN CHARACTER

Teki Prasetyo Sulaksono¹, Kokom Komalasari², Prayoga Bestari³, Susan Fitriaasri⁴

¹⁻⁴Universitas Pendidikan Indoensia, Bandung

*tekisulaksono@upi.edu

ABSTRACT

This research is motivated by issues of national and state life, especially the younger generation. Among the problems in the younger generation are the lack of a spirit of patriotism, idealism and nationalism as well as the younger generation's uncertainty about the future, moral, mental and social degradation of the younger generation, opportunities to access work, underage marriage, promiscuity and including the abuse of narcotics and drugs. forbidden. In fact, the active role of youth or the younger generation in the history of the Indonesian nation's struggle has played an extraordinary role. Developing the potential and role of youth through empowerment, awareness and development in national development which has a role and is part of a very strategic function and role. Citizenship education for the younger generation is important, not only in schools but also in society. This research aims to study and develop the character of the younger generation based on Pancasila values. This research was carried out in Kedaton II Village, Batang Hari Nuban District, East Lampung. The data in this research is through documentation studies, observations and interviews. The method in this research uses descriptive qualitative. The results of the research show that there is an influence on young citizens when they receive guidance based on Pancasila values. Education for the younger generation can strengthen the character of citizens.

Keywords: education, civic education, young generation, character

1. INTRODUCTION

The active role of youth or the younger generation in the history of the Indonesian nation's struggle has played an extraordinary role. Developing the potential and role of youth through empowerment, awareness and development in national development which has a role and is part of a very strategic function and role. As individual youth, they are citizens who understand and are able to carry out their rights and obligations well, according to their functions and roles, can solve their own problems and problems in society, are sensitive and have social responsibility, so that they can lead to quality as individuals and the behaviour of good citizens who are good citizens. good (Wahab and Sapriya, 2011; Maksum, 2016).

According to Suryadi (2014), the problems experienced by young people are a lack of patriotism, idealism and nationalism as well as the young generation's uncertainty about the future, suffering from physical, mental and social disabilities in the younger generation, unbalanced educational facilities for the number of young people, nutritional problems. low, opportunities to access work, underage marriage, promiscuity and including abuse of narcotics and illegal drugs. The current development of the younger generation has not been able to provide a significant impact. It has been proven that there are still many Indonesian teenagers who commit juvenile delinquency, and have not been properly trained at certain levels.

Changes resulting from globalization make citizens of a nation become global citizens (Malihah, 2015; Anwar, 2022). The westernized lifestyle brought by globalization tends to weaken local wisdom values, especially in Indonesia. The influence of globalization has influenced aspects of education which have an impact on the mindset, attitudes and actions of Indonesian society (Sakman, 2019). If it is not accompanied by strengthening character education, the influence of globalization will result in a decline in morals for the nation's young generation. Komalasari (2019) describes that the young generation has its own characteristics, namely having big ambitions for success, instant behaviour, love of freedom, self-confidence, liking details, desire for recognition, digital and information technology.



So it is important to provide guidance to the younger generation in society. So that coaching is consistent and directed and at the same time as a form of education in society for the younger generation. Education of the younger generation is needed to prepare young people who will lead the nation in the future. There is a need for Citizenship Education in society targeting the younger generation in order to strengthen character.

2. METHODS

A qualitative approach was used in this research. Qualitative research is research that presents descriptive data in the form of written or spoken words from people or observed behaviour. When related to this research, researchers try to describe conditions, opinions that are growing, processes that are ongoing, consequences that are occurring or trends that are developing (Moleong, 2002). According to Creswell (2014) Case study research is a qualitative approach whose research explores real life, contemporary limited systems (cases) or various limited systems (various cases), through detailed and in-depth data collection involving various sources of information or resources. compound information (for example; observations, interviews, audiovisual materials, and various report documents), and reporting case descriptions and case themes. This research uses research in one stage, which means short term. Citizenship Education is closely related to the education of the Young Generation. Education of the younger generation is a necessity for a nation to prepare for the future and the continuation of statehood.

A. Data Collection

Data collection used was interview, documentation and observation techniques. As for determining data collection in research, it is based on the principles of implementation and affordability, both in terms of time, energy and data sources. This is in line with the opinion expressed by Arikunto (2006) who states that determining the techniques and instruments used in research depends on the research subject, data source, available time and funds, number of research staff, and techniques to be used. to process data. The following is an explanation of the data collection techniques that will be used in this research.

1) Interview Technique

According to Basrowi (2008, p. 127) an interview is a conversation with a specific purpose by two parties, namely the interviewer as the asker or giver of questions and the interviewee as the giver of answers to those questions. In this research, interview techniques were used to obtain in-depth information. Researchers interact directly with research subjects so that researchers can analyze and interpret the answers given by the subjects.

2) Observation

Researchers observed directly by going directly to the place where the Karang Taruna program activities were carried out.

3) Documentation

Researchers gather information not from people as sources, but obtain information from various written sources or from documents available to informants. Documents are needed to examine in depth so that they can support and increase trust and proof of an incident (Al Mukhtar, 2015).

The process of analysing data in qualitative research is carried out from the time of data collection and is carried out in depth, both while in the field and after leaving the field. The technique that will be used to analyse the data that has been obtained is the qualitative data analysis technique modelled by Miles and Huberman (1992,), namely data reduction, data presentation, and drawing conclusions. Data reduction in data analysis needs to be carried out considering that the amount of data obtained in the field is quite large, for this reason it needs to be recorded carefully and in detail, the longer the researcher is in the field, the greater the amount of data,



complex and complicated. So, data reduction needs to be carried out. In this research, data reduction was carried out by grouping data from interviews and documentation obtained from each respondent. Presenting data in qualitative data analysis will make it easier to understand what will happen, plan further work based on what has been understood (Sugiyono, 2012).

3. RESULTS & DISCUSSION

The results section should summarize all of the collected data and the statistical analysis used in order to answer the problems mentioned in the introduction. The use of table(s) and figure(s) must be adjusted to APA 6th edition format as the example below. The name of the table title is written above (center), is in bold, and is written consequently (Table 1, Table2, etc). The author should start with introducing the table, inserting the table, and providing some explanation about the table content.

a. Young Generation Education

Citizenship education in the sense of education in society, especially the younger generation, is important. According to Dimond in Wahab and Sapriya (2011) "civics or citizenship education" has a broad and narrow meaning when related to school and community life. In a narrow sense, it places more emphasis on aspects of the theory and practice of democratic government, while in a broader sense it places more emphasis on the involvement and participation of citizens in social problems. According to Parry & Uwin, (2010) the existence of differences in events and regional differences in the history of layout is also one of the things in the debate to group generations. Ryder (1965) explains that the position of a group of individuals who experience the same events in the same period of time is also called a generation. Generation is a social order in which there are a number of groups of people who have the same age and the same historical experience (Manheim, 1952). Lyons (2004) provides an explanation of the characteristics of generation Z, namely that everything in individuals is different, both in terms of economics, family conditions, open communication systems which are different from previous generations. Youth is defined according to UU No. 40 of 2009, namely Indonesian citizens who are entering an important period of growth and development aged 16 (sixteen) to 30 (thirty) years; and Youth are various things related to the potential, responsibilities, rights, character, capacity, self-actualization and ideals of youth.

b. Karang Taruna Organization

Regulation of the Minister of Social Affairs of the Republic of Indonesia Number 25 of 2019 concerning Karang Taruna. Karang Taruna is an organization formed by the community as a forum for the young generation to develop themselves, grow and develop on the basis of awareness and social responsibility of, by and for the young generation, which is oriented towards achieving social welfare for society. Empowerment and development of Karang Taruna is a process of developing capabilities, opportunities and giving authority to Karang Taruna to increase potential, prevent and handle social problems, develop pioneering values through the use of human resources, natural resources, social resources and technology. Karang Taruna aims to: a. realizing awareness of social responsibility for each young generation in anticipating, preventing and countering various social problems, especially among the younger generation; b. developing the capabilities of the younger generation in implementing social welfare through social rehabilitation, social security, social empowerment and social protection; c. building the character of the young generation who are knowledgeable, personable, skilled, intelligent, innovative and creative; d. developing the potential and abilities of the younger generation; e. develop the social entrepreneurial spirit and spirit of the



younger generation towards independence in an effort to improve Social Welfare; f. motivating the younger generation to become the glue of unity in the diversity of social, national and state life; and g. establishing synergy and partnership cooperation between the younger generation and various parties in realizing increased social welfare.

c. **Organizational Benefits**

Chester Barnard in Fathoni (2009) Organizations exist when people relate to each other, want to contribute activities or work together to achieve common goals. According to Indra (2011), the benefits of organizations include: a) Cultivating a positive mental attitude Organizing makes us aware of the importance of positive mental attitudes. With all responsibilities in the organization, we are trained to be disciplined, honest, think critically, and be able to manage time. We are also increasingly trained to be brave in making decisions. These attitudes will be achieved in the world of work, thereby enabling career advancement more quickly. b) Discussing and Expressing Opinions, because in our organization we work with many people with different characters, we are required to be able to respect opinions and be willing to listen to other people's opinions. We are also forced to have the courage to express our opinions through discussions, both in meetings and with older parties. c) Study Active Organizational Management, in organizations it will teach us to act according to procedures in organizational management. For example, regarding meeting procedures, how to submit a good proposal, including the steps in working on a project. d) Socializing event, because in an organization our social circle will expand, we will have lots of friends.

d. **Young Generation Education in Strengthening Citizen Character**

Through a series of programs and activities for the younger generation who are members of youth organizations. Either through regular meetings then education and training. Filled with material about the values of Citizenship Education and Pancasila, the younger generation understands the importance of Pancasila and Citizenship values. Through education and training, young people are equipped with knowledge and insight. Then there are joint activities in the community through committee activities and social activities. Including joint sports activities as a form of developing physical fitness. And finally, religious activities to foster divine values in the younger generation.

4. CONCLUSION

Issues of national and state life, especially the younger generation. Among the problems in the younger generation are the lack of a spirit of patriotism, idealism and nationalism as well as the younger generation's uncertainty about the future, moral, mental and social degradation of the younger generation, opportunities to access work, underage marriage, promiscuity and including the abuse of narcotics and drugs. forbidden. In fact, the active role of youth or the younger generation in the history of the Indonesian nation's struggle has played an extraordinary role. Developing the potential and role of youth through empowerment, awareness and development in national development which has a role and is part of a very strategic function and role. Citizenship education for the younger generation is important, not only in schools but also in society. By providing education for young citizens in society, it can provide guidance and strengthen the character of young citizens in society.

5. ACKNOWLEDGMENTS

Thank you to everyone who has provided support so that this writing can be completed. May Allah SWT give you the best reward.



REFERENCES

- Al Muchtar, Suwarma. (2015). *Dasar Penelitian Kualitatif*. Bandung: Gelar Potensi Mandiri.
- Anwar, F. (2022). Generasi Alpha: Tantangan dan Kesiapan Guru Bimbingan Konseling dalam Menghadapinya. *Jurnal At-Taujih*, 5(02), 68-80.
- Arikunto (2006). *Prosedur Penelitiann Pendekatan Praktik*. Jakarta: PT. Rineka Cipta
- Basrowi, dkk. (2008). *Memahami Penelitian Kualitatif*. Jakarta Rineka Cipta
- Creswell, JW. (2014). *Penelitian Kualitatif dan Metode Riset*. Yogyakarta: Pustaka Pelajar
- Fathoni, A. (2009). *Organisasi dan Sumber Daya Manusia*. Jakarta: Rineka Cipta
- Indra, Roni. (2011). *Sukses sebelum lulus kuliah*. Bandung: Master publishing
- Komalasari, K., Saripudin, D. 2022. *Pendidikan Karakter; Konsep dan Aplikasi Living Values Education*. Bandung: PT Refika Aditama
- Lyons, S. (2004). An exploration of generational values in life and at work *Pro Quest Dissertations And Theses*, 441-441. Retrieved from <http://ezproxy.um.edu.my/docview/305203456?accountid=28930>
- Malihah, E. (2015). An ideal Indonesian in an increasingly competitive world: Personal character and values required to realise a projected 2045 'Golden Indonesia'. *Citizenship, Social and Economic Education*, 14 (2), 148-156.
- Maksum, H., & Anwar, F. (2016). The Model Citizen Project to Improve the Civic Education Skill in Developing Nationalistic Attitudes. *Researchers World*, 7(4 (1)), 173-176.
- Manheim, K. (1952). The Problem of Generations. *Essays on the Sociology of Knowledge*, 24(19), 276-322-24.
- Miles, M & huberman, AM. (1992). *Analisis Data Kualitatif. Buku Sumber tentang Metode-Metode Baru*. Jakarta: Universitas Indonesia Press.
- Moleong, L.J. (2002). *Metodologi Penelitian Kualitatif*. Bandung: Remaja Rosdakarya
- Parry, E., & Urwin, P. (2010). Generational differences in work values: A review of theory and evidence. *International Journal of Management Reviews*, 13, 79-96. doi:10.1111/j.1468-2370.
- Peraturan Menteri Sosial Republik Indonesia Nomor 25 Tahun 2019 Tentang Karang Taruna
- Ryder, N. B. (1965). The Cohort as a Concept in the Study of Social Change *American Sociological Review*, 30(6), 843-861. <https://doi.org/10.2307/2090964>
- Sakman, Bakhtiar. Pendidikan Kewarganegaraan Dan Degradasi Moral di Era Globalisasi. *Volume XIV Nomor 1, April 2019 (halaman 01 - 08)*
- Sugiyono, (2008). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta
- Suryadi, Ace. (2014). *Pendidikan Indonesia Menuju 2025*. Bandung: Remaja Rosdakarya
- Wahab, Abdul Aziz dan Sapriya. (2011). *Teori dan Landasan Pendidikan Kewarganegaraan*. Bandung: Alfabeta.
- UU No. 40 Tahun 2009 Tentang Kepemudaan.



FACTORS AFFECTING TEACHER PERFORMANCE

Sri Langgeng Ratnasari^{1*}, Rahman Hasibuan², Catur Fatchu Ukhriyawati³, Velya Tri Desi⁴, Mutiara Fadila⁵, Gandhi Sutjahjo⁶, Widy Winarso⁷

¹⁻⁵Universitas Riau Kepulauan, Indonesia

⁶Universitas Batam, Indonesia

⁷Universitas Islam 45 Bekasi, Indonesia

*sarisucahyo@yahoo.com

ABSTRACT

The purpose of this research is to determine and analyze the influence of leadership style on teacher performance, the influence of organizational culture on teacher performance, the influence of the work environment on teacher performance, the influence of motivation on teacher performance, and the influence of leadership style, organizational culture, work environment, and motivation on teacher performance. This type of research is quantitative research. The population of this study was all 74 teachers at Maitreyawira Elementary School, Batam. The sampling technique was carried out using the Saturated Sampling technique. Data was obtained using a questionnaire instrument. The research results show that: Leadership style has a positive and significant effect on teacher performance, organizational culture has a positive and significant effect on teacher performance, the work environment has a positive and significant effect on teacher performance, and motivation has a positive and significant effect on teacher performance. Leadership style, organizational culture, work environment, and motivation have a positive and significant effect on teacher performance.

Keywords: Leadership Style, Organizational Culture, Work Environment, Motivation, Teacher Performance.

1. INTRODUCTION

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual, religious, self-development, intelligence, noble morals and skills that they need in life in society, nation and state. Formal education is carried out in schools, because schools are places where students and teachers meet to achieve their dreams. Teachers as educators are one of the determining factors for the success of educational goals. Teachers are human resources who are planners, actors and determinants of achieving national education goals as mandated by law. According to Republic of Indonesia Law Number 14 of 2005 concerning Teachers and Lecturers, in Chapter 1 article 1 it is stated that: "Teachers are professional educators with the main task of educating, teaching, guiding, directing, training, assessing and evaluating students in early childhood education formal education, primary education and secondary education". For this reason, teachers must be creative in designing fun learning.

Sumarsono (2012) explains that teacher performance is the extent to which tasks have been described and can be carried out in relation to obligations and responsibilities in learning planning activities, implementing learning, and evaluating learning implementation as well as carrying out learning or improvement and enrichment. Teachers are also required to have performance that is able to realize and provide hope for all parties, especially the general public who have trusted schools and teachers in developing these students. Achieving good quality education is greatly influenced by the performance of teachers in carrying out their responsibilities. To be able to carry out tasks well, it is necessary to develop teacher performance.

Considering the importance of teacher performance in the world of education, it is necessary that performance appraisal is an organizational process for assessing employee performance. The general purpose of performance appraisals is to provide feedback to employees in an effort to improve their performance and increase organizational productivity. Objective performance criteria are performance evaluations against specific standards, while subjective measures are how well an employee works overall. According to Ahmad (2017), performance appraisal is a means of improving those who do not perform their duties well in the organization. Based on this definition, teacher performance plays a very important role in the progress of the nation and state because teachers will develop students in the future.



Teacher performance needs to be paid attention to in order to educate a brilliantly intelligent generation of the nation. The factors that influence teacher performance include: work ethic or discipline, adequate educational facilities, teacher ability or competency, teacher work motivation, job satisfaction, work welfare, conducive school climate and also a good leadership style (Yawan, 2016). Another opinion from Ahmad (2017) states that factors that support teacher performance can be classified into two types of factors, namely: 1). Internal factors (intelligence, skills and abilities, talents, abilities and interests, motives, health, personality, ideals and goals at work), 2). External factors (family environment, work environment, communication with the school principal, facilities and infrastructure, and teacher activities in class). In this regard, teacher performance must be improved considering the challenges in the world of education to produce quality human resources that are able to compete in the increasingly stringent global era.

The factors that determine the level of performance (work performance) include performance assessments which relate to how well a teacher carries out the tasks or work given to him. This teacher performance assessment usually takes place within a certain time period once a year (Muhammad and Gusrianty, 2019; Nufus, 2023). One of the factors that causes teacher performance achievement is to determine teacher performance assessments so far by looking at teachers who are active in various fields at school. Other causes are also factors in teacher performance, namely: the leadership style of teachers and school staff, and the culture of an organization. Because leaders' direct teachers, and traditions at school will create a teaching and learning atmosphere for teachers.

Apart from teacher performance issues, leadership style needs to be considered because it will affect teacher performance. In this era, the leader's attitude is to listen to teachers' complaints about students, provide important news, and show a humanitarian attitude towards other staff. Leaders also take time to pray, be friendly, and serve guests. Leaders are not only related to the world of education but must adapt to the community environment. Based on the problems mentioned regarding leadership style, Purnomo and Sarigih (2016) stated that leadership is the process of influencing or giving an example by a leader to his followers in an effort to achieve organizational goals. All bad attitudes about leaders will affect teacher performance. Therefore, leaders must investigate teachers' difficulties and help resolve them.

Apart from the importance of leadership style on teacher performance. Organizational culture also influences teacher performance. The main function of organizational culture is to help understand the environment and determine how to respond to it so as to reduce anxiety and restlessness. Adaptation to various human characters requires a teacher to respond appropriately and freely. Culture is the totality of human thoughts, works and results, which are not rooted in conscience, and therefore can only be created by humans after going through a learning process. In order to be able to carry out their main duties and functions well, employee development needs to be well directed (Susilo, 2017). Based on the definition of culture, an organization needs a good culture so that its educational institutions can create a family atmosphere and be united.

Another problem is that teachers still want to maintain their health so they don't adapt to their colleagues, some teachers are still unable to adapt to changes in the curriculum, and work leave continues to change over time. There are still teachers who don't want to work more because they don't get compensation. The allowances received by teachers are not in line with teachers' expectations, such as decreasing allowances.

From the problems above, to create a safe atmosphere it is necessary to pay attention to a supportive work environment. According to Anam (2018), the definition of the work environment is everything around the teacher that influences him in carrying out and completing the tasks given to him in an area. A good work environment (good facilities and infrastructure) or bad (unavailability of supporting facilities and infrastructure) in an organization can directly or indirectly affect teacher performance, for example a work environment that is far from the teacher's residence can cause teacher performance to decrease. because of fatigue from traveling, a dirty work environment, an unsafe work environment, an uncomfortable work environment, and loud noises. All of this can affect teacher performance (Candana, 2018).

Apart from work environment problems, motivation can also influence a teacher's performance. In this school there are still teachers who have not moved themselves to be more successful, that is, they are worried about unwanted life challenges, and some teachers lack reading literacy. Another problem is that some teachers



lack independence, some teachers lack mastery of the curriculum, some teachers are late in collecting learning tools.

Another problem that arises with teacher motivation is that some teachers do not develop learning models that attract students' interest in learning. This will result in teachers and students being lazy to explore knowledge. Then there is no movement of the teacher's heart to help students with special needs and a teacher's lack of passion in teaching. Because he felt unable to understand the students' character, he threw his responsibility onto the homeroom teacher. There are also some teachers who often rely on each other's work because they are not encouraged to explore their knowledge. This indicates that teacher motivation is still relatively low.

As for expert opinion regarding motivation, according to Cahyani et al (2020), learning motivation is the overall driving force that lies within the teacher which gives rise to the intention to carry out teaching and learning activities, so that the desired goals are achieved. In line with world developments, the management of educational institutions cannot be separated from the role of teachers. For this reason, every effort made by teachers is very important for the nation's future generations.

Maitreyawira School is a universal family which is a mission for every student, educator, school administrator and the entire world community in an effort to realize the beauty of human nature towards creating a world of one family. Based on the background of the problem that has been put forward, this research.

Based on the background of the problems that have been stated, several have been identified, namely: 1) Lack of teacher responsibility in their work so that their work is often delayed and they only rely on experienced teachers. 2) Lack of leadership style to manage time and guide teachers in carrying out their duties and responsibilities. 3) Some teachers are not open enough to share knowledge with colleagues so that the organizational culture is inadequate. 4) School facilities are less supportive and the work environment is less comfortable for teachers. 5) Some teachers do not want to work more, resulting in their tasks piling up and teachers' lack of willingness to try to find new knowledge so that teacher motivation is still relatively low.

The aims of this research are: 1) To test and analyse the influence of leadership style on teacher performance. 2) To test and analyse the influence of organizational culture on teacher performance. 3) To test and analyse the influence of the work environment on teacher performance. 4) To test and analyse the influence of motivation on teacher performance. 5) To analyse the influence of leadership style, organizational culture, work environment, and motivation on teacher performance.

Teacher Performance

According to Minister of National Education Regulation Number 35 of 2010 regarding teacher performance is the result of an assessment of the process and work results achieved by teachers in carrying out their duties. According to Komar (2020) teacher performance assessment is a reference for schools to determine career development and promotion for teachers. It is hoped that the results of this teacher performance assessment will be able to provide benefits in creating various policies related to improving the quality and performance of teachers, which is the basis for implementing the teaching and learning process in the educational process to produce a generation that is intelligent, qualified, competent and highly competitive. Teacher performance in general can be seen from their activities in preparing learning plans, implementing the learning process, implementing interpersonal relationships and evaluating the results of the teacher's work.

Sumarsono (2012) explains that teacher performance is the extent to which tasks have been described and can be carried out in relation to obligations and responsibilities in learning planning activities, implementing learning, and evaluating learning implementation, as well as carrying out learning/improvement and enrichment. Furthermore, in measuring how successful a teacher has been in carrying out his duties and obligations according to established standards, he also revealed that a teacher's success in carrying out his duties and obligations is determined by the achievement of results as normatively stipulated in the Regulation of the Minister for Empowerment of State Apparatus and Bureaucratic Reform Number. 16 of 2009 concerning Teacher Functional Positions and Credit Scores, namely teacher achievements or accomplishments in planning learning and guidance, implementing quality learning and guidance, and evaluating learning outcomes, guidance as well as carrying out learning and improvement and enrichment.



Regarding expert opinion, a teacher's performance is measured by achieving success in; (1) planning learning and guidance, (2) implementing a quality teaching and learning process, (3) evaluating the results of learning and guidance, and (4) carrying out learning, improvement and enrichment.

Leadership Style

According to Kawilarang (2019) leadership style is one of the methods used by a leader to influence, direct and control the behaviour of other people to achieve a goal. Leadership style is the process of directing and influencing members in carrying out various activities in an organization, leaders use their influence to clarify organizational goals for their subordinates, motivate them to achieve organizational goals and help create a work atmosphere so that employees can be productive at work (Walsa and Ratnasari, 2016; Hariani, 2022). From several definitions of leadership style that have been stated above, researchers conclude that leadership style is the behaviour or method that is led and used by leaders in leading their employees to work.

The opinion of Hidayat et al (2019) suggests that leadership style indicators can be explained, namely: 1) authoritarian (threats, close supervision, closed), 2) participative (consultative, open, communicative), 3) delegative (trust, freedom, leadership guidance) . Based on the opinion above, the researcher concluded that the indicators that will be used for leadership style are authoritarian, participative and delegative.

Organizational Culture

According to Kurniawan and Hazir (2019) stated that organizational culture is a series of values and strategies, leadership style, vision and mission as well as norms of trust and understanding that are adhered to by members of the organization and are considered as truth for new members and become a guide for each member. organizational elements of a company to shape attitudes and behaviour. Organizational culture reflects the attitudes, values and behaviour of members in the organization which describes the characteristics of the organization and is a differentiating factor from other organizations (Junianto and Sabtohadhi, 2019). From several opinions about culture conveyed by research, the researcher concluded that culture is the entire result of humans' views on their environment.

According to Jumriatunnisah et al (2016) the indicators used are individual initiative, tolerance for risk, school direction and goals, and integration. The indicators used in this research are external adaptation, internal integration, and basic assumptions (Cupiadi and Kedaton, 2016). Based on several opinions in the explanation of culture, the researcher concluded that the indicators used for research were individual initiative, tolerance for risk, school direction and goals, and integration.

Work Environment

According to Suhardi (2019), the work environment is everything that is around an employee while working, whether physical or non-physical, directly or indirectly, which can affect him and his work while working. According to Anam (2018) the work environment is everything around an employee that influences him in carrying out and completing the tasks given to him in an area. Based on several people's opinions about the work environment, the researcher concluded that the work environment is a means of supporting a person's smooth processes at work so that it supports employee performance at work.

According to Anam (2018), in general, the work environment is influenced by the following factors, namely: work facilities, salary and benefits, and work relationships. The opinion of Suhardi (2019) states that the indicators he uses are work regulations, lighting, circulation, the work itself, and salary. Based on the opinions of several experts above regarding the work environment, researchers used the following indicators: work facilities, salary and benefits, and work relationships.

Motivation

According to Ahmadiansah (2016) work motivation is something that creates an urge to do work that leads to achieving a goal. According to Anggrayni et al (2018), the definition of motivation is a drive or encouragement that comes from within a person or from outside to take action in order to achieve goals. From several opinions about motivation conveyed by research, the researcher concluded that motivation is an action that encourages a person to act towards a goal. The opinion of Suhardi (2019) states that the indicators he uses are



physiological, safety & security, self-esteem, motives, and traits. The 3 basic characteristics of work motivation relating to employees are effort, persistence, and direction (Ratnasari, 2017). Based on these opinions, indicators are used, namely: effort, persistence, and direction.

2. METHODS

The method used in this research is quantitative using multiple regression techniques. This research is to analyze the influence of independent and dependent variables. According to Ananda and Fadhli (2018), multiple regression is used to determine the linearity of the relationship between two or more independent variables (X) and one dependent variable (Y) and can also be used to predict the price of the dependent variable if the prices of the independent variables are known. This research was carried out using a survey method, namely collecting primary data obtained from original sources.

The quantitative analysis approach is a research approach carried out to test hypotheses using accurate statistical data tests and presented in the form of numbers based on the background and problem formulation that has been mentioned. This research is useful for measuring the influence of leadership style, organizational culture, work environment, and motivation on teacher performance.

In this research, researchers took the location at the Maha Vihara Duta Maitreya Bukit Untung Complex, Sei. Panas, Batam City, Batam 29433, Riau Islands-Indonesia, namely Maitreyawira Elementary School Batam. The research was carried out in March-April 2021. The population in this research was all 74 teachers at Maitreyawira Elementary School in Batam City, Riau Islands. The sample used in this research is a saturated sample or census. In this study, researchers took the entire sample of 74 permanent teachers at Maitreyawira Elementary School, Batam. The independent variables in this research are leadership style, organizational culture, environment, and motivation. The dependent variable in this research is Maitreyawira Elementary School Teacher Performance, Batam. The instruments used in this research were documentation and questionnaires.

In this study, researchers used construct validity. Construct validity is validity that concerns how far the instrument items are able to measure what is really intended to be measured in accordance with a specific construct or concept or conceptual definition that has been determined. This validity test uses SPSS window version 20 (Purnomo, 2016).

The validity test is used to measure whether a questionnaire is valid or not. Validity testing was carried out using SPSS window version 20. Before distributing it to all respondents, it is a good idea to try out the instrument so that you can find out whether the instrument is valid or not. Based on the results of the validity test of the research instrument for the teacher performance variable, it was concluded that there were 30 valid statements and 1 invalid statement out of 31 statements. Of the 30 valid statements, each statement represents each variable indicator of teacher performance. The results of the validity test of the research instrument for the leadership style variable concluded that there were 14 valid statements. This means that there are no invalid statements out of the 14 statements. Where each statement represents each indicator of the leadership style variable.

For the organizational culture variable, it was concluded that there were 12 valid statements and 1 invalid statement out of 13 statements. Of the 12 valid statements, each statement represents each indicator of the organizational culture variable. For the work environment variable, it was concluded that of the 20 statements there were 15 valid statements and 5 invalid statements. Of the 15 valid statements, each statement represents each indicator of the work environment variable. For the motivation variable, it was concluded that there were 15 valid statements and 5 invalid statements out of 25 statements. Of the 15 valid statements, each statement represents each indicator of the motivation variable.

After the validity test is carried out, the next step is the reliability test. The following are the results of the questionnaire reliability test on teacher performance, leadership style, organizational culture, work environment and motivation. The results of reliability test calculations using SPSS obtained the following values:

- 1) The leadership style variable obtained a Cronbach Alpha value of $0.974 > 0.60$
- 2) The organizational culture variable obtained a Cronbach Alpha value of $0.950 > 0.60$



- 3) The work environment variable obtained a Cronbach Alpha value of $0.788 > 0.60$
- 4) The motivation variable obtained a Cronbach Alpha value of $0.883 > 0.60$
- 5) The teacher performance variable obtained a Cronbach Alpha value of $0.975 > 0.60$

3. RESULTS & DISCUSSION

Descriptive statistics are statistics used to describe and analyze research results or observations, but not to draw conclusions (Jaya, 2019).

Table 1 Descriptive Statistical Analysis

	Leadership Style	Organizational Culture	Work Environment	Motivation	Teacher Performance
N Valid	74	74	74	74	74
Missing	0	0	0	0	0
Mean	61,73	50,66	65,51	87,03	132,84
Median	61,5	51	66	87,5	134
Std. Deviation	4,546	5,407	4,253	5,402	9,060
Minimum	54	40	59	73	112
Maksimum	70	60	75	98	148

Based on Table 1, it explains that the leadership style variable has a mean value of 61.73 with a standard deviation of 4.546. The mean value of the leadership style variable has a higher value than the minimum value, which is 54. This shows that the leadership style of Maitreyawira Batam Elementary School teachers still needs to be evaluated. The organizational culture variable has a mean value of 50.66 with a standard deviation of 5.407. The mean value of the organizational culture variable has a higher value than the minimum value, which is 40. This shows that the organizational culture of Maitreyawira Batam Elementary School teachers still needs attention.

The work environment variable has a mean value of 65.51 with a standard deviation of 4.253. The mean value of the work environment variable has a higher value than the minimum value, which is 59. This shows that the work environment of Maitreyawira Batam Elementary School teachers still needs to be improved.

The motivation variable has a mean value of 87.03 with a standard deviation of 5.402. The mean value of the motivation variable has a higher value than the minimum value, which is 73. This shows that the motivation of Maitreyawira Elementary School Teachers in Batam is still insufficient so it needs attention. The teacher performance variable has a mean value of 132.84 with a standard deviation of 9.060. The mean value of the teacher performance variable has a higher value than the minimum value, which is 112. This shows that the teacher performance of Maitreyawira Batam Elementary School teachers still needs to be evaluated.

Data analysis

1. Normality Test

The normality test is used to test whether the data is normally distributed or not. Normality test data was processed using SPSS with the results in the image below, which are as follows:

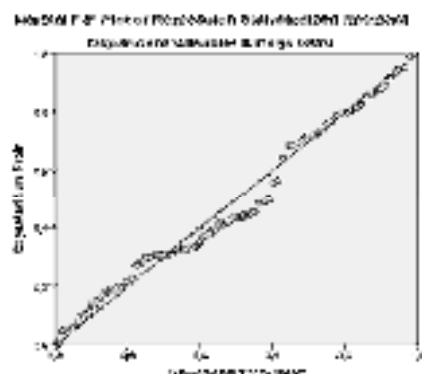


Figure 2. Normal P-P Plot of Regression Standardized Residual Graph

Figure 2 shows the points spread around the line and following the diagonal line, so it can be concluded that the residuals in the regression model are classified as normal.

2. Multicollinearity Test

A regression model experiences multicollinearity if there is a perfect linear function for some or all of the independent variables in the linear function. The data was processed using the SPSS program and the results obtained in Table 3 are as follows:

Table 3. Multicollinearity Test Results

Coefficients			
Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Leadership Style	,308	3,242
	Organizational Culture	,859	1,164
	Work Environment	,294	3,398
	Motivation	,460	2,176

a. Dependent Variable: Teacher Performance

Based on the test results in Table 3, it can be seen that the Leadership Style Tolerance figures are $0.308 > 0.1$ and $VIF\ 3.242 < 10$, Organizational Culture Tolerance $0.859 > 0.1$ and $VIF\ 1.164 < 10$, Work Environment Tolerance $0.294 > 0.1$ and $VIF\ 3.398 < 10$, and Motivational Tolerance $0.460 > 0.1$ and $VIF\ 2.176 < 10$. It can be concluded that there is no multicollinearity between the independent variables in this study.

3. Heteroscedasticity Test

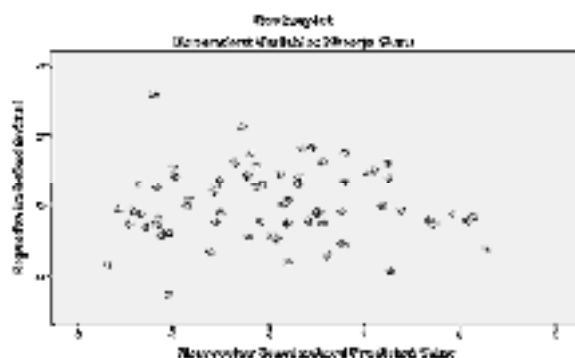


Figure 3. Multicollinearity Test Results

In Figure 3, the scatter plot graph shows that the points are spread randomly and do not form a clear pattern, and are spread both above and below the number 0 on the Y axis. This means that there is no



heteroscedasticity in the regression model, so the regression model is feasible to predict teacher performance based on input variables of leadership style, organizational culture, work environment, and motivation.

Table 4. Multiple Regression Equation

Coefficients						
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1 (Constant)	3,952	9,619		,411	,682	
Leadership Style	,869	,217	,436	3,999	,000	
Organizational Culture	,237	,109	,141	2,163	,034	
Work Environment	,557	,238	,261	2,341	,022	
Motivation	,308	,150	,183	2,053	,044	

a. Dependent Variable: Teacher Performance

In Table 4, it is known that the regression equation formed is: $Y = 3.952 + 0.869X_1 + 0.237X_2 + 0.557X_3 + 0.308X_4 + e$

Based on the regression equation it can be explained that:

If a = constant (3.952), the equation shows the magnitude of teacher performance (Y) which is influenced by leadership style (X1), organizational culture (X2), work environment (X3), and motivation (X4). This means that if leadership style (X1), organizational culture (X2), work environment (X3), and motivation (X4) are equal to 0, then teacher performance (Y) is 3.952. This shows that there are other factors that can influence the performance of Maitreyawira Elementary School teachers in Batam, apart from leadership style, organizational culture, work environment and motivation.

For b1 to be the same as the regression coefficient then $X_1 = 0.869$. This shows the direction of influence of leadership style (X1) on teacher performance (Y) at Maitreyawira Elementary School, Batam. This means that if the leadership style is 1, teacher performance will increase by 0.869 units, assuming the magnitude of the leadership style is constant/does not change.

Hypothesis testing

1. T test

Table 5. Results of the t test

Coefficients						
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1 (Constant)	3,952	9,619		,411	,682	
Leadership Style	,869	,217	,436	3,999	,000	
Organizational Culture	,237	,109	,141	2,163	,034	
Work Environment	,557	,238	,261	2,341	,022	
Motivation	,308	,150	,183	2,053	,044	

Based on Table 5. The results of the t test analysis are as follows:

The significance value of leadership style is 0.000, which is smaller than $\alpha = 0.05$ ($0.000 < 0.05$), so H_0 is rejected. So it is proven that the leadership style variable (X1) has an effect on teacher performance. In Table 5, the leadership style regression coefficient has a positive value of 0.000, indicating that leadership style influences the performance of teachers at Maitreyawira Elementary School, Batam.

The significance value of organizational culture is 0.034, which is smaller than $\alpha = 0.05$ ($0.034 < 0.05$), so H_0 is rejected. So it is proven that the leadership style variable (X2) has an effect on teacher performance. In



Table 5, the organizational culture regression coefficient has a positive value of 0.034, indicating that organizational culture influences the performance of teachers at Maitreyawira Elementary School, Batam.

The work environment significance value of 0.022 is smaller than $\alpha = 0.05$ ($0.022 < 0.05$), so H_0 is rejected. So it is proven that the work environment variable (X3) has an effect on teacher performance. In Table 5, the work environment regression coefficient has a positive value of 0.022, indicating that the work environment has an influence on the performance of teachers at Maitreyawira Elementary School, Batam.

The motivation significance value of 0.044 is smaller than $\alpha = 0.05$ ($0.044 < 0.05$), so H_0 is rejected. So it is proven that the motivation variable (X4) has an effect on teacher performance. In Table 5, the motivation regression coefficient has a positive value of 0.176, indicating that motivation has an influence on the performance of teachers at Maitreyawira Elementary School, Batam.

Table 6. F Test Results

ANOVA ^a						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4475,597	4	1118,899	50,911	,000 ^b
	Residual	1516,457	69	21,978		
	Total	5992,054	73			

b. Predictors: (Constant), Motivation, Leadership Style, Work Environment, Organizational Culture

Based on the F test results in Table 6, it is known that the F value is 50.911 with a significance level of 0.000. The significance value of 0.000 is smaller than 0.05, so the regression model used is fit, which means H_0 is rejected. This means that the variables of leadership style, organizational culture, work environment and motivation simultaneously have a positive and significant effect on teacher performance.

Table 7. Coefficient of Determination Test Results (R2)

Model Summary ^b							
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	df1
1	,864 ^a	,747	,732	4,688	,747	50,911	4

a. Predictors: (Constant), Motivation, Leadership Style, Work Environment, Organizational Culture

b. Dependent Variable: Teacher Performance

Based on Table 7 above, the coefficient of determination (R2) value seen from the Adjusted R Square value is 0.732. This shows that the ability of the leadership style variables (X1), organizational culture (X2), work environment (X3), and motivation (X4) has an effect on the teacher performance variable (Y) by 73.2% while the remaining 26.8% is the influence of other independent variables.

Leadership style influences teacher performance

The results of this study indicate that leadership style has a partially significant effect on teacher performance. The results of the t test analysis showed that the value of t count ($3.999 > t$ table (2.00)) and the significance value of α for leadership style was 0.000, which was smaller than $\alpha = 0.05$ ($0.000 < 0.05$), so H_0 was rejected. From the results of this research, it can be concluded that to achieve maximum employee performance or work performance, the use of appropriate leadership from superiors is one of the factors that can move, direct, guide and motivate employees to achieve more at work.

Organizational culture influences teacher performance

The results of this research indicate that organizational culture has a partially significant effect on teacher performance. The results of the t test analysis obtained a value of t count ($2.163 > t$ table (2.00)) and a significance value of organizational culture α of 0.034 which was smaller than $\alpha = 0.05$ ($0.034 < 0.05$). Based on the results obtained regarding organizational culture, some teachers do not get along with other teachers of different ethnicities, religions or races. This results in a lack of communication for some teachers. This results in



teachers carrying out learning in different ways. This illustrates that organizational culture is very important for teachers in solving educational problems by expressing opinions and ideas that build the world of education

The work environment influences teacher performance

The results of this research indicate that the work environment has a partially significant effect on teacher performance. The results of the t test analysis showed that the value of t count (2.341) > t table (2.00) and the significance value of α for the work environment was 0.01, which was smaller than $\alpha = 0.05$ ($0.022 < 0.05$). Regarding the results obtained, in this school there are still some teachers who like to chat and make noise, some teachers live far from the school where they work so they are late due to traffic jams on the highway, and some students throw rubbish carelessly. This indicates that the work environment is everything around the teacher that influences him in carrying out and completing the tasks given to him in an area.

Motivation influences teacher performance

The results of this study indicate that motivation has a partially significant effect on teacher performance. The results of the t test analysis obtained a value of t count (2.053) > t table (2.00) and a significance value of α motivation of 0.044 which was smaller than $\alpha = 0.05$ ($0.044 < 0.05$). Based on the results of research on motivation, teachers need to be given motivation in various ways, such as awards in the form of speeches for teachers who excel. School principals are expected to motivate teachers seriously to carry out their duties so that their intrinsic motivation increases.

4. CONCLUSION

Based on the results of data analysis and calculations using SPSS version 20, the researchers concluded as follows: 1) Leadership style has a partially significant effect on teacher performance. 2) Organizational culture has a partially significant effect on teacher performance. 3) The work environment has a partially significant effect on teacher performance. 4) Motivation has a partially significant effect on teacher performance. 5) Leadership style, organizational culture, work environment and motivation simultaneously and significantly influence the performance of teachers at Maitreyawira Batam Elementary School by 73.2% and the remainder is influenced by other factors not examined in this research.

In this research, there are several suggestions that are studied to support the results of this research, namely: 1) Teachers in carrying out their responsibilities, it is good for each teacher to be able to develop and present teaching materials in accordance with learning objectives so that these teaching materials are enjoyable for students so that participants Students are motivated to learn and can proceed according to what was planned. 2) The principal of Maitreyawira Elementary School should often give praise to every teacher who has worked hard in carrying out their responsibilities so that teachers feel concern from their superiors and the implementation of teaching and learning activities can be directed when supervised by the principal.

5. ACKNOWLEDGMENTS

We would like to thank the teachers and principal, Chancellor, and Director of the Postgraduate Program at the University of Riau Islands who have helped so that this research can be completed well.

REFERENCES

- Ahmad LOI. (2017). The Concept of Teacher Performance Appraisal and Factors That Influence It. *Idarah Journal*, Vol. 1, No. 1, 133-142
- Ahmadiansah R. (2016). The Influence of Work Motivation and Job Satisfaction on the Performance of Muhammadiyah Salatiga Vocational School Teachers. *Inject Journal*, Vol. 1, No. 2, 223-236
- Anam C. (2018). The Influence of Motivation, Competency, Leadership, Work Environment, and Work Discipline on Teacher Performance in Vocational High Schools. *Journal of Management and Islamic Education*, 4(1):40-56



- Ananda R, Fahdli M. (2018). Educational Statistics Theory and Practice in Education. Medan: Widya Puspita
- Anggrayni D. et al. (2018). The Influence of Work Motivation and Work Environment on the Performance of Teachers at Pancasila 6 Jatisrono Vocational School, Jatisrono District, Wonogiri Regency. *Journal of Information and Communication* Vol. 2, no. 2, 1-9
- Cahyani A. et al. (2020). High School Students' Learning Motivation in Online Learning during the Covid-19 Period. *Journal of Islamic Education*, Vol. 3, no. 1, 123-140
- Candana DM. (2018). The Influence of Work Discipline, Work Environment and Incentives on PT Employee Performance. Incasi Raya Muaro Sakai Pancung District About Pesisir Selatan Regency. *Journal of EKOBISTEK Faculty of Economics*, Vol. 7, No. 1, 1-8
- Cupiadi H, Kedaton IP. (2016). The Influence of Motivation and Organizational Culture on Employee Performance at PDAM TIRTA Intan - Garut Main Branch, Garut City, Garut Regency. *Journal of Economic Discourse*, Vol. 15, no. 3, 1-7
- Guterres LA, Supartha WG. (2016). The Influence of Leadership Style and Work Motivation on Teacher Performance. *Udayana University Journal of Economics and Business*, Vol. 5, no. 3, 429-454
- Hariani, L., Anwar, F., & Marpaung, S. F. (2022). Supervisi Internal Kepala Sekolah dalam Menerapkan Kedisiplinan Guru di SD Negeri 9 Tamon Jaya Kecamatan Salang Kabupaten Simeulue. *Jurnal Edukasi El-Ibtida'i Sophia*, 1(1), 39-48.
- Hidayat S. et al. (2019). The Influence of Leadership Style, TEAM Collaboration and Competitiveness on Employee Performance through job satisfaction. *Darussalam Journal of Economic Perspectives* Vol. 5, no. 1, 86 - 100
- Jaya I. (2019). Application of Statistics to Educational Research. Jakarta: Prenadamedia Group
- Jumriantunnisah N. et al. (2016). The Influence of School Culture, Compensation, and Internal Motivation on the Performance of Honorary Teachers in Senior High Schools (SMA) in Madapangga District, Bima Regency. *Mirai Management Journal*, Vol. 1, No. 1, 25-41
- Junianto D, Sabtohadhi J. (2019). The Influence of Organizational Culture and Organizational Environment on Job Satisfaction and Organizational Commitment. *Journal of Economic Sciences*, Vol. 12 No. 2, 12-22
- Kawilarang J. (2019). The Influence of Innovative Culture and Leadership Style on Employee Performance in Traditional Coffee Houses in Manado City. *EMBA Journal*, Vol. 7, no. 4, 5348-5357
- Komar A. (2020). Improving Teacher Performance Based on School Culture and Teacher Work Motivation. *Journal of Education*, Vol. 6, No. 2, 109-117
- Kurniawan R, Hazir AY. (2019). The Influence of Leadership, Motivation, Work Environment, and Organizational Culture on Performance Which Impacts Work Achievement. *STIE Journal of Economics and Management*, Vol. 5, no. 1, 115-134
- Muhammad A, Gusrianty. (2019). Development of Teacher Performance Assessment Applications in Junior High Schools (SMP) Using Fuzzy Logic (Case Study: SMP Negeri 3 Mandau). *Student Journal of Computer and Information Technology Applications*, Vol. 1, No. 1, 46-51
- Nufus, H., & Anwar, F. (2023, April). Teachers' Efforts to Increase Students' Interest in Reading through Literacy Activities in Class IV of Sibreh Public Elementary School, Aceh Besar District. Dalam *Proceedings of International Conference on Education* (Vol. 1, No. 1).
- Ngiode S. (2016). The Influence of Principal Leadership, Work Motivation and Work Discipline on the Performance of MTS.N Batudaa Teachers, Gorontalo Regency. *Journal of Islamic Education Management*, Vol. 4, no. 2, 127-137



- Ningsih P. (2017). The Influence of Commitment, Competency and Work Environment on Teacher Performance in Pasangkayu District, North Mamuju Regency. *Catalog Journal* Vol.4, No.11, 127-137
- Patarai I. et al. (2018). Teaching Motivation, Professional Competence, and Level of Education on Teacher Performance. *Mirai Management Journal*, Vol. 3, no. 2, 120-133
- Government Regulation no. 16 of 2009 concerning Teacher Functional Positions and Credit Scores
- Purnomo E, Sarigih HJR. (2016). *Leadership Theory in Organizations*. Jakarta: Nusantara Bangun Jaya Foundation
- Purnomo RA. (2016). *Analysis of Economic and Business Statistics with SPSS*. Ponorogo: Wade Group
- Ratnasari SL. (2017). *Human Resources Planning*. National library. Surabaya: KDT National Library
- Reni A, et al. (2019). The Influence of Organizational Culture, Organizational Commitment, and Job Satisfaction on the Performance of High School Teachers in Makassar. *HJABE Journal*, Vol. 2, no. 2, 89-99
- Ridho, T. et al. (2018). The Influence of Organizational Culture, Principal Leadership, and Teacher Competency on Teacher Performance with Job Satisfaction as an Intervening Variable. *Journal of Management*, Vol. 2, no. 1, 23-40
- Suhardi. (2019). The Influence of Work Motivation, Competence, Work Environment, and Compensation on PT Employee Performance. Life Insurance in Batam City with Organizational Citizenship Behavior as an Intervening Variable. *Benefia Journal*, No.4, No. 2, 296-315
- Sumarsono. (2012). *Measuring Teacher Performance in a Change Management Perspective*. Jakarta: Alphabeta
- Susilo CI. (2017). The Influence of Organizational Culture and Career Development on Soldier Job Satisfaction Through Work Motivation in the Koarmatim Amphibious Ship Unit. *Journal*



EMBRACING DIGITALIZATION: TRANSFORMING EDUCATION FOR THE 5.0 ERA

Erna Yupeni¹

¹*Program Pascasarjana Pendidikan Kimia, Universitas Riau, Pekanbaru, Indonesia*

*t.ernast@guru.sma.belajar.id

ABSTRACT

In the evolution of time, humans continue to develop and adapt to their environment during that period. Throughout this evolutionary process, humans constantly create innovations to enhance their effectiveness and ease of living. One of the tools used by humans in this process of adaptation and change is technology. Technology brings convenience and efficiency to human life. The development of the digital world progresses dynamically, and its influence on society's lifestyle cannot be ignored. Therefore, this paper aims to explore the importance of digitization in education in facing the changes from the 4.0 revolution towards 5.0. This research employs qualitative descriptive research with a literature review method. Data collection techniques utilize Content Analysis obtained from various sources including scientific articles, government documents, mass media, books, and others deemed relevant to this study, which are then analyzed using policy research. The research findings indicate that the digitization of education in schools is important to meet several needs, including increasing the demand for knowledge, improving the quality of student learning, strengthening students' four abilities: creativity, communication, critical thinking, and collaboration, as well as supporting the government's "independent learning" program, which is not limited by space and time. The digitization of school education can be used as a tool to support virtual learning without diminishing the essence of delivering learning materials, through online platforms that can be used flexibly.

Keywords: Education digitization, Technological innovations

1. INTRODUCTION

Technology is a field of knowledge that is constantly evolving. Human curiosity drives technological development as if it were limitless. Technological progress impacts every aspect of life, facilitating the fulfillment of human needs, including clothing, food, shelter, and even bureaucracy, through technology. The continuous innovation in technology signifies that humanity has entered the digital era. The digital era is a period where every aspect of human life is simplified by the sophistication of digital systems.

The digitization of schools is a logical consequence of the changing times, necessitating adaptation to master knowledge and technology, as emphasized by Dewanti (2020). In this regard, the government has implemented a policy regarding the digitization of schools to support digital learning activities by providing teaching materials through networks for use by education stakeholders, including teachers, students, schools, and the community. The policy emphasizes the use of information technology tools such as computer tablets and learning portal as operational aids in school performance, with regulations referring to Ministry of Education and Culture Regulation number 31 of 2019 and Minister of Education and Culture Decision number 320/P/2019 (Dewanti, 2020). Educational institutions, as platforms shaping the future generations, must not only preserve cultural traditions but also present an education system capable of addressing global challenges. Globalization is a dynamic reality, as highlighted by Ajizah (2021). Technological advancements have a broad impact, including in the field of education. Zubaidah, as cited by Hasanuddin et al. (2022), describes digital literacy as a key skill for learners facing the digital world, enabling critical, creative, and safe practices when dealing with digital technology in all aspects of life.

Digital literacy in the context of digital technology is the ability to use technology as a tool for work and learning, as defined by Nafi'ah Setiani and Barokah (2021). Another definition describes digital literacy as an individual's ability to research, create, and communicate more effectively, whether at home, school, workplace, or in daily life (Uršej, 2019). In the last decade, digital technology has



become part of society's culture. Digital media has become a central aspect of many people's lives, regardless of age. Therefore, the skills, knowledge, and understanding of digital literacy become crucial as digital culture grows among the community, from adults to young people and even children (Nafi'ah Setiani & Barokah, 2021).

To prepare students for technological literacy, early preparation is required, starting from schools. Schools serve as a platform to train students to become accustomed to the use of information technology, making it a familiar aspect of their lives. Digitalization of education can take the form of content digitalization and facility digitalization, with the presence of digital education paving the way for the realization of future-oriented smart schools (Murhadi & Ponidi, 2019).

The era of digitization, associated with the fourth industrial revolution, requires students not only to master science and information technology but also to be able to develop technology, presenting a real challenge. In line with these developments, the challenges faced by teachers in producing graduates that meet parental expectations are becoming more complex and are constantly adjusted to societal demands (Aulia et al., 2020). Both software and hardware tools are needed to face these challenges, including the learning process, as stated in the Ministry of Education and Culture Regulation Number 22 of 2016 on Basic and Secondary Education Process Standards. The regulation emphasizes that the learning process in educational institutions should be interactive, inspiring, enjoyable, challenging, motivating students to be actively involved, and providing sufficient space for initiatives, creativity, and independence in accordance with the talents, interests, and physical and psychological development of students (Sulis Setiawati, 2019).

Information technology in the modern era has penetrated all aspects of human life. Educational technology is an integrated strategy process in solving learning problems, serving as a system used to support learning to achieve desired outcomes. Therefore, educational technology is considered all efforts aimed at solving problems related to learning (Fauziah et al., 2020). The digitization of education programs involves utilizing technology as an aspect of the learning system, from curriculum to education administration. In the era of Digital Education Programs, understanding digital literacy, a set of basic technical skills to operate computer devices and other supporting media to understand, think critically, evaluate, and design communication content, is crucial. Paul Gilster, as mentioned by Eti (2020:70), defines digital literacy as the ability to use technology and information from digital devices effectively and efficiently in various contexts such as academic, career, and daily life.

2. METHODS

This research utilizes qualitative research methods (Darmawan, 2013) employing the library research method or literature review, also known as Content Analysis, related to the importance of educational digitization to obtain research data from library sources (Rahmi, 2021). The data sources in this study consist of subjects where the researcher obtained information sources related to the urgency of educational digitization in various forms such as recordings, images, sound, writing, and others, objectively and systematically (Rahmi, 2020). The data collection technique involves documentation such as scholarly articles, government documents, mass media, books, and other relevant materials, which are then analyzed using policy research methods (Qiftiyah et al., 2020).

3. RESULTS & DISCUSSION

Digital literacy is an essential skill for students at all levels of education. The digital world enables everyone to connect, collaborate (Rahmi & Fadhil, 2022), innovate, and discover continuously evolving information. In today's digital age, digital literacy is inseparable from students' skills, understanding, and knowledge, which will help them play significant and active roles in social, cultural, economic, and intellectual life, whether the impacts are felt now or in the future.



In the realm of education, digitization is the ability to transform various perspectives and educational processes into various forms of digitalization. Moreover, technology can improve human beings, serve as a platform for student creativity, foster a desire for critical thinking among students, and enhance the quality and structure of education, facilitating smooth learning processes. Thus, the emphasis of learning implementation should be on students' efforts to seek learning sources, problem-solving skills, and analytical thinking. The 21st century emerges specifically due to the global educational reality that has not fully met the needs of educational output, where the prevailing mindset generally revolves around competition. In this context, a competitive mindset only emphasizes cognitive aspects, sidelining cooperation and collaboration culture. From the perspective of the 21st century, this is contrary to the idea that individuals live in an environment rich in technology use, with widespread access to information, new communication patterns, and collaboration. Therefore, to support success in the digital age, a foundation of digital skills is crucial, including critical thinking, problem-solving, communication, and collaboration skills.

In today's era of information openness, digital literacy becomes crucial. The ability to operate digital technology devices is a necessity, as is the ability to interact in the digital world. Effective communication occurs when students understand the various forms of communication in the digital world. Currently, almost all aspects of human life use the internet, increasing the urgency to enhance digital literacy, from understanding responsible digital product use to accessing networked data sources.

Schools, as educational institutions, play a significant role in managing technology correctly as a learning tool or medium. Technological developments in the educational world have many positive aspects, but they also have negative implications. Therefore, human resources capable of managing technology appropriately as a learning tool are highly needed. The design of technology in the educational world should incorporate educational values and ethics to maximize its potential.

The fourth industrial revolution has brought about significant changes in various aspects of human life, including education. With the COVID-19 pandemic, schools are required to conduct digital-based learning activities. This could become a new culture in learning activities, indirectly enhancing learning quality by implementing new digital learning patterns (Septina Alrianingrum, 2020). The industrial revolution is defined as a rapid change process where the produced products have added value and better commercial value. The increase in data volume, computing power, connectivity, and the emergence of data analysis by the Internet of Things (IoT) or Internet of People (IoP) originating from human-machine interactions are the main work patterns and characteristics of the fourth industrial revolution, making it also known as the era of disruptive technology (Kasali, in Anggraeni, H., et al., 2019). The Ministry of Research, Technology, and Higher Education (2018) stated that the fourth industrial revolution era would disrupt various human activities, including science and technology fields and higher education. Therefore, educational support and roles are expected to enhance the nation's competitiveness amidst rapid global technological developments.

The era of globalization has significant impacts on every aspect of life. The education sector is required to produce human resources with four competencies known as 21st-century competencies (Yuni et al., 2016). This term is promoted because this era demands quality in every human effort and work result. Referring to the statement above, the Partnership for 21st Century Learning demands that students have skills, knowledge, and abilities in technology, media information, learning and innovation skills, life skills, and career as outlined in the 21st-century learning framework (Prayogi & Estetika, 2019). In other words, 21st-century competencies can be presented in the following four categories: ways of thinking, including creativity and innovation; ways of working, consisting of communication and collaboration; tools for working, including general knowledge, and



information and communication technology skills (Sugiman et al., 2022); and ways of living, which include career, personal and social responsibility, including awareness of culture and competence (Griffin et al., 2012).

In the era of the fourth industrial revolution towards industry 5.0, education should not only turn students into passive learners but rather the opposite. Learning must be student-centered and allow students to explore various sciences independently through various evolving technologies. Therefore, students must be equipped with four abilities (Creative, communicative, critical thinking, and collaborative) (Costa et al., 2022) by utilizing the role of technology in supporting these abilities.

a. Creative

The advancement of technology and information is not always a challenge for teachers. This advancement can be seen as an opportunity to develop the potential of teachers in honing students' abilities to face the Industry 4.0 revolution. Technological advancements also facilitate teachers in delivering learning materials with the help of instructional animations, PowerPoint presentations, and similar tools that emphasize student-centered learning (Sugiman et al., 2022). Additionally, technology-based learning can present engaging and enjoyable learning experiences (Ajizah, 2021). Besides creativity in delivering lessons, the use of technology provides opportunities for students, such as creating simple instructional videos, which technology serves as a platform to showcase students' creativity and opens pathways for everyone to develop themselves (Ajizah, 2021). Therefore, creativity is not just about students who are good at drawing or wording in a text. Instead, creativity can be interpreted as thinking outside the box without limitations imposed by binding regulations.

b. Communication

Communication is defined as students' potential to present their ideas and thoughts quickly, clearly, and effectively, including several sub-skills such as reading the audience to ensure their message is conveyed. In this regard, students are expected to master, organize, and build good and correct communication verbally, in writing, or through multimedia. Technological advancements provide much easier communication access than before, whether between educators and students or among students. This has advantageous impacts on individuals in enhancing their communication skills (Ajizah, 2021). This benefit is also greatly felt by introverted students. Where introverts can use technology as a facility to express their arguments in writing. This is relevant as shown in a study by (Afifah et al., 2016) through the development of media named letter sharing.

c. Critical thinking

Critical thinking can be interpreted as a person's ability to argue in a structured manner. In the process, critical thinking skills are applied in mental activities such as problem-solving, decision-making, persuading, analyzing opinions, and conducting scientific research. In other words, critical thinking skills are applied to systematically evaluate the weight of personal arguments and the opinions of others (Ajizah, 2021). The implementation of technology-based learning can ignite students' enthusiasm, which will affect the improvement of their learning motivation. Thus, students are encouraged to think critically about a problem, where they are required to solve the problems that arise. This can be encouraged through the implementation of Problem-based Learning strategies, where students utilize technology to obtain information to solve the problems they face. Referring to the statement above, many modern people rely more on internet search engines than available library services (Santoso & Isminarti, 2020).

d. Collaborative

Collaboration, or in other terms known as cooperation with a group of people to achieve common goals (Ajizah, 2021). In the learning process, this activity is important to be implemented to students so that they are trained to develop the best solutions that can be accepted by everyone in their group and ready to cooperate in the future. In this collaboration, children will gain learning such as empathy towards others, respecting different



opinions, and leadership. Additionally, collaboration aims to shape students to have a sense of responsibility, adapt easily to the environment, society, and set high targets for groups/individuals. In this regard, educators are responsible for training students' collaboration skills. With the technological advancements in today's era, teachers can utilize technology as a medium to help students collaborate without being limited by space and time (Hamidy & Purboningsih, 2016).



In welcoming the era of Society 5.0 revolution, the government has begun to develop everything based on digital platforms, especially in education. One of them is the implementation of independent learning. Independent learning is a program designed with the aim for students to have the freedom to learn, not only in specific classrooms but anywhere. This statement is in line with what Meylan Saleh expressed; he stated that independent learning is learning done without coercion, where students can be free to be creative and innovate (Saleh, n.d.). Furthermore, Aan Widiyono et al. also expressed similar views; they stated that independent campus is a natural learning process aimed at obtaining freedom and opening up broader learning opportunities, which can also stimulate students' interest in learning (Ke et al., n.d.). Here are some opportunities of independent learning, including developing students' creativity, fostering curiosity through exploration and experimentation related to learning, and allowing learning to take place anytime and anywhere without being restricted by space and time (Sidiq, n.d.). However, there are several challenges in the independent learning program, one of which is that lesson plans need to be shorter and must adapt to the personalities of students (Sasikirana et al., n.d.). In this program, there are also some implementation challenges, such as educators finding it difficult to determine indicators when arranging lesson plans (Fibra et al., 2021). Moreover, economic deficiencies can also hinder the realization of independent learning due to insufficient budgets to fulfill facilities in its implementation (Suhartono et al., n.d.). Thus, it can be understood that the government's "independent learning" program greatly assists students in developing creativity and increasing knowledge. Here, learning can take place anywhere and anytime, without being bound by space and time. In fact, learning can also proceed smoothly with or without educators.

Regarding the discussion above, in terms of education, the Society 5.0 revolution is a learning process that will be carried out without limitations of place and time, and whether or not educators are present is not a problem (Sasikirana et al., n.d.). In schools, students are now being accustomed to using technology to prepare for the Society 5.0 revolution. All students are required to master digital-based things. One of them is smartphones, which have become the most common learning media during the Covid-19 pandemic. At the elementary school level, the use of smartphones must be supervised by parents to minimize the negative impacts of smartphone use, one of which is students becoming lazy to study and only relying on the internet without genuine interest in learning. Regarding the above, Cut Nelga Isma et al. stated that when using smartphones, students must still be under parental supervision, and every parent must be firm with their children to prevent negative impacts of smartphone use (Pendidikan Tambusai et al., n.d.). Furthermore, Faiz N also mentioned that there are many possibilities for young children when using smartphones, both good and bad. In this case, he stated that parents play a crucial role as supervisors and controllers in the child's development process.

4. CONCLUSION

In conclusion, in the digital era and the fourth industrial revolution, education plays a crucial role in shaping learners to be individuals ready to face future challenges. Through the development of creative, communicative, critical thinking, and collaborative skills, education can produce competent and adaptable generations to technological and environmental changes. The use of technology in education allows teachers to create engaging and interactive learning experiences for students. It also opens opportunities for students to develop their skills through creativity, collaboration, and various digital media. Effective communication is key in



facilitating student-oriented teaching and learning processes. By leveraging technology, students can communicate more easily and efficiently, as well as develop critical and reflective communication skills. Critical thinking skills lay the foundation for problem-solving and making sound decisions amid the complexities of the modern world. Through learning approaches that encourage students to think critically, they can develop the analytical and evaluative skills necessary for success in life. Collaboration among students is also crucial in creating an inclusive and supportive learning environment. By working together in groups, students can learn to appreciate differences, build empathy, and solve problems collectively. Overall, technology-based education prioritizing the development of critical and collaborative skills is key in preparing future generations for success in the digital era and the fourth industrial revolution.

REFERENCES

- Afifah, E., Triyono, T., & Hotifah, Y. (2016). Pengembangan Media Letter Sharing Untuk Meningkatkan Keterampilan Komunikasi Siswa Introvert. *Jurnal Kajian Bimbingan Dan Konseling*, 1(2), 27–32. <https://doi.org/10.17977/Um001v1i12016p027>
- Ajizah, I. (2021). Urgensi Teknologi Pendidikan: Analisis Kelebihan Dan Kekurangan Teknologi Pendidikan di Era Revolusi Industri 4.0. *Istighna*, 4(1). <http://books.uinsby.ac.id/id/eprint/635/>
- Costa, J. M., Miranda, G. L., & Melo, M. (2022). Four-Component Instructional Design (4c/Id) Model: A Meta-Analysis on Use and Effect. *Learning Environments Research*, 25(2), 445–463. <https://doi.org/10.1007/s10984-021-09373-y>
- Darmawan, D. (2013). *Metode Penelitian Kualitatif*. Remaja Rosdakarya.
- Dewanti, A. K. (2020). Efektifitas Program Digitalisasi Sekolah. In Bhirawa (P. 4).
- Direktorat Sekolah Dasar. (2021). *Program Digitalisasi Sekolah*. Direktorat Sekolah Dasar: Direktorat Jenderal Paud Dikdas Dan Dikmen Kementerian Pendidikan, Kebudayaan, Riset, Dan Teknologi.
- Fibra, N. P., Prodi, J. I., Pancasila, P., & Kewarganegaraan, D. (2021). Kendala-Kendala Dalam Penyusunan Dan Pelaksanaan Rencana Pelaksanaan Pembelajaran Program Merdeka Belajar (Studi Pada Guru Ppkn di Sma Negeri 1 Gunung Talang). In *Journal of Education, Cultural and Politics* (Vol. 1). <https://jecco.ppj.unp.ac.id/index.php/jecco/article/view/13>
- Griffin, P., McGaw, B., & Care, E. (2012). Assessment And Teaching Of 21st Century Skills. In *Assessment and Teaching Of 21st Century Skills* (Vol. 9789400723). Springer Netherlands. <https://doi.org/10.1007/978-94-007-2324-5/Cover>
- Gusty, S., Nurmiati, N., Muliana, M., & Sulaiman, O. (2020). Belajar Mandiri: Pembelajaran Daring Di Tengah Pandemi Covid-19. <https://www.google.com/books?hl=id&lr=&id=Hsz7dwaaqbaj&oi=fnd&pg=pa85&dq=Gusty,+Sri,+Nurmiati+Nurmiati,+Muliana+Muliana,+Oris+Krianto+Sulaiman+Ots=Qnhielyjnk&sig=Geqdtggvkylo8hvjziktnp9rkm>
- Hamidy, A., & Purboningsih, D. (2016). Pembelajaran Kolaboratif Berbasis Online Dalam Perkuliahan Filsafat Pendidikan Matematika. *Prisma, Prosiding Seminar Nasional Matematika*, 138–144.
- Hasanuddin, H., Puryadi, P., & Jayadi, A. (2022). Analisis Kesiapan Digitalisasi Sekolah Jenjang Smp Di Kabupaten Sumbawa Barat. *Sang Pencerah: Jurnal Ilmiah Universitas Muhammadiyah Buton*, 8(1), 1–13. <https://doi.org/10.35326/pencerah.v8i1.1855>



- Huda, I. A. (2020). Perkembangan Teknologi Informasi Dan Komunikasi (Tik) Terhadap Kualitas Pembelajaran Di Sekolah Dasar. *Jurnal Pendidikan Dan Konseling (Jpdk)*, 2(1), 121–125. <https://doi.org/10.31004/jpdk.v2i1.622>
- Ke, J. P., Widiyono, A., Irfana, S., Firdausia, K., & Kunci, K. (N.D.). Frederiksen Novenius Sini Timba, Dkk / Implementasi Merdeka Belajar / 102-107 Metodik Didaktik Implementasi Merdeka Belajar Melalui Kampus Mengajar Perintis Di Sekolah Dasar. *Ejournal.Upi. Edu*. Retrieved May 26, 2022, From <https://ejournal.upi.edu/index.php/metodikdidaktik/article/view/30125> Khairunnisa, S., Matematika, T. A.-J. R. P., & 2021, Undefined. (N.D.).
- Murhadi, & Ponidi. (2019). Digitalisasi Sekolah Melalui Pengembangan Website Dan Layanan Sekolah Berbasis Teknologi Informasi. *Intek : Jurnal Informatika Dan Teknologi Informasi*, 2(2), 62–69.
- Nafi'ah Setiani, N., & Barokah, N. (2021). Urgensi Literasi Digital Dalam Menyongsong Siswa Sekolah Dasar Menuju Generasi Emas Tahun 2045. *Prosiding Semai Seminar Nasional Pgmi 2021*, 411–427.
- Nelga Isma, C., Rohman, N., Pgmi, P., Teungku Dirundeng Meulaboh, S., Barat, A., & Pascasarjana Pgmi Uin Sunan Kalijaga Yogyakarta, P. (N.D.). Pengaruh Penggunaan Smartphone Terhadap Minat Baca Siswa Kelas 4 Di Min 13 Nagan Raya. In *Jptam.Org*. Retrieved May 26, 2022, From <https://jptam.org/index.php/jptam/article/view/3650>
- Prayogi, R. D., & Estetika, R. (2019). Kecakapan Abad 21: Kompetensi Digital Pendidik Masa Depan. *Jurnal Manajemen Pendidikan*, 14(2).
- Qiftiyah, M., Rahmi, R., & Anti, S. L. (2020). Implementasi Kepemimpinan Kepala Sekolah Terhadap Peningkatan Profesionalisme Guru. *Indonesian Journal of Islamic Educational Management*, 3(1), 1–9.



THE INFLUENCE OF LEADERSHIP STYLE, COMMUNICATION AND INDIVIDUAL CHARACTERISTICS ON TEACHER PERFORMANCE AT SMK NEGERI 1 SINABANG

Febyolla Presilawati^{1*}, Mirza Murni², Kiky Agusriady³, Fudja Devany Balqis⁴

^{1,2,3,4} Universitas Muhammadiyah Aceh, Banda Aceh, Indonesia

*febyollaraviq.fr@gmail.com

ABSTRACT

This study was conducted with the aim of analyzing how the influence of leadership style, communication and individual characteristics on teacher performance at SMK Negeri 1 Sinabang. This research was conducted at SMK Negeri 1 Sinabang, with hypothesis testing using Technical Analysis Test (T) Partial and Test (F) Simultaneous, the number of samples was 43 respondents. Research data is obtained using interview methods and questions / questionnaires. Based on the results of the analysis, it shows that the partial test between the variables of Leadership Style, Communication and Individual Characteristics has a significant influence on teacher performance at SMK Negeri 1 Sinabang. Then simultaneously, namely Leadership Style, Communication and Individual Characteristics have a significant influence on teacher performance at SMK Negeri 1 Sinabang. The results of Partial Test (T) data processing, the Leadership Style variable has a calculated T of 2.909 and Sig. 0.034, the Communication variable has a calculated T of 2.785 and Sig. 0.047, and the Individual Characteristics variable has a calculated T value of 3.051 and Sig. 0.047. On the other hand, the Simultaneous Test (F) obtained F count of 3.368 > F table 2.85 of these values can be interpreted that the independent variables together simultaneously affect the dependent variable.

Keywords: leadership style, communication, individual characteristics, teacher performance.

1. INTRODUCTION

Organizations need a leader who can inspire team members to increase productivity and carry out their tasks with passion. The existence of a leader in the organization is not only felt by subordinates, but can also be an example and source of enthusiasm that is fundamental to master performance. An effective leadership, especially in the context of the principal, can be considered a key resource for the entire organization. Therefore, a leader needs to understand leadership theory and have a deep understanding related to the potential and talents possessed by subordinates or himself in order to achieve effectiveness in work.

A leader is able to create situations and conditions where subordinates can work based on their individual abilities to facilitate in carrying out work in achieving the goals to be achieved by an organization. In other words, a leader in the organization is able to adjust between the achievements desired by the organization and the wishes of subordinates in achieving goals. According to (Angga & Iskandar, 2022) Being in front of a leader can influence the attitudes and behaviors of others, which will then be used as examples. Along with that, a leader also has the ability to be in the midst of the people he leads, to work together in carrying out activities together or hand in hand. Leaders also need to understand that managing employees is a difficult and complex task because they have diverse thoughts, feelings, statuses, desires, and backgrounds that are brought into the organization. (Presilawati, F., Amin, A., Fahmi, A., 2022).

The role of the principal in leading an organization through leadership style aims to be able to direct teachers to increase understanding, participation, awareness to advance the school and especially the world of Education. The principal's leadership style can be identified through attitudes, body movements, or language used to inspire, motivate, manage, plan programs, and implement programs that have been designed together with colleagues' teachers and all personnel in the school. The main goal is to achieve the vision and mission of the school (Kadarsih et al., 2020).



Leaders in an organization must have the capacity to read the situation at hand and can also adjust the existing leadership style to the conditions in an organization, each leader has his own characteristics, traits, disposition and personality in terms of leading an organization to achieve success and organizational goals are determined by the leadership style, communication and individual characteristics of a leader to his subordinates. Leadership is reflected through the behavior of a leader who shows attitudes and patterns of behavior in influencing his subordinates and coordinating their tasks. Leadership behavior, which is influenced by attitudes and behavior patterns, needs to be supported by good relationships between leaders and subordinates as well as among peers. (Yusuf, Y., & Irbawi, M. 2022).

Factors related to the role of the Principal towards the Teacher include the ability to create consistent and effective communication. Organizational communication in the school environment has great potential to influence the success rate in achieving organizational goals. In the scope of work, communication becomes a key element in interactions between individuals, both from the leadership and subordinates, and vice versa. The existence of communication allows the formation of strong cooperative relationships, promotes cooperation to advance performance, and finally, increases the productivity of all human resources in the context of the school or organization.

Individual characteristics in an organization require a leader who can effectively utilize his responsibilities and powers to support the improvement of the performance of each member, so that these aspects can contribute to the achievement of organizational goals. The characteristics possessed by each individual, such as abilities, expectations, needs, personal beliefs, and experience, are highly dependent on the control exercised by leaders in carrying out their duties and functions over subordinates. Therefore, a leader needs to have a leadership style that can be adapted to the diversity of individuals in the organization. A good understanding of individual characteristics in the organization is important for every leader.

The performance of a teacher includes his ability to carry out learning tasks in the school environment and be responsible for the students under his guidance. This task involves the delivery of learning that can improve the learning ability and achievement of learners. This concept is in line with the view that qualified teachers are certainly able to carry out education, teaching, and training effectively and efficiently. They are believed to be able to optimize their potential in order to achieve organizational goals and educational standards that have been set. The ability of teachers in accordance with the standards of the task carried out has a positive impact on the achievement of the desired results, thereby increasing the success rate that has been previously set. Performance is a structured evaluation that systematically presents the positive and negative aspects of an individual or group's work. Although various technical challenges such as format selection and human challenges such as resistance from appraisers and obstacles in relationships between individuals may arise, all of them are difficult to overcome by performance appraisers (Musriadi et al, 2020; Presilawati, F. 2018).

Based on observations made by researchers at SMK Negeri 1 Sinabang on January 6 to 8, 2024, by conducting interviews with 8 Teachers, where the Principal's Leadership Style directs teachers to be active in improving performance and focusing on learning methods that can have a positive impact on student creativity in accordance with the goals of Vocational High Schools whose main task is to shape every graduate to be able to compete and enter the workforce or open a business afterwards. To be able to meet these goals, teachers as educators are expected to be able to meet the goals of accelerating and increasing student competition in schools, which sometimes makes teachers tend to be difficult and slightly burdened with the achievements of the learning process and through the encouragement of the Principal's Leadership, teachers are expected to be able to meet existing standards and can achieve the targets desired by the school to produce graduates who are skilled in their fields of expertise.

The principal's communication is very open with what happens in the school environment and involves teachers in every policy and program that can advance the school through the mechanism of small discussions or meetings to produce conclusions from what is discussed. However, the headmaster tends to be more openly accepting of the opinions of teachers who have longer experience in the school who sometimes make the results of discussions received by the principal from the teacher alone, who have more experience in knowledge and information about what the school needs in the future.



Individual Characteristics The principal who is a graduate of Bachelor of Economics certainly has an important role in managing the school environment through leadership style and communication between leaders and teachers is expected to have a positive impact on teachers through encouragement, motivation to be able to improve performance. This character is needed by teachers to make the figure of the principal an example and make a strong basis for continuing to be enthusiastic in working.

2. METHODS

a. Research Design

In this study, researchers utilized associative and quantitative approaches. According to (Sugiyono (2018), associative approaches are evaluated based on the way they are explained, while quantitative approaches are assessed based on the type of data used. The associative approach aims to find the influence or relationship between two or more variables. This research has the potential to build theories that can serve to explain, predict, and control a phenomenon. Meanwhile, descriptive research is a type of research that focuses on situations, conditions, circumstances, or other elements that have been mentioned before, and the results are presented in the form of research reports. The use of descriptive methods in this study was chosen because this method is more focused on solving more actual problems and specifically explores situations, conditions, circumstances, or other factors that have initially been detailed, explained, and then analyzed.

b. Data Analysis Methods

The data analysis used in this study starts from the instrument validity test, reliability test. While the classical assumption test uses normality, heteroscedasticity, and multicollinearity tests. The hypothesis testing uses the T test (Partial) and F Test (Simultaneous). Data processing in this study was assisted by *SPSS 20.0 software for window* ie :

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + e$$

Information:

Y: Performance

a: Constant

$b_1 - b_3$: Regression coefficient of each variable

X_1 : Leadership Style

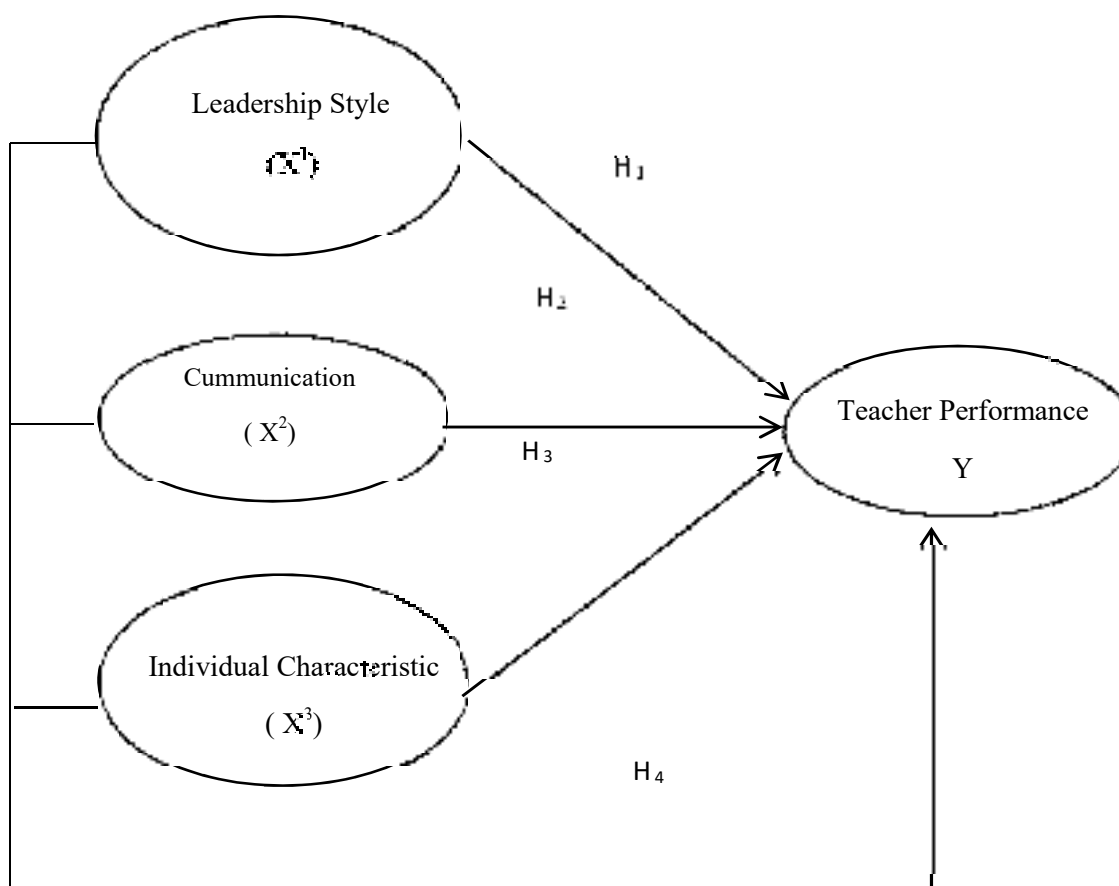
X_2 : Communication

X_3 : Individual Characteristics

e: *Standard Error*



c. Framework of Thought



Based on the above framework, the hypothesis of this study is as follows:

- H1 : It is suspected that leadership style affects teacher performance at SMK Negeri 1 Sinabang.
- H2 : It is suspected that communication affects teachers' performance at SMK Negeri 1 Sinabang.
- H3 : It is suspected that individual characteristics affect teachers' performance at SMK Negeri 1 Sinabang.
- H4 : Alleged Leadership Style, Communication and Characteristics Individuals influence teachers' performance at SMK Negeri 1 Sinabang.



d. Operational Variables and Definitions

Table 1. Definition and operations

No	Variable	Variable Definition	Indicator	Size	Measuring Scale	Question Items
Dependent						
1	Teacher Performance (Y)	A teacher's performance includes skills and dedication in carrying out learning tasks optimally, from planning teaching programs, carrying out learning activities, to evaluating learning outcomes. (Ritonga, 2020)	1. Competence Pendagogic 2. Competence Personality 3. Competence Social 4. Competence Professional	1-5	Likert	A1-A5
Independent						
1	Style Leadership (X1)	Leadership style is a process in which There is an element of influencing. With the existence of a leadership style will establish cooperation and the existence of a vision and mission to achieve common goals. (Dian Sudiantini & Farhan Saputra, (2022)	1. Decision Making Motivation 2. Communication 3. Ability to control subordinates. 4. Responsibility.	1-5	Likert	B1-B5
2	Communication (X2)	Communication is a delivery process News and ideas from one source of information to a specific purpose. In the context of communication, the source of information and its purpose lies in human thinking. (Evi Zahara, 2018)	1. Understanding 2. Feedback 3. Timeliness 4. Media compliance 5. Content accuracy	1-5	Likert	C1-C5
3	Individual characteristics (X3)	Individual characteristics are characteristics that reflect a person's differences in terms of motivation, initiative, and the ability to complete tasks to completion or solve problems.	1. Personality Skills n and aptitudes 2. Values and beliefs Motivation 3. Communication skills. 4. Time management capabilities 5. The ability to control emotions.			

e. Population and Sample

The number of teachers of SMK Negeri 1 Sinabang registered in mid-2023 is 43 people, and because the population is adequate and accessible for research purposes, the entire employee population is used as a research sample.



3. RESULTS & DISCUSSION

a. Research Results

Table 1. Partial Test Results (T Test)

		Coefficient			t	Sig.
Type		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta		
1	(Constant)	23.608	4.320		8.465	.000
	Style					
	Leadership	.119	.098	.185	2.909	.034
	Communication	.093	.136	.104	2.785	.007
	Individual characteristics	.274	.134	.306	3.051	.047

a. Dependent Variable: Teacher Performance

Based on the results of the data processing above, the test decision used in this study is if $t_{\text{count}} > t_{\text{table}}$ (2.022) or $\text{sig.} < 0.05$, the independent variable has an individual or partial influence on the dependent variable. From the table above, the leadership style variable has a calculated t value of 2.909 and sig. 0.034, the communication variable has a calculated t value of 2.785 and sig. 0.007, and the individual characteristic variable has a calculated t value of 3.051 and sig. 0.047. From these values it can be interpreted that each variable has a value of t , calculate t , $t >$, table and $\text{sig.} < 0.05$, it can be concluded that the independent variable in this study has an individual or partial influence with the dependent variable, in other words the variables of Leadership Style, Communication and Individual Characteristics have a significant influence individually with the performance of SMK Negeri 1 Sinabang Teachers. While the calculation of the coefficient of determination (R^2), obtained an r value of 0.893 means the relationship between the variables of Leadership Style, Communication, and Individual Characteristics to the variables tied to Teacher Performance of 89.3% which means a positive and very close relationship. The value of $R^2 = 0.814$, means that 81.4% of teacher performance can be explained by leadership style, communication, and individual characteristics while the remaining 18.6% is explained by other factors not studied in this study.

Table 3. Simultaneous Test Results (Test F)

		ANOVA				
Type		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	8.472	3	2.824	3.368	.045b
	Residuals	46.505	39	1.192		
	Total	54.977	42			

a. Dependent Variable: Teacher Performance

b. Predictors: (constant), individual characteristics, communication, leadership style.

Based on the results of the data processing above, the test decision used in this study is if $F_{\text{count}} > F_{\text{table}}$ (2.85). From the table above, the calculated F value of (3.368) means greater than the table F (2.85). From this value, it can be interpreted that the independent variables together (simultaneously)



affect the dependent variable, in other words, the variables of leadership style, communication and individual characteristics have a joint influence on the performance of teachers of SMK Negeri 1 Sinabang.

Table 4. Leadership Style Reliability Test Results
Reliability Statistics

Cronbach's Alpha	N of Items
.651	5

Based on the table above, it can be seen that the leadership style variable has a *Cronbach alpha* of 0.651, which means that the leadership style variable in this reliability test can be said to be reliable.

Table 5. Communication Reliability Test Results
Reliability Statistics

Cronbach's Alpha ^a	N of Items
-.688	5

Based on the table above, it can be seen that the communication variable has a *Cronbach alpha* of 0.688, which means that the communication variable in this reliability test can be said to be reliable.

Table 6. Individual Characteristic Reliability Test Results
Reliability Statistics

Cronbach's Alpha ^a	N of Items
-.679	7

Based on the table above, it can be seen that the individual characteristic variable has a *Cronbach alpha* of 0.703, which means that the individual characteristic variable in this reliability test can be said to be reliable.

Table 7. Teacher Performance Reliability Test Results
Reliability Statistics

Cronbach's Alpha ^a	N of Items
-.995	4

Based on the table above, it can be seen that the teacher performance variable has a *Cronbach alpha* of 0.995, which means that the teacher performance variable in this reliability test can be said to be very reliable.

Table 8. Instrument Multicollinearity Test Results

Coefficients			
Type		Collinearity Statistics	
		Tolerance	VIF
1	Leadership Style	.929	1.076
	Communication	.933	1.072
	Individual characteristics	.976	1.025



a. Dependent Variable: Teacher Performance

Based on the results of the SPSS multicollinearity test contained in the table above, it shows that the Leadership Style variable has a tolerance value of 0.929 and VIF of 1.076, the Communication variable has a tolerance value of 0.933 and VIF of 1.072, and the Individual Characteristics variable has a tolerance value 0.976 and VIF 1.025. In accordance with the results of the multicollinearity test if the tolerance value > 0.100 and VIF

< 10 , the data in the study concluded that there was no multicollinearity.

Table 9. Instrument Heteroscedasticity Test Results
Coefficients

Type		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.204	2.767		-.074	.942
	Style Leadership	.033	.063	.085	.529	.600
	Communication	.088	.087	.162	1.003	.322
	Individual characteristics	-.072	.086	-.132	-.841	.406
a. Dependent Variable: ABS						

Based on the results of the SPSS output heteroscedasticity test contained in table 4.12 above obtained from the transform value (ABS), there is a significance value (sig) of the Leadership Style variable of 0.600, the Communication variable of 0.322, and the Individual Characteristics variable of 0.406 which means > 0.05 . In accordance with the results of the heteroscedasticity test, if the sig value > 0.05 , the data in the study does not occur heteroscedasticity.

b. Discussion

Based on some of the explanations of the variables above, it can be concluded that the variables of leadership style, communication, and individual characteristics have an individual or partial influence on teacher performance. When viewed from the test decision using the F (simultaneous) test hypothesis, the data obtained are $F_{count} > F_{table}$. From these results, the calculated F value of (3.368) means greater than the table F (2.85). This value can be interpreted that independent variables together (simultaneously) affect the dependent variable, in other words the variables of leadership style, communication and individual characteristics have an influence together on the performance of teachers of SMK Negeri 1 Sinabang. While the calculation of the coefficient of determination (R^2), obtained an r value of 0.893 means the relationship between the variables of Leadership Style, Communication, and Individual Characteristics to the variables tied to Teacher Performance of 89.3% which means a positive and very close relationship. The value of $R^2 = 0.814$, means that 81.4% of teacher performance can be explained by leadership style, communication, and individual characteristics while the remaining 18.6% is explained by other factors not studied in this study.



From some of these explanations, the results of this study can be concluded that based on the T hypothesis test (Partial) that the variables of leadership style, communication, and individual characteristics have an individual or partial influence on teacher performance. While testing the hypothesis with the F test (Simultaneous), the variables of leadership style, communication, and individual characteristics have a simultaneous influence on the performance of teachers of SMK Negeri 1 Sinabang.

4. CONCLUSION

a. Conclusion

Based on the results of processed data and data analysis, the conclusions in this study are as follows:

1. Based on the results of data processing using the T hypothesis test (partial) with the help of the SPSS 20.0 program. From the data obtained, the Leadership Style variable has a calculated t value of 2,909 and sig. 0.034. Based on these data, it can be interpreted that the leadership style variable has a calculated t-value > t table and sig. < 0.05, meaning that the Leadership Style variable has a significant influence on the performance of SMK Negeri 1 Sinabang teachers.
2. Based on the results of data processing using the T hypothesis test (partial) with the help of the SPSS 20.0 program. From the data obtained, the communication variable has a calculated t value of 2.785 and sig. 0.007. Based on these data, it can be interpreted that the Leadership Style variable has a value of t, calculate > t, table, and sig. < 0.05, meaning that the Communication Style variable has a significant influence on the performance of SMK Negeri 1 Sinabang teachers.
3. Based on the results of data processing using the T hypothesis test (partial) with the help of the SPSS 20.0 program. From the data obtained, the Individual Characteristics variable has a calculated t value of 3.051 and sig. 0.047. Based on these data, it can be interpreted that individual characteristic variables have t-values calculated > t tables and sig. < 0.05, Individual Characteristics have a significant influence on the performance of SMK Negeri 1 Sinabang Teachers.
4. Based on the test decision using the F test hypothesis (simultaneous), the data obtained are F count > F table. From these results, the calculated F value of (3.368) means greater than the table F (2.85). This value can be interpreted that independent variables together (simultaneously) affect the dependent variable, in other words the variables Leadership Style, Communication and Individual Characteristics have a joint influence on the performance of teachers of SMK Negeri 1 Sinabang.
5. Based on the calculation of the coefficient of determination (R^2), an r value of 0.893 means the relationship between the variables of Leadership Style, Communication, and Individual Characteristics to the variable tied to Teacher Performance of 89.3% which means a positive and very close relationship. The value of R square = 0.814, means that 81.4% of teacher performance can be explained by leadership style, communication, and individual characteristics while the remaining 18.6% is explained by other factors not studied in this study.

b. Suggestion

Based on the results of research that has been conducted by the author, suggestions to consumers and companies are as follows:

1. For Principals

The principal's leadership style on teacher performance has a positive influence, so it can be suggested that the principal strives to better improve teacher performance by giving a positive influence through his leadership to be able to improve teacher performance.

2. For Teachers

For teachers to be able to always improve their performance because with the improvement of good performance, education will be achieved in accordance with the goals that have been set together. This



performance improvement must be supported by the teacher's compliance as a subordinate to the principal as his superior. This can be done by complying with all policies given by the principal's leadership, in order to achieve goals in education.

REFERENCES

- Angga, A., & Iskandar, S. (2022). Principal's Leadership in Realizing Independent Learning in Elementary Schools. *Basicedu Journal*, 6(3), 5295–5301. <https://doi.org/10.31004/basicedu.v6i3.2918>
- Akbar, N. (2018). Types and styles of educational and da'wah leadership. *Al-Hiwar : Journal Science And Technique Da'wah*, 5(9), 9979–9985. <https://doi.org/10.18592/al-hiwar.v5i9.1883>
- Ahmad, M. (2019). Influence of Work Environment and Individual Characteristics on the Performance of PT. Cassia Coop Full River. *Journal Benefita*, 4(2), 377. <https://doi.org/10.22216/jbe.v4i2.3944>
- Evi Zahara. (2018). The Role of Organizational Communication of Organizational Leaders. *The Role of Organizational Communication for Organizational Leaders*, 1829– 7463(April), 8.
- Hanafi, A. S., Almy, C., & Tirtana Siregar, M. (2018). The Effect of Leadership Style and Work Motivation on Employee Performance. *Journal of Industrial Management and Logistics*, 2(1), 52–61.
- Hendri, R. (2020). The Effect of Teacher Competence on Teacher Performance. *Madināsika*, 1(2), 92–102. <https://ejurnalunma.ac.id/index.php/madināsika>
- Kadarsih, I., Marsidin, S., Sabandi, A., & Febriani, E. A. (2020). Roles and Duties Principal's Leadership in Primary Schools. *Educative: Journal of Educational Sciences*, 2(2), 194–201. <https://doi.org/10.31004/edukatif.v2i2.138>
- Musriadi, F. A., Ansari, K., & Ambarita, B. (2020). Management of Teacher Performance Development in Context of Aceh Policy Act No 9 Year 2016 about Implementation of Education.
- Novianti, R. D., Sondakh, M., & Rembang, M. (2018). Interpersonal communication in husband-and-wife harmonization. *Acta Diurna*, VI (2).
- Nurhadi, Z. F., & Kurniawan, A. W. (2018). Journal of Communication of Thought and Research Results. *Journal of Communication of Thought and Research Results*, 3(1), 90–95.
- Presilawati, F. (2018). The effect of compensation and work discipline on the performance of teachers of SMAN Negeri 6 Banda Aceh. *Visionary & Strategic Journal*, 5(2).
- Presilawati, F., Amin, A., & Fahmi, A. (2022). The Influence of Leadership, Non-Physical Work Environment and Compensation on the Performance of Beutong Health Center Employees, Nagan Raya Aceh Regency. *EKOMBIS REVIEW: Scientific Journal of Economics and Business*, 10(S1), 439-454.
- Purwoko, S. (2018). The influence of the principal's leadership, the commitment of the teacher, teacher work discipline, and school culture towards the performance of vocational teachers. *Journal of Accountability Management Education*, 6(2), <https://doi.org/10.21831/amp.v6i2.8467>,
- Rahayu, I. D. (2018). Influence of Leadership Style and Occupational Health Program against Work Motivation. *Journal of Business Administration*, 43(1), 1–9. <https://media.neliti.com/media/publications/87703-ID-pengaruh-gayakepemimpinan-dan-program-k.pdf>



- Renanda, A., Presilawati, F, S. E., & Sulfitra, S. (2019). The influence of transformational leadership on employee performance with organizational culture as an intervening variable at the Banda Aceh High Court. *Scientific Journal of Management Muhammadiyah Aceh*, 9(1).
- Ritonga, B. (2020). The Influence of Interpersonal Communication, Leadership Style, Organizational Culture on Teacher Performance in the MAN 2 Model. *Journal of Physics A: Mathematical and Theoretical*, 44(8), 1689–1699. <http://journal.umsu.ac.id/index.php/edutech/article/view/4930>
- Soetopo, I., Kusmaningtyas, A., & Andjarwati, T. (2019). The influence of transformational leadership style, individual characteristics, work environment on work motivation and teacher performance of Smk Negeri 1 TambelanganSampang.*Jmm17*,5(02). <https://doi.org/10.30996/jmm17.v5i02.1947>
- Sukmawati, E., Ratnasari, S. L., & Zulkifli, Z. (2020). The influence of leadership style, communication, training, work ethic, and individual characteristics on employee performance. *Journal of Dimensions*, 9(3), 461–479. <https://doi.org/10.33373/dms.v9i3.2722>
- Yusuf, Y., & Irbawi, M. (2022). The Influence of Relationship-Oriented Leadership Behavior, Promotion, and Physical Work Environment on the Performance of Civil Servants at the Education and Culture Office of Banda Aceh City. *Scientific Journal of Management Muhammadiyah Aceh*, 12(1).
- Sugiyono (2018). Quantitative, Qualitative and R&D Research Methods. Alfabeta. Bandung.



BENIFITS OF AN INCLUSIVE EDUCATION PROGRAMS ON EARLY CHILDHOOD SOCIAL DEVELOPMENT

Syarifatul Luthfia

Al-Irsyad Elementary School, Indonesia

*syarifatulluthfia@gmail.com

ABSTRACT

Inclusive education is part of the regional development mission of the Banyuwangi Regency in the 2016-2021 RPJMD "Realizing Accessibility and Quality of Education Services." The aim of this innovation is for all levels of schools to accept children with disabilities or to provide inclusive education. This study aims to determine the social development benefits of an inclusive education program in PAUD Cerdas, Banyuwangi, Indonesia. There were 130 students, 46 of whom had special needs such as ADHD, Down Syndrome, cerebral palsy, autism, or speech and hearing impairments. The methodology used was Qualitative research was conducted through interviews with a headmaster, teacher, and a student parent. According to the research findings, it appears that the Inclusivity Education Program at PAUD CERDAS has the potential to enhance students social development, including communication skills, independence, and respect. Students' parents demonstrated positive self-esteem by developing patience and gratitude to God. In addition, inclusive education programs for early childhood have a greater potential for social development to continue education to the next level because their golden age is given a positive stimulus. In conclusion, it is believed that an inclusivity education program for early childhood has the potential to enhance social development.

Keywords: *Inclusivity Education, Social development, Early Childhood*

1. INTRODUCTION

In the context of the COVID-19 disaster, learning gaps widen and increase other confirmed inequalities. Inclusivity in education becomes even more important. Therefore, it is time to take into account the exclusionary processes that may stem from disability and other group-based vulnerabilities (de Beco, 2018; Tamim, 2021). As we know that the Goal 4 of SDGs (Sustainable Development Goals) in 2030 are pledges for inclusive, equitable, and equality education for all (UNESCO, 2017). Based on that, one of the primary objectives for many teacher education programs is promoting inclusivity across the UK, USA, Canada, and other highly diverse countries. Promoting inclusivity is a challenge for teacher education programs for preparing teachers who feel confident to handle the diversity and inclusivity in their classroom (DeLuca, 2012).

Individuals with disabilities may encounter various challenges when it comes to being included in society. This may include negative attitudes from the public, lack of knowledge, and misunderstandings about disabilities. Many articles highlighted challenges faced by children, such as difficulty accessing educational placements. Providing opportunities for disabled children to share their experiences using their preferred communication means can offer valuable insights into their lives. It is important to support media professionals in facilitating children to have their voices heard (McAndrew et al., 2021). Inclusion and social justice are important aspects of belonging in a world that is free from poverty, illness, and prejudice. These values rely on interdependence, community, and collaborative efforts. It is important that we collaborate to address the marginalization and exclusion of impoverished and neglected individuals, and to avoid using privilege to exert control. By working together towards a common goal, each other can be free (Hodge, 2017).

The policy internationally and nationally as stipulated in Permendiknas no. 70 of 2009 and Law No.20 of 2003 on article 32, by providing opportunities for students with special needs to acquire education in regular schools (Saputra, 2016). Based on BPS (Central Bureau of Statistics) data, the number of children with special needs reached 1.6 million children in 2017 (Marani, 2017). Inclusive education becomes alternative education to



give opportunities for children who have physical disabilities so they can accept the material in public school. Inclusive education gives children the opportunity to socialize with other normal children and helps them to improve their emotional abilities. From its background, inclusive education is organized. Inclusive education exists as a child-friendly education and provides opportunities for children to develop their academic or nonacademic skills (Hafiz, 2017). Inclusive education, which is a teaching approach, guarantees that disadvantaged students are able to learn alongside their non-disadvantaged peers and have the same opportunities to receive education (Ünal & Yel, 2019).

There are several important points in implementing inclusive education in schools. The first is that every child has different abilities, interests, talents, ethnic backgrounds and so on. Second, every child has the ability to learn. And finally, the education system must meet the needs of children (Murniarti & Anastasia, 2016). Teachers' knowledge of inclusive education is essential to ensure that disabled children's rights are realized with the inclusive education program. positive expectations for all types of students and students with disabilities are one of them (Schuelka et al., 2020). The curriculum for children with special needs must receive attention in the world of education. Their cognition is very different from normal children so the curriculum for them must be different. For example, the learning approach for low vision children is to learn using touch and feeling as modalities. While students with hearing loss, learn by using speech reading and finger spelling (Marani, 2017).

Inclusive education has faced challenges in supporting children with disabilities, which can be attributed to a lack of awareness about disabilities factors, including a lack of awareness about disabilities, low levels of pedagogical skills, and a lack of commitment to the additional activities needed to support learners with disabilities in education. Additionally, there is a lack of available data to monitor the actual situation, and there is no clear structure for coordinating and administering special and inclusive education at all levels. Furthermore, there is an absence of an adequate financing mechanism. One of the challenges facing inclusive education is the lack of infrastructure, facilities, and adapted teaching and learning materials in schools. Additionally, there is a lack of a career structure to support educational professionals with disabilities in mainstream schools and inclusive education resource centers (IERCs) (Šiška et al., 2020).

Dijkstra (2012) said that education plays an important role in social-emotional development, such as fewer psychological problems, higher well-being, and better physical and mental health later in life. Effective inclusive practice in the early years, incorporating high quality programs and transition services have the capacity to enhance equitable practices and promote all children's learning and development. Quality relationships are an essential aspect of collaborative engagement between individual children and teachers, which leads to quality early childhood inclusive education. It is widely acknowledged that children learn best when they collaborate in a network of community. Therefore, it is important to ensure that children are not separated from their relationships, as it may hinder their learning. It is important to consider the interactions that children have with their teachers and peers in order to fully understand and support their developmental and learning conditions. It brings positive relationships, and positive relationships between children can have a positive impact on children's social, emotional and academic aspects (Anwar, 2022; Klibthong et al., 2014).

The purpose of this study was to determine the impact of inclusive education on early childhood social development. Descriptions from principals, teachers and parents contributed to the role of inclusive education programs on children's social skills. This research can provide positive hope for the development of inclusive education in Indonesia.



2. METHODS

The study's methodology was descriptive qualitative. The application of descriptive methods was a deliberate choice in response to the aims and objectives of the study. This choice influences the sampling, data collection, and analysis phases of the study (Doyle et al., 2020). The study utilized purposive sampling was used to select research participants based on their knowledge and experience relevant to the research aims (Ritchie et al., 2013). This study utilized purposive sampling given the limited sample size. The subject research is PAUD Cerdas, an inclusive preschool, as the best model inclusive education in Banyuwangi country for early childhood-education.

The data collection methods used in this descriptive research involved semi-structured individual face-to-face interviews, which are a commonly used approach for descriptive qualitative. Deep interviews were conducted with three sources: Fatmawati, as a founder and headmaster of PAUD Cerdas; Umi Hanik, as a transition class-teacher; and Mukaromah, as a parent student. The interview instrument functioned as a reliable guide for researchers throughout the interviews. The questions were designed to concentrate on classroom learning, the benefits that teachers and parents perceived for children's development, and the challenges encountered during the learning process. The method of analysis is determined by the objectives of the research, and as qualitative descriptive research is typically exploratory in nature, it aims to provide a detailed description of the subject matter (Kim et al., 2017).

3. RESULTS & DISCUSSION

The results of the interview with Fatmawati, founder and principal of PAUD Cerdas can be seen below.

Question: *When was PAUD Cerdas established and what is its purpose?*

Answer: *The school was established on April 9, 2008. At that time, I saw many children around my house playing and not going to school. Their parents did not have the money to send their children to school. On the other hand, some of them were children with disabilities. This encouraged me to establish a free school for them. Many parents appreciated and supported my initiative*

Question: *How many students are there?*

Answer: *In this school year, there were 130 students, 40 of whom had special needs. There were 4 students with speech and hearing impairment, 4 students with Down syndrome, 4 students with attention deficit hyperactivity disorder (ADHD), 5 students with cerebral palsy and speech delay, and the most common was autism.*

Question: *What is the curriculum used and how is learning generally in the classroom?*

Answer: *We used a merdeka curriculum integrated with Individualized Education Service (IES). A pre-assessment was conducted to determine the child's initial condition. However, we cannot justify the student's condition to their parents, as it is a duty of psychology and we worked with psychology. PAUD Cerdas was established with a focus on social services for normal children and those with special needs. Our program is dedicated to providing a friendly school for all types of students. Here, we find several types of children. It is not only a place where normal children and children with special needs meet, but also where children of different religions, different economic statuses, and different abilities meet. PAUD Cerdas has a transition class for children with special needs who cannot yet socialize with others. We continue to train them to socialize positively or well until they can enter the regular class.*

Question: *What are the challenges faced in inclusive education?*

Answer: *The inclusive education program is the most challenging because of the many characteristics of students. Therefore, we must be patient with the students and always expect cooperation from their parents. Teachers must have a strong heart, mentality, and physical strength, as well as constantly upgrade their*



knowledge. Our institution focuses on the social aspects of students, while the aspects of handling disorders must be one by one in conjunction with psychology.

Question: *What is the educational background of the teachers at PAUD Cerdas?*

Answer: *Our teachers had diverse educational backgrounds. We had 24 permanent and volunteer teachers. Some had a bachelor's degree in early childhood education, psychology, special education graduates, and high school graduates. However, we provide training to all our teachers through conferences or any training education as an effort to ensure them as GPK (Guru Pembimbing Khusus/ Special Guidance Teacher). PAUD Cerdas operates as a social institution in which our school does not charge students fees. Parents pay what they can because of the school's dedication to help children obtain an education.*

Question: *What are the challenges faced in inclusive education?*

Answer: *The inclusive education program is the most challenging because of the many characteristics of students. Therefore, we must be patient with the students and always expect cooperation from their parents. Teachers must have a strong heart, mentality, and physical strength, as well as constantly upgrade their knowledge. Our institution focuses on the social aspects of students, while the aspects of handling disorders must be one by one in conjunction with psychology. Many children with special needs are not accepted by other schools, and our school has become the reference school. There are many positive social aspects that children experience. The earlier the problem is addressed, the better is the outcome. Children with mild and moderate impairments showed positive social attitudes and were ready to continue to the next school level.*

The results of an interview with Ummi Hanik (52 years old), a transitional class teacher, early childhood education graduated, who has worked at PAUD Cerdas for 16 years, can be seen below.

Question: *What is the transition class?*

Answer: *The name of the transition class at the PAUD Cerdas is Salmon Class. This class is specifically for children who have severe special needs that prevent them from socializing with others. It is like they have their own world. There were 14 students with several conditions, such as autism, cerebral palsy, and Down syndrome.*

Question: *When can students in transition classes move into regular classes?*

Answer: *If they have good independence, they can get to know or socialize with others despite having fewer communication skills.*

Question: *How is learning in transitional class?*

Answer: *There are 3 teachers who assisted students in the class. We worked together to design a teaching plan that suits the needs of the students because each student is handled differently. We could not force a student or several students to leave the class. To handle this, there are teachers who accompany students outside the classroom and teachers in the classroom with other students.*

Question: *What are the challenges faced by transition classes?*

Answer: *Teachers should be taught sincerely. We work sincerely because our salary is what parents can afford. This is because our institution is in the social field.*

The results of the interview with Mukaromah (34 years old) as a parent, having a regular student with hyperactivity, Muhammad Ibrahim (4 years old), can be seen below.

Question: *Why do you choose PAUD Cerdas for your child's school?*

Answer: *I got many positive things when I sent my child. PAUD Cerdas is a school where children with special needs meet regular students. There are ADHD, Down syndrome, autism, speech, and hearing impairment, and it brings positive social skills for my child. PAUD Cerdas has many sincere and patient teachers compared with*



regular schools. My son is in dolphin class and has a hyperactive disorder, does not like to learn in class, and likes to hit his friends. Alhamdulillah, my child's improvement of attitude, like independence, can speak more politely, apologize, tell back what he studied in the class, and know what is and is not allowed. In addition, I became more patient as a parent of my child, and I am more grateful to God with God's grace. Here, I found many parents who had children with more severe disorders than my own. A parenting seminar was held once a month at PAUD Cerdas. So, I as a parent get many positive things here.

The interview results from the interviewees show that PAUD Cerdas implements inclusive education well. As we know, the concept of an inclusive education framework is that children with special needs can participate in the education process together with other children. Inclusive education provides learning environments for disadvantaged students and good self-esteem about themselves (Ünal & Yel, 2019). PAUD Cerdas is supported by the Banyuwangi District Education Office as Banyuwangi District was declared an Inclusion District on August 27, 2014, and has received Inclusion Certification from the Indonesian Ministry of Education, Culture, Research and Technology. In addition to local government, psychologists, communities and parents also support and cooperate with PAUD Cerdas as inclusive education so that PAUD Cerdas is awarded as the best inclusive education model for early childhood in Banyuwangi District. In line with Olusakin et al. (2008), to build strength in serving the needs of children, every school must work together with parents and the whole community (figure 1).

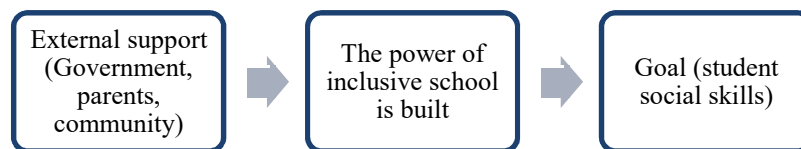


Figure 1. Building on the strengths of inclusive education programs

Based on the results of the interview with Fatmawati as the principal of PAUD Cerdas, it can be seen that PAUD Cerdas applies IES (Individualized Education Service). IES is one of the inclusive education services in addition to FEP (Full Education Service) and MES (Modification Education Service). Service delivery is based on the results of student identification and assessment. IES is a service where students with special needs follow the learning process together with normal students under the guidance of GPK (Special Guidance Teacher) (Hapsari, 2019).

PAUD Cerdas has a transition class called Salmon Class. This class is specifically for children who have severe special needs that prevent them from socializing with others. If the children in this class show good development of independence, they can get to know or socialize with others despite having less communication skills, they can move to the regular class. Teachers work together to design a teaching plan that suits the needs of the students as each student is handled differently. The existence of transition classes provides social development for students. In addition, I assume that the golden age period of early childhood provides additional strength to improve their social skills. Every child has a period called the "golden age" as a golden period for children to develop their character and intellect. Based on this, the role of the teacher is very important and using the right strategy for different types of students (Abdurrahman, 2012). As mentioned by Klibthong et al. (2014) in the introduction, effective inclusive practices such as transition services in early childhood can enhance equitable practices and promote children's learning and development. Collaboration between individuals, peers and teachers



can lead to quality early childhood inclusive education. Inclusive education provides a collaborative space for them and brings them into positive relationships. Positive relationships will develop children's social, emotional and academic skills.

Interviews with parents showed that inclusive education has a positive impact on their self-esteem. The positive self-esteem they receive leads to their acceptance of their child's condition. In addition, parents also support the inclusion program and its positive impact on their children's social skills. Feedback connection between each others can be seen in figure 2.

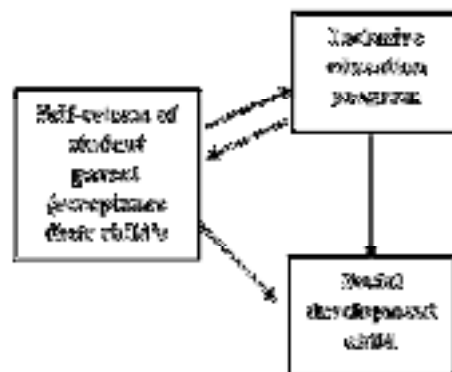


Figure 2. Positive relationship between parents and inclusive program for social development of child

4. CONCLUSION

This study aims to determine the role of inclusive education programs on early childhood social development. The results of interviews with principals, teachers and parents at PAUD Cerdas, the best model of inclusive education in Banyuwangi regency, are as follows:

1. Government, community and parental support can give strength to inclusive education programs
2. The golden age is the golden period for developing students' intelligence and social skills.
3. Transition class is one of the programs that can improve students' social development
4. Collaboration between students with special needs, normal students and teachers can improve social skills
5. Inclusive education provides positive self-esteem for parents in accepting their child's condition. It can also improve students' social development.

REFERENCES

- Abdurrahman, M. (2012). *Anak Berkesulitan Belajar*. Rineka Cipta.
- Anwar, F. (2022). Memahami Pertumbuhan & Perkembangan Siswa Sekolah Dasar. *Jurnal Sociohumaniora Kodepena (JSK)*, 3(2), 143–155.
- de Beco, G. (2018). The right to inclusive education: why is there so much opposition to its implementation? *International Journal of Law in Context*, 14(3), 396–415. <https://doi.org/DOI: 10.1017/S1744552317000532>
- DeLuca, C. (2012). Promoting inclusivity through and within teacher education programmes. *Journal of Education for Teaching*, 38(5). <https://doi.org/10.1080/02607476.2013.739792>
- Dijkstra, A. B. (2012). *UvA-DARE (Digital Academic Repository) Sociale opbrengsten van onderwijs*. <https://dare.uva.nl>



- Doyle, L., McCabe, C., Keogh, B., Brady, A., & McCann, M. (2020). An overview of the qualitative descriptive design within nursing research. *Journal of Research in Nursing*, 25(5), 443–455. <https://doi.org/10.1177/1744987119880234>
- Hafiz, A. (2017). Sejarah dan Perkembangan Pendidikan Inklusif di Indonesia. *Jurnal As-Salam*, 1(3), 9–15.
- Hapsari, M. I. (2019). Implementasi Kebijakan Pendidikan Inklusif di SDN 3 Karangrejo Kecamatan Banyuwangi Kabupaten Banyuwangi [Tesis]. Jember University.
- Hodge, N. (2017). Socially just and inclusive education. *Community, Work & Family*, 20(1), 112–115. <https://doi.org/10.1080/13668803.2016.1264370>
- Kim, H., Sefcik, J. S., & Bradway, C. (2017). Characteristics of qualitative descriptive studies: A systematic review. *Research in Nursing & Health*, 40(1), 23–42.
- Klibthong, S., Fridani, L., Ikegami, K., & Agbenyega, J. S. (2014). The Relationship Between Quality Early Childhood Programs and Transition Services in Inclusive Education of Young Children. In *Asian Journal of Inclusive Education (AJIE) 35 AJIE Asian Journal of Inclusive Education* (Vol. 2, Issue 1). <http://www.ajie-bd.net>
- Marani, A. (2017). Kurikulum Bagi Anak Berkebutuhan Khusus (ABK). *Jurnal Studia Insania*, 5(2), 105. <https://doi.org/10.18592/jsi.v5i2.1358>
- McAndrew, B., Carroll, C., & O'Malley-Keighran, M.-P. (2021). Representations of disabled children and young people in Irish newspapers. *Disability & Society*, 36(10), 1617–1642. <https://doi.org/10.1080/09687599.2020.1802577>
- Murniarti, E., & Anastasia, N. (2016). Pendidikan Inklusif di Tingkat Sekolah Dasar. *Jurnal Dinamika Pendidikan*, 9, 9. <https://doi.org/10.33541/jdp.v9i1.134>
- Olusakin, A. M., Osarenren, N., & Obi, F. (2008). Towards Helping Children with Attention Deficit Hyperactivity Disorder (ADHD) to Enjoy Peaceful Schooling. *Studies on Home and Community Science*, 2(1), 19–32. <https://doi.org/10.1080/09737189.2008.11885249>
- Ritchie, J., Lewis, J., Nicholls, C. M., & Ormston, R. (2013). *Qualitative research practice: A guide for social science students and researchers*. sage.
- Saputra, A. (2016). Kebijakan pemerintah terhadap pendidikan inklusif. *Golden Age: Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini*, 1(3), 1–15.
- Schuelka, M. J., Braun, A. M. B., & Johnstone, C. J. (2020). Beyond Access and Barriers: Inclusive Education and Systems Change. *FIRE: Forum for International Research in Education*, 6(1). <https://doi.org/10.32865/fire202061198>
- Šiška, J., Bekele, Y., Beadle-Brown, J., & Záhořík, J. (2020). Role of resource centres in facilitating inclusive education: experience from Ethiopia. *Disability & Society*, 35(5), 811–830. <https://doi.org/10.1080/09687599.2019.1649120>
- Tamim, T. (2021). Language, Class, and Education: Deconstructing the Centre to Rethink Inclusivity in Education in Pakistan. *Cogent Education*, 8(1). <https://doi.org/10.1080/2331186X.2021.1897933>
- Ünal, R., & Yel, S. (2019). Development of a social acceptance scale for inclusive education. *Universal Journal of Educational Research*, 7(10). <https://doi.org/10.13189/ujer.2019.071017>
- UNESCO. (2017). *Ensure quality education for all: Sustainable Development Goal 4; ten targets*. https://unesdoc.unesco.org/notice?id=p::usmarcdef_0000259784



ISLAMIC BOARDING SCHOOL MANAGEMENT IN DEVELOPING ENTREPRENEURSHIP IN ACEH

Muliana¹, Abdul Aziz^{2*}, Fadhilah³ Fathimah⁴

¹Universitas Serambi Mekkah, Banda Aceh, Indonesia

²Akademi Keuangan Perbankan Nusantara, Aceh Timur, Indonesia

³ Universitas Serambi Mekkah, Banda Aceh, Indonesia

⁴STIS Dayah Amal, Aceh Timur, Indonesia

*teukuabdulaziz@gmail.com

ABSTRACT

As time goes by, Islamic boarding schools in Aceh no longer focus their students' attention on continuing to focus on studying religion, but many Islamic boarding schools in Aceh teach or provide provisions to their students on how to have the potential and skills within themselves so that they can be useful for their future lives. In the future, the skills that must be provided by Islamic boarding schools are entrepreneurial skills, therefore researchers conducted research related to Islamic boarding school management in fostering the entrepreneurial spirit of students. The methodology used in this research is a qualitative descriptive approach that uses data collection techniques through observation, interviews and documentation. The results of this research found that: Islamic boarding school management in developing entrepreneurship in Aceh is: 1) Encouraging and supporting entrepreneurial students to pursue their entrepreneurial efforts by giving them motivation to do so, 2) Efforts that need to be made to develop an entrepreneurial spirit are by teaching students and then provide assistance. them in creating a business plan that allows them to have independent and creative skills that benefit them. 3) Steps for developing Santri entrepreneurial skills are as if they were carried out through business units supervised by the Islamic Boarding School. These include cooperatives, vegetable plantations and animal husbandry

Keywords: Management; Islamic boarding school; Student Entrepreneurship.

1. INTRODUCTION

Islamic boarding schools are still currently an alternative form of education for the general public, especially in Indonesia (Salmon, et al. 2024). Even though Islamic boarding schools are classified as traditional organizations, (Taufik, et al. 2024) but in fact is able to become a bridge for developing awareness of Muslims and the general public. Sending Muslims to send their children to Islamic boarding schools to take part in the religious learning process at Islamic boarding schools with joy without coercion, which creates Islamic boarding schools. So that in 2021 the number of santri in Aceh from 23 districts/cities in 2021 will reach 204,370 people (<https://data.acehprov.go.id>)

In general, there are three types of Islamic boarding schools: traditional Islamic boarding schools (salaf), which are types of Islamic boarding schools whose activities are based on classical educational methods, or more generally, on traditional teaching methods, and have not been integrated with modern educational methods. (Nihwan, M., & Paisun, P. 2019; Anwar & Julia. 2021) Modern Islamic boarding schools (khalaf) refer to Islamic boarding schools whose main focus is teaching core Islamic boarding school subjects, but also include modern subjects which are taught according to the classical system and include general knowledge contained in the curriculum, (Prabowo, Get.al. 2024). In contrast, mixed Islamic boarding schools (comprehensive) refer to Islamic boarding schools that utilize a mixture of traditional and modern education systems. On the surface, each Islamic boarding school is highly respected for its religious education, which emphasizes learning about religion and how to be a good citizen, with integrity, and morals every day. Periodically, supervision of Islamic boarding schools is carried out.

Currently, Islamic boarding schools not only educate their students by studying religion but also educate students by skill (Sucipto, S. 2024; Julia, et al. 2022). However, there are many Islamic boarding schools that teach students how to develop their potential so that it is useful for the future life they will live. Because students always have to face a constantly changing environment, Islamic boarding school provisions and instructions teach students



how to face a constantly changing environment. The most important skill or advice that a teacher/Ustad must give to his students is how to become an entrepreneur (Tapaningsih, 2024).

Entrepreneurship, also known as self-employment, refers to people recognizing their potential and learning how to develop it to maximize their opportunities and organize their businesses to meet their living needs. An entrepreneur or entrepreneur must be able to think creatively, innovatively and empathetically. Al Falah, *et al.* (2024). They must also be able to see opportunities and be open to opportunities for positive change that can help them continue to grow and succeed. (Wiwi, Y. N., & Giatman, M. 2024).

2. METHODS

This research was conducted in Aceh, a province in Indonesia, with Banda Aceh as the capital. . Aceh is the only province in Indonesia designated as a special region. Aceh's uniqueness lies in several aspects, including the important role of ulama in enforcing regional policies, administering religious life, administering customs, and administering education as well as being the only province in Indonesia that enforces Islamic sharia law. Acehese society is heterogeneous, consisting of people from various regions and tribes throughout Indonesia.

This research is qualitative case study research with an ethnographic approach to explore Islamic boarding school management in developing entrepreneurship in Aceh. Several cases are presented to provide a logical basis for the findings. The data used in this paper consists of social practice data and reasoning, with a focus on Islamic boarding school management in developing entrepreneurship in its students, how to encourage students to carry out entrepreneurship, and the efforts made by Islamic boarding schools to foster students' interest in entrepreneurship and the steps taken. by Islamic boarding schools in developing entrepreneurship.

Qualitative data was collected by distributing questionnaires to fifty informants who were Islamic boarding school teachers/Ustads in Aceh. based on the understanding that they will provide the insight needed in this research, considering the role of their Islamic boarding school's stove/Ustad as an educator. In-depth interviews were conducted to obtain detailed information regarding encouragement and support for Islamic boarding schools in entrepreneurship, efforts that need to be made to develop an entrepreneurial spirit and steps for developing Santri entrepreneurial skills by Islamic boarding schools.

After the data was collected, analysis was carried out using the Miles and Huberman analysis technique which includes data reduction, presentation and verification steps (Miles & Huberman, 2014). Data is processed by classifying it according to themes and research objectives. To present the data, pictures and interviews were used. Data verification was carried out by connecting one data set with another data set to identify internal coherence in the data and compare it with the Islamic boarding school management context regarding motivation, efforts and steps taken to develop Santri entrepreneurial skills.

3. RESULTS & DISCUSSION

Encourage and motivate students to become entrepreneurs. To grow the entrepreneurial spirit of students, one way is to provide motivation to students on how they should have an entrepreneurial spirit or become an entrepreneur, apart from that, it also opens students' insight regarding the importance of becoming an entrepreneur and apart from being a religious teacher and ustadzah, students must also be able to become an entrepreneur or person who has their own business, because by providing motivation and opening the students' horizons, it is the same as encouraging the students to continue learning and trying so that they can have an entrepreneurial spirit within themselves and they will also continue to learn to gain knowledge and experience in entrepreneurship.

In accordance with what Islamic boarding schools in Aceh do to help students develop an entrepreneurial spirit among students, the first thing to do is provide motivation to the students, where the teacher/teacher, ustadzah, and supervisor, always provide motivation to the students. students about the importance of having an entrepreneurial spirit or entrepreneurial motivation. Islamic boarding school teachers always comment that apart from being successful business owners, they can also be successful and valuable contributors to their own lives. This was also expressed by the Ns1 furnace: "The first thing we did was express our gratitude and provide inspiration to the students that life is not as simple as we think, there are many obstacles that stand in our way. We also believe that after we settle down, we will be able to develop our own work. The insight of the santri is opened so that they have businesses, so that later they will not expect something like looking for a job but they



will already have their own business. This can foster an entrepreneurial spirit while they are here. However, if he does have a job the next day, he can also earn money by starting another business.”

Ustazah Ns2 “Dayah Modern Darul Ulum Gp. Kec. Kuta Alam, Banda Aceh City, Dayah business units, such as screen printing, printing, photocopying, making acrylic works, and hair barbering services. Apart from having business units that operate under the dayah, Dayah Darul Ulum also has business units that are managed by teachers or guided by the Dayah. Then a profit-sharing system is implemented.”

Providing encouragement to students in the form of encouraging, strengthening and increasing self-confidence so that students have the confidence to pursue their dreams. Apart from that, encouraging students can help them develop tenacity, hard work and perseverance. It can also give them a strong sense of self-worth and give them the confidence to pursue their entrepreneurial dreams and become successful business owners.

Based on the explanation above relating to providing motivation to students in line with the theory put forward by (Damayanti, D. P. 2024)., then motivation can be understood as a driving force within an individual to take action in order to achieve a certain goal. so it can be understood as encouragement or driving force (Nurhaedah, A., & Kadir, S. 2024). According to Robbin, motivation theory is the desire to work towards a certain goal, based on the belief or assumption that each individual will participate in this effort because each person's potential will be influenced by the inspiration provided. Wisnuwardhana, I. A. 2024). Running a business with integrity to develop an entrepreneurial spirit, as well as providing motivation to students

Another opinion was also expressed by Ustazah Ns3 "Islamic boarding schools also guide their students to make handicrafts or creativity, which trains students to make something creative that can be produced. Then, they sell the handicrafts to parents and the community. "Such as handicrafts that are taught or made by students, including making flowers, hijab brooches, foot prints and wall decorations."

Based on the explanation above regarding crafts, students will be encouraged to make handicrafts. If these handicrafts are created, the students will be encouraged to be creative and at the same time learn about self-reliance and develop their creativity and innovation in creating things. This is related to the theory of entrepreneurial characteristics, which generally focuses on the process of recruiting new students for entrepreneurship, with an emphasis on developing new products.

Steps in developing an entrepreneurial spirit. Several business units owned by Islamic boarding schools include vegetable plantations, goat farms, animal husbandry, and cooperatives. This is the method used to develop student entrepreneurship in Islamic boarding schools in Aceh. Some of the business ventures discussed or carried out include the steps that must be taken so that students have an entrepreneurial spirit within themselves:

1. Collaboration, Santri are guided for Islamic boarding school cooperative business units, in a way where Islamic boarding schools manage a business unit, train independence and train students' honesty.
2. Learning about animal husbandry. At the santri unit's goat farm, students will learn how to handle livestock properly, provide animal feed, and handle livestock well.
3. Vegetable plantations. In this vegetable plantation business unit, students will teach how to care for them on a daily basis and how to grow vegetables properly, which is directly led by the ustadz or Islamic boarding school leader.
4. Crafts, handicrafts, sewing, halal food, Muslim women's clothing and so on, which are taught directly by ustadz or leaders of Islamic boarding schools or who have skills regarding these craft businesses, share knowledge with each other



Figure 1: goat farming business in Dayah Nasyrul Ulum Samalanga, Muslim fashion business at Darul Huffaz Islamic Boarding School, Rambah Sayang village, Tanoh Alas sub-district, Central Aceh, Koprasi in Dayah Al Huda Malikussaleh, Reuleut Timu village, Kec. Muara Batu, Kab. North Aceh

Based on information provided by Ustad Ns4, "For example, raising goats and sheep on this farm involves alumni. and students; At this farm, the students will guide how to manage livestock, which involves the students at certain times being brought to experience what it is like to be a farmer as well as the cooperative managed by the students. So that students develop an entrepreneurial spirit."

Based on the results of interviews from the Ns5 furnace at the Dayah Ruhul Fata Islamic boarding school, there are three methods or approaches in carrying out this task, as follows: (1) Developing self-awareness; (2) Develop creative thinking in subjects; and (3) Developing subjects to become more self-aware.

In their journal entry, Mulyantini, et al. (2024); Ula, N., Alham, F., & Saragih, F. H. (2024). explains how to help students to strengthen their own will. Developing the entrepreneurial spirit of students must be done in the following way, or in the following ways: (1) Developing students' self-confidence; (2) Develop enthusiasm and perseverance or the desire to always be active; (3) Developing an introspective attitude while being able to control oneself; (4) Developing accuracy and istiqomah; (5) Developing a creative mindset; (6) Develop problem solving abilities; (7) Seeing or judging something. (Sutihat, A., Budiantini, A., & Jelanti, D. 2024).

About how to manage a business unit and related matters are also intended to develop a healthy entrepreneurial spirit. For this reason, in order to strengthen students, they need to be educated and trained by actively participating in the management of business units in Islamic boarding schools. Based on information provided by Ustad/tungku Ns6 "By involving them in everything produced by the Islamic boarding school, the students must be involved so that they know how to sell, how to offer an item and also train the students' independence and honest attitude because when they have the opportunity "open it and close it again, then like handicrafts we teach them how to make handicrafts and then sell them at what price, then with things like that we can grow the entrepreneurial spirit of the students."

Based on the results of the interview above, an entrepreneurial spirit can be developed by providing training to students, namely by involving students in the operations of a business unit. Sucipto, S. (2024). explained in his journal that utilizing the alumni network in developing Islamic boarding school entrepreneurship which has special products and collaborates with several private and government partners. Entrepreneurship education system, form of business units and products, empowerment of human resources and the environment

4. CONCLUSION

Encouraging and supporting entrepreneurial students, namely by motivating students to become entrepreneurs. The aim of the Islamic Boarding School in fostering entrepreneurship in its students is to inspire and encourage students to become entrepreneurs by providing motivation and teaching the importance of being an entrepreneur.

Diligently foster an entrepreneurial culture. After leaving the Islamic boarding school, students are encouraged to carry out creative activities or businesses that can produce results that are expected to help students become more independent.



The steps involved in developing entrepreneurial skills in Islamic boarding schools are used in managed business units with the aim of providing benefits in the process of managing the business unit. This can also help students to strengthen team spirit and become stronger in building students' businesses through business units run by Islamic boarding schools, including cooperatives, livestock businesses, agriculture and vegetable plantations.

5 ACKNOWLEDGMENTS

The author would like to express his thanks to the Islamic boarding school who were willing to be interviewed and provide information in this research, and the author would also like to express his thanks to his team colleagues who carried out this research until it was completed.

REFERENCES

- Al Falah, A. C. A., Fathurrahman, I. M., Rachman, J. N., Anti-Riba, K., Dan, K. E. M. P. K., Rasulullah, M., ... & Nihayah, A. Z. (2024). Perspektif Pemikiran tokoh Filsafat Klasik. *Filsafat Pendidikan Ekonomi*, 1(1), 85.
- Damayanti, D. P. (2024). Pengembangan Model Dukungan Orang Tua terhadap Santri dalam Meningkatkan Prestasi Akademik di Pondok Pesantren. *JIIP-Jurnal Ilmiah Ilmu Pendidikan*, 7(1), 168-175.
- Anwar, F., & Julia, P. (2021). The Application of Mental Health at Islamic Boarding Schools. In *Proceedings of International Conference on Multidisciplinary Research* (Vol. 4, No. 1, pp. 130-140).
- Jumlah Santri Dayah Aceh (2021) <https://data.acehprov.go.id/id/dataset/jumlah-santri-dayah/resource/23f86fda-608f-4933-a4a3-5f22a4fa17a8>
- Julia, P., Aswita, D., Isa, M., & Anwar, F. (2022). Memanfaatkan Peluang Bisnis di Era Pandemi Melalui Pelatihan Kerajinan Tangan. *ABDIKAN: Jurnal Pengabdian Masyarakat Bidang Sains dan Teknologi*, 1(3), 338-345.
- Mulyantini, S., Irawatie, A., Zahram, G. R. A., & Aminatuzzahro, A. (2024). Menumbuhkan Jiwa Wirausaha Siswa/Siswi Pondok Pesantren Melalui Rangkaian Program Santripreneur. *IKRA-ITH ABDIMAS*, 8(1), 294-302.
- Mulyantini, S., Irawatie, A., Zahram, G. R. A., & Aminatuzzahro, A. (2024). Menumbuhkan Jiwa Wirausaha Siswa/Siswi Pondok Pesantren Melalui Rangkaian Program Santripreneur. *IKRA-ITH ABDIMAS*, 8(1), 294-302.
- Nihwan, M., & Paisun, P. (2019). Tipologi pesantren (mengkaji sistem salaf dan modern). *Jurnal pemikiran dan ilmu keislaman*, 2(1), 59-81.
- Nurhaedah, A., & Kadir, S. (2024). Motivasi Kepala Sekolah Dalam Menciptakan Iklim Kerja Di Madrasah Aliyah DDI Kelurahan Baru Kabupaten Tolitoli. *Journal of Educational Management and Islamic Leadership (JEMIL)*, 4(01), 1-15.
- Prabowo, G., Iلمي, R. M., & Umam, M. K. (2024). Transformasi Pesantren Salaf dalam Wajah Moderisasi. *Jurnal Ilmu Pendidikan dan Kearifan Lokal*, 4(1), 64-72.
- Salmon, Y., Saefudin, D., Mujahidin, E., & Husaini, A. (2024). Pengembangan Kurikulum Sekolah Islam Terpadu Tingkat SMP di Pondok Pesantren (Studi Lapangan pada Pesantren Ibnu Salam Nurul Fikri Boarding School Serang Banten). *Jurnal Global Ilmiah*, 1(6), 321-324.
- Sucipto, S. (2024). Implementasi Pengembangan Pendidikan Wirausaha Pesantren Berbasis Kearifan Lokal di Kabupaten Jombang. *EDUKASIA: Jurnal Pendidikan dan Pembelajaran*, 5(1), 469-482.
- Sutihat, A., Budiantini, A., & Jelanti, D. (2024). Menumbuhkan Jiwa Kewirausahaan Melalui Implementasi Edupreneurship di SMK Techno Media. *Jurnal Abdi Citra*, 1(1), 40-46.



- Tapaningsih, W. I. D. A. (2024). Pengenalan Jiwa dan Watak Wirausaha Melalui Pelatihan Kewirausahaan pada Santri Pondok Pesantren Abuzairi Bondowoso. *SMART HUMANITY: Jurnal Pengabdian Masyarakat*, 1(1), 23-30.
- Taufik, M., Patimah, S., Arafah, A. L. A., & Warisno, A. (2024). Implementasi Manajemen Strategi dalam Meningkatkan Mutu Pendidikan di Pondok Pesantren. *Journal on Education*, 6(2), 15121-15130.
- Ula, N., Alham, F., & Saragih, F. H. (2024). Analisis Perbandingan Pendapatan Penggilingan padi Statis dan Penggilingan padi mobile di kecamatan Manyak payed Kabupaten Aceh Tamiang. *Jurnal Cakrawala Ilmiah*, 3(6), 1779-1788.
- Wisnuwardhana, I. A. (2024). Pelatihan Kerja Dan Pengembangan Kompetensi Terhadap Kinerja Karyawan Melalui Motivasi Yang Dimiliki Sebagai Variabel Intervening (Studi Pada Jasa Transportasi Pariwisata Di Karisidenan Surakarta) (Doctoral dissertation, STIE Bank BPD Jateng).
- Wiwi, Y. N., & Giatman, M. (2024). Membangun Jiwa Entrepreneurship pada Siswa Sekolah Menengah Kejuruan (SMK). *Jurnal Pendidikan Tambusai*, 8(1), 7801-7808.



MODEL TECHNOLOGY LEARNING CYCLE (TLC): SUCCESS IN LEARNING

Bayu Saputra^{1*}, Etin Solihatin², Suyitno Muslim³

¹FKIP, Universitas Lampung, Lampung, Indonesia

^{1,2,3}Universitas Negeri Jakarta, Jakarta, Indonesia

*bayudesmonn@gmail.com

ABSTRACT

The current 21st century development has had a major effect on educational reforms that must adapt to technological developments. There have been many developments in the learning process by integrating technology in order to realize educational reform, one of which is the technology-integrated learning model, TLC. The TLC model was developed to enable future educators to use technology for learning. The TLC model has shown its effectiveness in integrating technology into learning. This has been seen from several studies that show a positive impact on the use of TLC on student learning outcomes. Therefore, the purpose of this article is to explain what an integrated model of technology, TLC, and its application in the learning process is based on the findings of several researchers. Literature study was used in writing this article. The study of journals and books was carried out to enrich the study of the model of integrating TLC technology in learning as well as the study of research results according to several researchers. This article shows that TLC has five phases, namely awareness, exploration and filtration, learning, application, and sharing and reflection which are built to support the use of technology by educators. Educators will have the ability to use new technology and use technology applications in the learning process

Keywords: *Technology Learning Cycle (TLC), Learning, Education.*

1. INTRODUCTION

As the process of development and globalization taking place in the 21st century affects the emergence of various problems and competition in life, each person needs to strive to become an effective and attentive person to the various types of problems in the real world (Rahmasiwi, Susilo, & Suwono, 2018). The current development in the 21st century, more specifically, has a major effect on educational reform that must adapt to technological developments. The education reform in question is not only a curriculum change, but also a change in the orientation of education at a macro level, namely a change in acting from simple action to comprehensive action, a change from loop knowledge to cycle learning, a change from stand-alone learning to e-learning and community learning, and the shift in the dominance of teaching that emphasizes lower-order thinking skills (LOTs) to learning that emphasizes higher-order thinking skills (HOTs) (Miri, Ben-Chaim, & Zoller, 2007).

There have been many developments in the learning process by integrating technology in order to realize educational reform, including learning using The Concerns Based Adoption Model (CBAM) (Fuller, 1969); Technological Pedagogical Content Knowledge (TPACK) (Koehler & Mishra, 2005; Koehler, Mishra, & Cain, 2013); Substitution Augmentation Modification Redefinition (SAMR) (Puentedura, 2012); Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989); Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003); Will Skill Tool Pedagogy (WSTP) (Knezek & Christensen, 2015) and Technology Learning Cycle (TLC) (Marra, Howland, Jonassen, & Wedman 2003). A key factor in integrating technology into education is the availability of teachers directly involved in the delivery of materials as well as complex teaching practices. (Niederhauser & Lindstrom, 2018; Wang, 2017; Webb & Cox, 2004).

Of the several models of technology integration, one model that focuses on the use of technology in the learning process is the Technology Learning Cycle (TLC) model. The development of technology-driven teaching and learning processes is at the heart of the TLC model, as well as the development of one or more technology tools (Wedman & Diggs, 2001). At the TLC stage, an educator must consciously think about what technology is appropriate to use in learning in accordance with learning outcomes and the context of the school environment.



Educators must also understand how to use technology in learning. As far as possible educators should convince students of the benefits of using technology and teach students how to use the technology (Howland & Wedman, 2004; Marra et al., 2004, 2003).

The TLC model was developed to prepare future educators to use technology in their learning (Marra, et al, 2004). The results of initial trials implementing the TLC model show that it is quite effective in integrating technology in learning (Marra, et al, 2003). Furthermore, the development of technology integrated into learning through TLC has gone through a lot of research which has had a positive impact on student learning outcomes (Niederhauser & Lindstrom, 2018). This can be seen from the research results of Marra, et al, (2003), the results of experiments using the TLC model show that the application of TLC is quite effective in science learning. TLC grew out of dissatisfaction with the "techno-centric" perspective of teachers that was too dominant in using applied science and was instead based on the idea that people must become lifelong learners in developing educational technology (Marra, et al, 2003).

The results of subsequent research Howland and Wedman (2004) show The technology learning cycle provides a comprehensive metacognitive tool for individuals to evaluate and track their own progress in learning technology. This designed learning technology can not only be used during research, but can be used for continuous growth and renewal throughout his professional life. The latest research by Patonah, Sajidan, Cari, & Raharjo (2021) which combines the TLC model with the inquiry model to produce the Science Technology Learning Cycle (STLC) model shows that this model is practically applied and effective to empower students' critical thinking skills. Students feel the benefits of learning to develop simple technologies that help solve environmental problems (Patonah, et al, 2021).

Another recent study, namely the research of Utama, Sajidan, Nurkamto, & Wiranto (2019) which combines the TLC model with TPACK for e-learning called ELCoS shows that each stage of The school's electronic learning cycle has the advantage of having communication capabilities (Squillante, Wise, & Harter, 2014). The communication forum provided by Schoology can be done either as a group or individually. Communication can be made instantly to discuss or ask questions on topics related to study materials, homework, assignments, exams and self-observation reports. The technology has a positive impact in helping students and teachers self-development.

Despite the fact that the TLC model has been widely used to integrate technology in learning, it is necessary to further investigate the findings that have been previously reported regarding the application of TLC in learning. Therefore, this article seeks to explain what an integrated technology model, TLC, and its application in the learning process is based on the findings of several researchers.

2. METHODS

Literature study was used in writing this article. The study of journals and books was carried out to enrich the study of the model of integrating TLC technology in learning as well as the study of research results according to several researchers. In addition, empirical research results from several researchers are used as secondary data to strengthen arguments which are then synthesized into a single unit to provide meaningful information.

This study was conducted as a systematic literature review according to the Kitchenham Guidelines (2004) which consists of 3 phases namely; Plan Review, Conduct Review, Document Review. This method is then described by (Brereton, Kitchenham, Budgen, Turner, Khalil, 2007) as follows:

Phase 1, in this phase an overall assessment plan is carried out from the reviewed articles. The key question to explore the study of this review literature is, what is the TLC learning model and how is it applied in learning? The validation protocol development is rigorous and iterative. This includes an overall plan for systematic research and validation of the literature.

Phase 2, an empirical study of article searches using the Google Scholar and Scopus data bases for the last 10 years. These studies were analyzed and filtered in searches using the words "TLC," "Technology Learning Cycle". The next step is to search for articles that are suitable for learning and meet the rules of writing scientific articles. Several articles were removed from this study because the author was the same and he required rewriting.



From the search on the search engine mentioned above, 6 articles were obtained, but only 5 were taken. The articles are taken that have clear objectives, methodology and results.

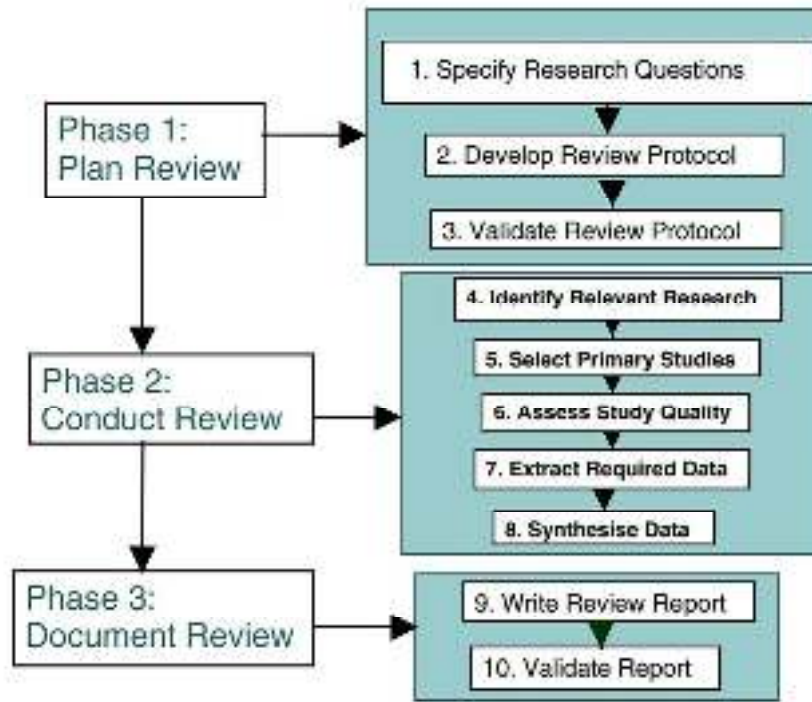


Figure 1. Literature Review Procedures

In addition, the article was rejected because it was written by someone in the same study. The results are presented in Table 1 below.

Table 1. List of articles that fit in the review

No.	Authors	Structure of scientific articles	Same study
1	Rose M. Marra, Jane Howland, Judy Wedman, Laura Diggs (2003)	√	
2	Rose M. Mara, Jane Howland, David H. Jonnasen, John Wedman (2004)	√	
3	Siti Patonah, Sajidan, Cari, Sentot Budi Rahardjo, (2021)	√	
4	Howland, J., & Wedman, J. (2004)	√	
5	C Utama, Sajidan, J. Nurkamto, Wiranto (2019)	√	√
6	C Utama, Sajidan, J. Nurkamto, Wiranto (2020)	√	√

The article in number 6 was deleted because it was already represented by article number 5. The data was extracted very carefully, avoiding overlapping factors in the study of the TLC learning method.



3. RESULTS & DISCUSSION

Learning with TLC Model

The need for effective use of technology in the 21st century makes technology integration an important part of the curriculum, Marra, et al (2014). Then continued by Howland and Wedman (2004) to develop a learning model for faculty development, specifically individual technology learning titled TLC. This model encourages the concordance of learning outcomes, learning activities, and assessment/feedback integrated into technology. (Nicolle, 2005). In this suggestion model is a view on the process. As for the development that involves effective technology: 1. Awareness, awareness of what technology can offer; 2. Opportunity, opportunity to study convergence technology; 3. Time, Time to learn skills; 4. Application, Applying Skills for Learning; 5. Reflection, reflected in training.

Access to all these components and hardware and software provides a foundation for professional development that enables educators to model skills through a teaching and learning tool called the TLC Concept Model. (Sprague, Kopfman, Dorsey, 1998; Wedman & Diggs, 2001). TLC encourages independent self-development that can change over time as new technologies and technology applications emerge. Therefore, TLC is based on the ability of educators to apply technology: the ability to learn and use new technologies and use technology applications (Wedman & Diggs, 2001). TLC has five phases, namely:

1. Awareness, Know the importance of technology through the media, family, students, friends and colleagues. 2. Exploration and filtration, choose the types of technology and techniques or tools that will be used alone or in the classroom. 3. Learning, Development and use of vocational training skills. This stage includes: Engineering studies advanced technology. Pedagogical - preparation, improving learning planning using tools and practices. 4. Application, apply strategies designed with technology for the intended learning outcomes. 5. Sharing and reflection, learn to discuss, criticize, apply it yourself and start the cycle over.

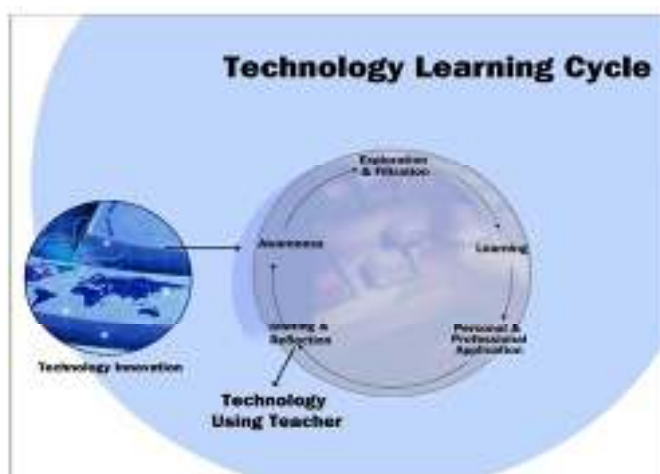


Figure 2. Five phases of the (TLC) Technology Learning Cycle

The results of the validation of the TLC integrated model in learning conducted by Marra, et al (2014) on 11 teachers in the faculty of education showed that 80% of the teachers indicated that web management-based learning was well integrated in their learning. Around 40% of all teachers reported that website creation and maintenance was well integrated with TLC and there was an increase of around 10% of teachers reporting that communication indicators in learning were well integrated. Two-thirds of teachers reported that the use of e-mail for students to connect with their peers, with indicators in the areas of collaboration, and social learning, was well integrated into targeted learning for one year of learning. on the other hand, there was an increase of 15% towards group learning and group problem solving. The biggest increase in technology integration after one year of participation was the use of technology tools to communicate between teachers and students increased from 25%



to 80%. One is used to make the syllabus and other educational information more accessible to students. Students use it to communicate with other students, as well as to obtain assignments and produce various documents for use in field experiences. Other teachers develop specialized applications such as web-based lesson plan formats and web-based literature systems. Students use this application to get feedback on lesson plans and to select literature used in learning (Merra, et al, 2004).

STLC Model in Empowering Critical Thinking Skills

The application of TLC in learning is also carried out by Patonah, et al, (2021) using the TLC model and the inquiry model to produce a Science Technology Learning Cycle (STLC) model. The concept of this model stems from science and inquiry which are an integral part of scientific inquiry (Kazempour, 2018). Student activities start from observing, students ask questions about conjectures or hypotheses, then test these hypotheses, after they are interesting and the final stage is reporting the results. This research process is a systematic and interdependent reflection process. (Thompson, 2017). The expected benefits of science students from scientific learning research are that students are able to think critically, do things systematically, and are factual. However, the activities carried out in the laboratory do not fully guarantee the benefits of these students. (Marchut & Gormally, 2019). Students engaged in research activities have little opportunity to tackle real problems. As a result, the resulting products do not match the problems they face. To deal with these problems, the right solution that can be used is with technology-integrated learning. Students show concepts learned with proper technology or simple technical products. These types of activities are a way to motivate students and engage them in real science and engineering practice (Applebaum, Vitale, Gerard, & Linn, 2017).

Learning that integrates technology with the claim of creating an STLC based on constructivist, meaningful, and discovery-based learning concepts. The term used in the learning syntax refers to the survey component (Wenning 2011) and the TLC by Marra, et al (2004). Model specificity is developed outside and inside the classroom to emphasize teachers' critical thinking skills. The STLC learning model has six different syntaxes, from observing, designing applied technologies, sharing, sharing, writing, and applying (Patonah, et al, 2019). Six cycles are performed sequentially, described as follows.

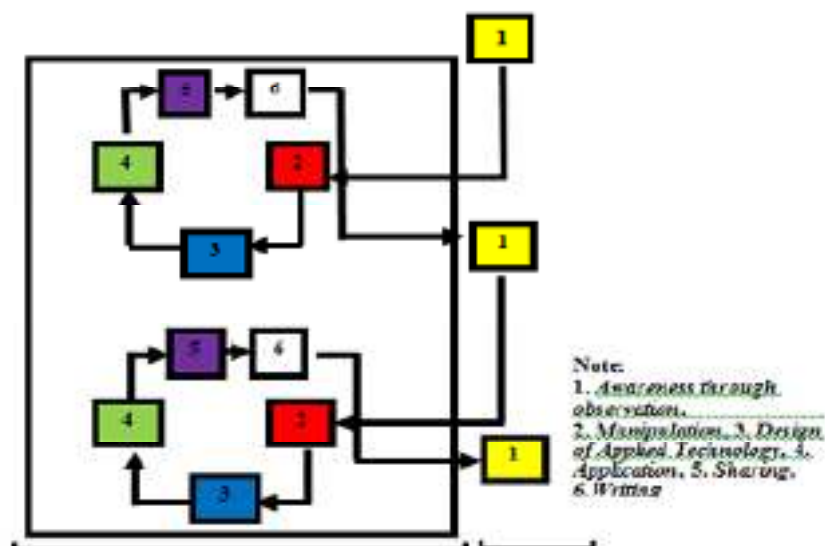


Figure 3. STLC Syntax

STLC syntax starts from observing which aims to manipulate. students have to observe really according to difficult situation. Then design simple technology from basic information and observations. Next, students design simple technology as a product. The process of student activities can be shared through the application or in groups in class. It can be said that the activities carried out in the STLC model prioritize groups to support each



other. Each group provides comments and questions about the product being developed. The STLC model in the last syntax is to write reports. In the end, students can write information reports from the Beginning Steps to the Final Steps. (Patonah, 2018).

This study provides suggestions that the STLC model is able to develop critical thinking skills practically and effectively. Practicality is shown in the activities of teachers and students in the “Good” and “Very Good” categories. The effectiveness of the STLC model on the development of critical thinking skills is evident in the high Ngain category, p-value in each cycle/theme <0.5 , and the responses of students who agree with the STLC model to empower critical thinking skills. Students experience the benefits of learning STLC to create simple skills that help them solve problems around them. This study suggests that the STLC learning model is an alternative learning model that can improve critical thinking skills at various educational levels, especially when preparing future teachers. (Patonah, 2021).

TLC Individualized Technology Learning

Research on the TLC learning model was also conducted by Howland & Wedman (2004) on 98 prospective teachers in the Faculty of Education. The basis of learning development designed in Howland & Wedman's (2004) research is process-oriented learning (Sprague, Kopfman, & Dorsey, 1998). The principle of process-based learning is that an effective skills-related teacher development model should include: (a) Awareness of what technology has to offer, (b) Opportunities to study technology integration, (c) time to learn skills, (d) Applying technology to education, and (e) reflection on teaching. Professional development processes that incorporate these elements are combined with access to technical simulation hardware and software as teaching and learning tools.

The development of the TLC model in the research of Howland & Wedman (2004) We view the ability to learn and use new technologies as a core competency for educators using technology. The TLC model demonstrates the belief that major changes need to be made to teacher education and provides learners with a viable, personalized approach at the level of knowledge of different technologies and their applications. The TCL phase in the research of Howland & Wedman (2004) is explained starting from awareness, at this stage, individuals want to use new technologies and are embracing new innovations. In the exploration and filtering phase, individuals consider and select technologies to explore and explore the capabilities, availability, and usefulness of the various innovations discovered in their consciousness. The learning phase includes mastering technical skills as well as acquiring pedagogical skills that enable effective integration of technology for learning. In the Application phase, people combine educational generation into the coaching methodology, the usage of their newly received understanding to aid coaching and learning. Finally, in the phase of exchange and reflection, people reflect and evaluate the skills integrated into the curriculum. At this stage, students develop their professional technical skills to support the teaching and learning process.

Electronic Learning Cycle on Schoology (ELCoS)

Another application of TLC in learning was carried out by Candra, et al (2019) who developed the concept of a new learning model adopted from the technology-based learning cycle or called TLC which in its application uses LMS Schoology. Schoology as an LMS is electronic learning that supports educational and learning activities using the Internet, extranets, intranets, or other networks as a means of communicating knowledge (Beran, Drefs, Kaba, Al Baz, Al Harbi, 2015). Schoology's electronic learning cycle learning model uses TLC syntax. It begins with recognition, exploration and filtering, learning, personal and professional applications, sharing and reflection.

The application of Schoology starts from the awareness stage where Schoology is an LMS tool. Then in the exploration and filtration stage, Schoology as (a) learning resources such as web, links, URLs, and others; (b) discussion forums and assistance interactions; (c) monitor readiness before class starts. At the learning stage as well as the personal and professional application stage, Schoology as (a) Quiz questions about pre-test and post-test, and other formative assessments; (b) Learning Resources: Content that can be linked to the web, classroom activities and link URLs; (c) Work as a product and work; (d) Group work/product sharing forum; (e) Forums used for asynchronous communication; (f) Master class for expert evaluation; (g) Shorter time / questionnaire for



reflection reporting in 3 minutes. The final stage is exchange and reflection, which schools can apply for. (a) a three-minute questionnaire as a reflection report; (b) Quiz for self-assessment; (c) Assignments for reflection reports; and (d) Forum for sharing medium-term reflection reports (Utama, 2019).

Derived from TLC, the concept of ELCoS has several syntactic steps to more specifically adapt the use of technology by both teachers and students. The difference is that the steps in the ELCoS concept can change their order and start with different syntax depending on the material and the material passing context (Howland & Wedman, 2004). Because e-learning-in-school (ELCoS) constructs are learning cycles, the learning phase can begin in different scenes that adapt to the learning outcomes. (Main, 2019). The results showed This communication may be conducted immediately through the school to discuss or ask questions about topics related to textbooks, exercises, assignments, exams, and self-observation reports. The technology has a positive impact in helping students' self-development towards students and students towards teachers.

4. CONCLUSION

TLC is a model for understanding how individuals apply the use of technology as well as a framework to support the development of learning. TLC takes a more process-oriented perspective, suggesting that an effective technology-related development model must include awareness (perception of what technology can offer), opportunity (opportunity to integrated technology discovery society), time (time to understand technology, application). technology application in teaching) and reflection (reflecting in teaching). TLC has five phases: awareness, exploration and filtration, learning, application, sharing and reflection designed to support educators' use of technology, where educators will have opportunities to use new technologies and use technology applications. The TLC model has been applied in various lessons starting from the learning of Marra et al. (2014), Howland & Wedman (2004), Patonah et al. (2021), and Candra et al. (2019), where all the evolution of this learning model shows the results of research that effectively integrates technology into learning and has a positive impact on student learning outcomes. However, it is necessary to develop this model with a combination of theory and more real applications in learning. By carrying out further research development, it is believed that it can make a significant contribution to the development of technology-based learning models that are more effective and relevant to the educational context in Indonesia, as well as increasing understanding of the importance of technology integration in improving student learning outcomes.

REFERENCES

- Applebaum, L. R., Vitale, J. M., Gerard, E., & Linn, M. C. (2017). Comparing design constraints to support learning in technology-guided inquiry projects. *Educational Technology and Society*, 20(4), 179–190.
- Beran, T., Drefs, M., Kaba, A., Al Baz, N., & Al Harbi, N. (2015). Conformity of responses among graduate students in an online environment. *Internet and Higher Education*, 25, 63–69.
- Davis, F. D., Bagozzi, R., & Warshaw, P. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982–1003.
- Fuller, F. F. (1969). Concerns of teachers: A developmental conceptualization. *American Educational Research Journal*, 6(2), 207–226.
- Kazempour, M. (2018). Elementary preservice teachers' authentic inquiry experiences and reflections: A multicase study. *Journal of Science Teacher Education*, 29(7), 644–663.
- Knezek, G., & Christensen, R. (2015). The will, skill, tool model of technology integration: adding pedagogy as a new model construct. In the 12th *International Conference on Cognition and Exploratory Learning in the Digital Age (CELDA 2015) Figure* (Vol. 12, pp. 84–91).
- Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge? *Journal of Education*, 193(3), 13–19.
- Koehler, M. J., Mishra, P., & Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology. *Computers and Education*, 49(3), 740–762.



- Howland, J., & Wedman, J. (2004). A process model for faculty development: individualizing technology learning. *Journal of Technology & Teacher Education*, 12(2), 239–263.
- Marchut, A. E., & Gormally, C. (2019). Successes and limitations of inquiry-based laboratories on affective learning outcomes for deaf, hard-of-hearing, and hearing signing students. *Journal of the Scholarship of Teaching and Learning*, 19(4), 18–31.
- Marra, R. M., Howland, J., Jonassen, D. H., & Wedman, J. (2004). Validating the technology learning cycle in the context of faculty adoption of integrated uses of technology in a teacher education curriculum. *Learning*, 1(1).
- Marra, R. M., Howland, J., Wedman, J., & Diggs, L. (2003). A little TLC (Technology Learning Cycle) as a means to technology integration. *TechTrends*, 47(2), 15–19.
- Miri, B., Ben-Chaim, D., & Zoller, U. (2007). Purposely teaching for the promotion of higher-order thinking skills: A case of critical thinking. *Res Sci Educ* 37,353-369.
- Nicolle, P. S. (2005). Technology adoption into teaching and learning by mainstream university faculty: a mixed methodology study revealing the how, when, why, and why not. Disertasi. The Department of Educational Leadership, Research, and Counseling. Baton Rouge.
- Niederhauser, D. S., & Lindstrom, D. L. (2018). Instructional technology integration models and frameworks : Diffusion, competencies, attitudes, and dispositions. *Handbook on Information Technology in Primary and Secondary Education*, 1–21.
- Patonah, S., Sajidan, Cari, Raharjo, S. B. (2021). The effectiveness of STLC (*science technology learning cycle*) to empowering critical thinking skills. *International Journal of Instruction*, 14(3), 39-58.
- Patonah, S., Cari, Raharjo, S. B., Sajidan. (2018). Designing of model science technology learning cycle (STLC) based material teaching to enhance student critical thinking and environmental awareness. *Advances in Social Science, Education and Humanities Research*, 330.
- Rahmasiwi, A., Susilo, H., & Suwono, H. (2018). Pengaruh pembelajaran diskusi kelas menggunakan isu sosiosains terhadap literasi sains mahasiswa baru pada kemampuan akademik berbeda. *Jurnal Pendidikan*, 3(8), 980-989.
- Sprague, D., Kopfman, K., & Dorsey, S. (1998). Faculty development in the integration of technology in teacher education courses. *Journal of computing in teacher education*, 2(14), 24-28.
- Squillante, J., Wise, L., & Hartey, T. (2014). Analyzing blackboard: Using a learning management system from the student perspective. *Journal Mathematics and Computer Science Capstones.*, 20, 1–50.
- Thompson, T. (2017). Teaching creativity through inquiry science. *Gifted Child Today*, 40(1), 29–42.
- Utama, C., Sajidan, Nurkamto, J., & Wiranto. (2019). A conceptual model for electronic learning cycle on schoology. IOP Conf. Series: Earth and Environmental Science, 234.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478.
- Wang, F. H. (2017). An exploration of online behaviour engagement and achievement in flipped classroom supported by learning management system. *Computers and Education*, 114, 79–91.
- Webb, M., & Cox, M. (2004). A review of pedagogy related to information and communications technology. *Technology, Pedagogy and Education*, 13(3), 235–286.
- Wedman, J., & Diggs, L. (2001). Identifying barriers to technology-enhanced learning environments in teacher education. *Computers in Human Behavior*, 17(4), 421–430



IDENTIFYING THE OBSTACLES FACED BY HEADMASTER AND TEACHER MOVER IN IMPLEMENTING THE INDEPENDENT CURRICULUM

Rauzatul Jannah¹; Dian Aswita^{2*}; Faisal Anwar³; Syamsul Rizal⁴

^{1,2,3}Department of Elementary School Teacher Education, Universitas Serambi Mekkah, Indonesia

⁴Department of Physics Education, Universitas Serambi mekkah, Indonesia

*aswita_dian@yahoo.com

ABSTRACT

This research aims to find out the obstacles faced by the headmaster and teacher mover in the implementation of the independent curriculum in SD Negeri 54 Banda Aceh City and what the solutions are for overcoming the obstacles faced by the headmaster and teacher mover in the implementation of the independent curriculum at SD Negeri 54 Banda Aceh City. This research uses a qualitative descriptive research method. The objects of this research are the principal and teachers. The data collection technique is carried out by conducting interviews. The results of the research show that obstacles faced by the headmaster and teacher movers in the implementation of the Merdeka Curriculum at SD Negeri 54 Banda Aceh City are the existence of several policies that are hampered by central policies, the lack of training and improvement of human resources from related agencies, and the fact that principals and teachers have to seek additional references from other parties. On the other hand, teachers must continue to teach without implementing complete policies. The solution to overcoming the obstacles faced by the headmaster and teacher mover in the implementation of the Merdeka Curriculum at SD Negeri 54 Banda Aceh City is to look for references outside the school and take part in external training for the principal, namely by bringing in and providing training as well as bringing in resource persons from other parties. Outside, the IKM program has been running well and continues to make improvements every day and year.

Keywords: Identification, Obstacles, School Mover, Teacher Mover, Independent Curriculum

1. INTRODUCTION

The development of science and technology (IPTEK) has brought changes to almost all aspects of life. Therefore, the world of education needs to receive serious attention from the government regarding the demand to produce quality human resources, because through the education process, a quality young generation will be born who is expected to be able to keep up with the changes and developments of the times in all aspects of life. Bahri (2017) mentioned that one important component of education that is often overlooked is the curriculum. In general, the curriculum is a description of the vision, mission, and educational goals of a nation. This also positions the curriculum as the central value content that will be transformed for students.

The curriculum is a collection of a set of values that are internalized by students, both in cognitive, affective, and psychomotor forms. Basically, there are three curriculum foundations, namely philosophy, psychology, and socio-cultural foundations. These three basic curriculum principles must be truly understood so that they can be guided in efforts to produce a better curriculum in the future (Bahri, 2017). Minister of Education, Culture, Research, and Technology Nadiem Makarim introduced a new curriculum on February 1, 2021, named Merdeka, which consists of three parts, namely: independent sharing, independent learning, and independent change. The Merdeka curriculum was first implemented in 2,500 schools spread across 34 provinces and 111 districts and cities in Indonesia, which took place in the 2001–2022 academic year (Rosminda et. al., 2023).

With the launch of the independent curriculum in the learning process for all students throughout Indonesia, it will be an improvement in the world of education implemented by the government. This program will really help students, especially those who live in the outermost, underdeveloped, and frontier areas (3T). Freedom to learn, teacher mover is the motto of the concept of an independent curriculum. The concept of the independent learning curriculum for students is the formation of independence in thinking. Meanwhile, the concept of learning



for teachers in the independent curriculum is the existence of freedom and independence in developing teacher potential according to the duties and responsibilities of each teacher (Manalu et. al., 2022).

Monday (01/02/2021), online in Jakarta, the Minister of Education and Culture (Mendikbud), Nadiem Anwar Makarim, launched Merdeka Belajar Episode 7: Mobilizing School Program. In his direction, the Minister of Education and Culture said that the School Mover Program is a fast way to realize the vision of Indonesian education, which focuses on developing overall student learning outcomes by realizing the Pancasila Student Profile (Kemendikbudristek, 2021).

School Mover are schools that focus on developing student learning outcomes evenly by realizing the integrity of the six dimensions of the Pancasila Student Profile, which include faith, devotion to God Almighty and noble character, independence, mutual cooperation, global diversity, critical reasoning, and creativity. School Mover also focus on student learning outcomes, including cognitive (literacy and numeracy) and non-cognitive (character) competencies, starting with superior human resources (the headmaster and teachers). Principals and teachers from School Mover carry out outreach in the form of outreach activities to other educational units (Kemendikbudristek, 2021).

The demands that arise along with the implementation of the independent learning curriculum are that teachers must be able to adapt. Teachers, as professionals, must be able to create quality learning in order to produce student output that has good morals and is competitive. Teachers must always improve their pedagogical abilities, in particular, with the aim of being able to guide students to have good reasoning. Achieving good reasoning abilities and the ability to create is possible if the teacher is able to provide stimuli that can stimulate students. This illustrates that teachers have freedom in their thinking.

Mobilizing teachers are teachers who motivate as leading agents who will become future principals, the headmaster, and curriculum trainers. Just like individuals who have been given provisions to advance education, teachers must continue to be cared for and nurtured in order to create a better educational ecosystem. Not only that, the teacher mover must also be able to maintain good communication and relationships with students and the school community. Using technology to improve the quality of education and always reflecting on and evaluating the implementation of learning. Teacher mover must also have the ability to encourage their colleagues to always innovate (Ningrum & Suryani, 2022).

Increasing the capacity of the headmaster will help school members explore the problems they face and solve their own problems. This is in line with the concept of transformation: someone who has knowledge and skills will be able to find solutions and fix all problems independently. "With the Mobilization School, it is hoped that it can make continuous changes and transform into a school that produces a Pancasila Student Profile" (Zamjani, 2020: 38).

Based on the results of initial observations at SD Negeri 54 Banda Aceh, it is known that this school is implementing the Merdeka curriculum, namely the Merdeka Sharing curriculum. The implementation of the Merdeka curriculum at SD Negeri 54 Banda Aceh has been going on since 2022 and has started to be implemented in Phases A, B, and C. Because the Merdeka curriculum is still a relatively new concept, teachers must have knowledge and understanding of it because the implementation of the independent curriculum starts with their readiness. This new policy certainly has obstacles to implementing it; the planning and implementation of learning are not yet perfect. The implementation has not gone according to plan because so many changes have been highlighted and many of them do not work effectively in the classroom. Teachers feel limited in adopting the Merdeka Curriculum (Fitriyah & Wardani, 2022).

2. METHODS

This research approach is a qualitative approach with a qualitative descriptive research type. The qualitative research method is research that describes a particular social condition through real and correct descriptions formed through words obtained from collecting and analysing relevant data from that natural condition (Sugiyono, 2016:337). So this research describes the identification of obstacles faced by the headmaster and teacher mover in implementing the Independent Curriculum in SD Negeri 54 Banda Aceh City. Data were collected using three methods, namely interviews, observations, and interviews. Data analysis techniques use the Miles and Huberman model, namely data reduction, data display, and conclusion drawing and verification.



3. RESULTS & DISCUSSION

Based on the results of research conducted at SD Kartika at SD Negeri 54 Banda Aceh City, What are the obstacles faced by the headmaster and teacher mover in implementing the independent curriculum in SD Negeri 54 Banda Aceh City? There are several policies that are hampered by central policies. The lack of training and improvement of human resources from related agencies requires the headmaster and teachers to look for additional references from other parties, and on the other hand, teachers have to continue teaching without implementing complete policies.

What are the solutions to overcoming the obstacles faced by the headmaster and teacher mover in the implementation of the Independent Curriculum in SD Negeri 54 Banda Aceh City, namely by looking for references outside the school and taking part in external training for the headmaster, namely by bringing in and providing training as well as bringing in resource persons from outside parties? The IKM program has been running well and continues to make improvements every day and year.

Minister of Education, Culture, Research, and Technology Nadiem Makarim introduced a new curriculum on February 1, 2021, named Merdeka, which consists of three parts, namely: independent sharing, independent learning, and independent change. The Merdeka curriculum was first implemented in 2,500 schools spread across 34 provinces and 111 districts and cities in Indonesia, which took place in the 2001–2022 academic year. With the launch of the independent curriculum in the learning process for all students throughout Indonesia, it will be an improvement in the world of education implemented by the government.

This program will really help students, especially those who live in the outermost, underdeveloped, and frontier areas (3T). Freedom to learn, teacher mover is the motto of the concept of an independent curriculum. The concept of the independent learning curriculum for students is the formation of independence in thinking. Meanwhile, the concept of learning for teachers in the independent curriculum is the existence of freedom and independence in developing teacher potential according to the duties and responsibilities of each teacher.

This is in accordance with previous research by Adha and Fadhila (2023). Challenges are threats or obstacles that prevent us from trying or doing something. To find this aspect, the headmaster and teacher must be able to identify the weaknesses that exist in their institution. The principal of SD Negeri Medono 07 Pandeglang "Ayu" stated that the challenges faced in implementing the independent curriculum were divided into two, namely internal and external challenges. Internal challenges include human resources, who still need to learn a lot about the independent curriculum. The main things that often occur in schools include limited insight into the independent/motivating curriculum and a limited number of resources. The second thing that is a challenge in terms of internal factors is the diverse abilities of students, so it is difficult to determine a joint project that covers all the abilities of heterogeneous students. External challenges faced include support from the community, which is still not optimal, even though the school Mover program requires collaboration between the school and the surrounding community. There are often conflicting regulations in schools that implement an independent curriculum, so the headmaster is hesitant to make decisions.

According to research by Kurniati and Kusumawati (2023), teachers have implemented an independent curriculum in classroom learning despite facing obstacles and challenges. The obstacles and challenges faced in the aspect of preparing learning tools are describing the TP from the available CP and compiling the ATP from each TP. The difficulties faced in implementing differentiated learning are identifying student needs and varying appropriate media and learning methods for each group of students. Meanwhile, the obstacles faced in implementing diagnostic assessments are mainly varying questions and analyzing diagnostic assessment results quickly and accurately. A common obstacle teachers face in all aspects of readiness is time management. Teachers need special time to carry out each activity in independent curriculum-based learning. It is hoped that time problems will be reduced due to the habit of implementing learning based on the independent curriculum consistently. There is a need to increase teacher human resources in all aspects. Guidance and assistance to teachers in implementing the independent curriculum are still needed intensively. Good communication between the principal, learning committee teachers, and teachers implementing the independent curriculum so that the technical guidance activities carried out can be carried out optimally.



According to research conducted by Nasution (2023), the implementation of the independent curriculum is currently experiencing several obstacles. Among others, teachers still have experience with low learning independence, limited references, uneven access to learning, time management, and so on. Meanwhile, the challenges in the education unit are: (1) teacher readiness (human resources) as the main pillar of implementing the independent curriculum; (2) teachers' ability to support digital-based technology facilities; (3) increasing communication and collaboration networks between educational units and stakeholders; and (4) difficulties in implementing the learning evaluation function as an integral part of learning. Learning assessment is an important component that is often overlooked by schools in achieving curriculum goals.

4. CONCLUSION

Based on the results of research regarding the identification of obstacles faced by the headmaster and teacher mover in the implementation of the independent curriculum in 54 public elementary schools in the city of Banda Aceh, these are the obstacles faced by the headmaster and teacher mover in implementing the independent curriculum in public elementary schools. 54. In the city of Banda Aceh, there are several policies that are hampered by central policies. The lack of training and improvement of human resources from related agencies requires that the headmaster and teachers seek additional references from other parties, and on the other hand, teachers have to continue teaching without implementing complete policies. The solution to overcoming the obstacles faced by the headmaster and teacher mover in the implementation of the Independent Curriculum in SD Negeri 54 Banda Aceh City is to look for references outside the school and take part in external training for the headmaster, namely by bringing in and providing training and bringing in resource persons from outside parties. The IKM program has been running well and continues to make improvements every day and year.

5. ACKNOWLEDGMENTS

We would like to thank the lecturers, teachers, students and everyone who was involved and participated in this research.

REFERENCES

- Adha, W. A., & Fadhila, S. (2023). Peran Kepala Sekolah Dalam Implementasi Kurikulum Merdeka. *IBTIDA: Jurnal Kajian Pendidikan Dasar*, 3(1), 50–59. <https://www.ejournal.iainu-kebumen.ac.id/index.php/ibtida/article/view/1121>
- Bahri, S. (2017). Pengembangan kurikulum dasar dan tujuannya. *Jurnal Ilmiah Islam Futura*, 11(1), 15-34.
- Fitriyah, C. Z., & Wardani, R. P. (2022). Paradigma Kurikulum Merdeka Bagi Guru Sekolah Dasar. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, 12(3), 236–243. <https://doi.org/10.24246/j.js.2022.v12.i3.p236-243>
- Kemendikbudristek. (2021). Program Sekolah penggerak. 24. Jakarta: Kemendikbud
- Kurniati, L., & Kusumawati, R. (2023). Analisis Kesiapan Guru SMP di Demak dalam Penerapan Kurikulum Merdeka. *Jurnal Cakrawala Ilmiah*, 2(6), 2683-2692.
- Manalu, J. B., Sitohang, P., & Henrika, N. H. (2022). Pengembangan perangkat pembelajaran kurikulum merdeka belajar. *Prosiding Pendidikan Dasar*, 1(1), 80-86.
- Nasution, A. F. (2023). Hambatan dan tantangan implementasi kurikulum merdeka di MTS Raudlatul Uluum Aek Nabara Labuhanbatu. *Journal on Education*, 5(4), 17308-17313.
- Ningrum, A. R., & Suryani, Y. (2022). Peran Guru Penggerak dalam Kurikulum Merdeka Belajar. *AR-RIAYAH: Jurnal Pendidikan Dasar*, 6(2), 219-232.
- Rosminda, T., & Fadriati, F. (2023). Kebijakan Kurikulum Merdeka Upaya Meningkatkan Pendidikan Karakter Di Indonesia. *Piwulang: Jurnal Pendidikan Agama Islam*, 5(2), 192–202. <https://e-journal.staima-alhikam.ac.id/piwulang/article/view/1516>



Sugiyono. (2017). "Metode Penelitian Pendidikan", Bandung: Alfabeta.

Zamjani. I, Dkk. 2021. Naskah Akademik Program Sekolah Penggerak. (<https://penggerak-simpkb.s3.ap-southeast-1.amazonaws.com/portal-programsekolahpenggerak/wp-content/uploads/2021/02/10114931/Naskah-Akademik-SP.pdf> diakses pada tanggal 28 Oktober 2021).



THE IMPACT OF GAME-BASED LEARNING ON COGNITIVE DEVELOPMENT IN EARLY CHILDHOOD: A REVIEW OF THE LITERATURE

Haerul Annuar¹, Etin Solihatin^{2*}, Khaerudin³

^{1,2,3}Universitas Negeri Jakarta, Indonesia

*haerulannuar_9902921027@mhs.unj.ac.id

ABSTRACT

This study aims to investigate the impact of game-based learning on cognitive development in early childhood through a literature review. Game-based learning has become a major focus in early childhood education because of its potential to stimulate children's cognitive development. Through a comprehensive literature review, this article describes various findings from previous research that reveal the impact of game-based learning on cognitive abilities such as problem-solving, critical thinking skills, conceptual understanding, and flexible thinking abilities in early childhood. These findings provide insight into how this learning approach can influence children's cognitive development at an early stage in their lives. Practical implications and future research directions are also discussed in this article. Thus, this article provides a better understanding of the importance of integrating play-based learning in early childhood education curricula to improve children's cognitive development.

Keywords: *Game-based Learning, Cognitive, Childhood, Systematic Review*

1. INTRODUCTION

Game-based learning has been considered an engaging teaching approach to promote student learning and motivation (Hussein et al., 2019). The GBL environment can help children, instructors, and game designers to create a friendly learning environment (Tang, 2020). According to various research results, the reason children play games is that games are fun, exciting, and offer challenges in solving problems (Dalton & Devitt, 2019; Gerkushenko & Gerkushenko, 2014; Godwin et al., 2015; Mouws & Bleumers, 2015). Many prominent gaming experts have even put forward the view that gaming has great potential to revolutionize the world of education, driven by its wide prevalence and strong motivational power (Gee, 2003; Prensky, 2008; Squire & Jenkins, 2003).

The literature on early childhood education (ECE) and GBL emphasizes that educational digital games, when designed and used in pedagogically appropriate ways, can aid learning (Edwards, 2013; Hatherly et al., 2009), creativity (Edwards, 2013; Zevenbergen & Logan, 2008), cognitive development (Divjak & Tomić, 2011; Doliopoulou & Rizou, 2012; Fessakis et al., 2013; Koivisto et al., 2011; Lieberman et al., 2009; Manesis, 2018; Verenikina et al., 2010; Yien et al., 2011), social interaction (Doliopoulou & Rizou, 2012; Lieberman et al., 2009; Manesis, 2018), higher order thinking (Hatherly et al., 2009; Manesis, 2018; Yien et al., 2011), critical abilities (Allsop et al., 2013; Lonigan et al., 2003; Manesis, 2018), problem solving (Allsop et al., 2013; Fessakis et al., 2013; Yien et al., 2011), memory (Allsop et al., 2013; Divjak & Tomić, 2011; Hatherly et al., 2009; Koivisto et al., 2011; Manesis, 2018; Zevenbergen & Logan, 2008) in young children. Currently, the implementation of GBL into PAUD is also an important issue to support teacher professional development (Altun, 2019). A literature review states that the adoption and use of ICT and digital games in the teaching and learning process is usually influenced by teacher confidence in integrating GBL in the classroom, teacher beliefs and attitudes towards GBL, teacher competence and skills in using technology (Blackwell et al., 2013; Hew & Brush, 2007; Ihmeideh, 2009; Nikolopoulou et al., 2019).

In recent years, there has been an increase in the use of online educational games in society and schools. However, this has also raised concerns among families regarding uncertainty regarding its negative impact on children (Konok et al., 2021). For example, some experts believe that such educational games can increase the risk of addiction, increase the level of aggressiveness and reduce motor abilities. Therefore, many researchers emphasize the importance of conducting further research to clarify how digital games affect children and what factors influence this (Lazarinis et al., 2020).



A number of literature reviews have attempted to analyze and summarize the knowledge accumulated in the field of game-based learning (GBL) to provide guidance for the development of this field. These reviews examine GBL from various perspectives. Some focus on GBL outcomes (Hainey et al., 2016; Qian & Clark, 2016; So & Seo, 2018; Tan et al., 2017; Tokac et al., 2019; Wouters & Van Oostendorp, 2013). Other studies focus on specific levels of education, such as K-12 (Hainey et al., 2016; So & Seo, 2018), higher education (Subhash & Cudney, 2018; Tan et al., 2017) and early childhood education (Garcia, 2020; Lamrani & Abdelwahed, 2020; Tang, 2020; Zapata-Cáceres et al., 2021). Several reviews also explore game design elements that can contribute positively to learning outcomes (Ke, 2016; Subhash & Cudney, 2018). Additionally, there are also reviews targeting specific study domains such as language (Despeisse, 2018; Hung et al., 2016), mathematics (Tokac et al., 2019), and health care (Gentry et al., 2019; Ghoman et al., 2020; Tan et al., 2017).

In an increasingly advanced digital era, game-based learning (GBL) has become one of the most innovative and interesting learning methods. This method uses games as a tool to help students understand concepts and subject matter more interestingly and interactively. However, although much research has been conducted to explore the effectiveness of GBL in general education contexts, there is a significant lack of research regarding the implementation of GBL in early childhood. This paper aims to analyze the impact and benefits of game-based learning on children's cognitive development. This research is a systematic literature review, which means that this research will collect and analyze previous studies that have been conducted on GBL and children's cognitive development. By conducting a systematic review, this paper will try to answer important questions. It is hoped that the results of this analysis will provide new insights into how GBL can be used effectively in early childhood education. Thus, this paper can help educators and parents in designing learning programs that support their children's cognitive development. In addition, the results of this analysis can also provide a basis for further research on the use of GBL in early childhood education.

According to the research conducted in this paper, 66 studies relevant to the research topic were selected and systematically evaluated using the PRISMA analysis method (Liberati et al., 2009). This research explores the impact of game-based learning factors on children's learning. The five categories investigated in this study are;

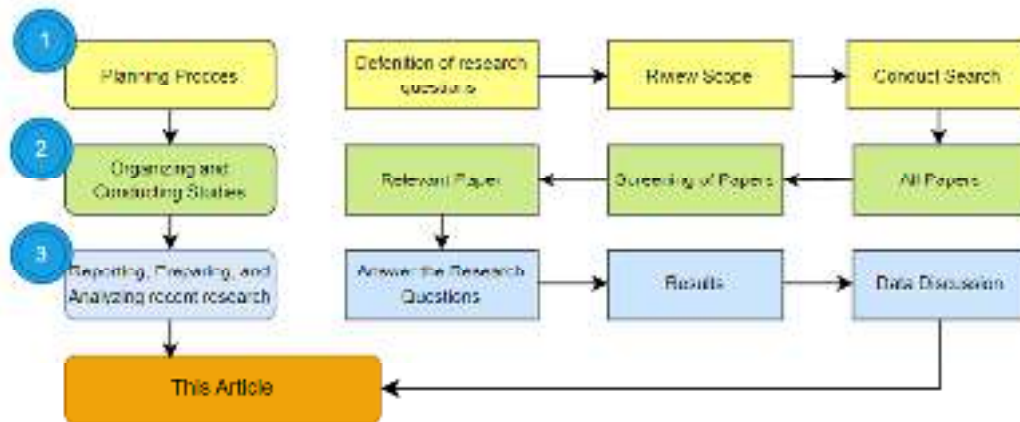
- 1) What are the annual publication trends in the field of game-based learning for early childhood from 2015-2023?
- 2) Who are the top 10 most influential writers in the field of game-based learning for early childhood based on their citations from 2015-2023?
- 3) What are the documents based on the research subject of game-based learning in early childhood education from 2015 to 2023?
- 4) What are the benefits of game-based learning research in early childhood education from 2015 to 2023?
- 5) The effect of game-based learning on children's cognitive development?

2. METHODS

The authors of this study have applied a systematic analysis approach and PRISMA review to gain the latest understanding of developments and current research surrounding play-based learning (GBL) at the preschool level (Moher, 2009).



In this paper, the research and review steps include the stages illustrated in Figure 1.



- 1) Planning process; Collection of journals and internet sites, exit and entry criteria for research, and expression of analysis and review steps.
- 2) Organize and conduct studies; Selected articles are analyzed, then the data is encrypted.
- 3) Reporting, compiling, and analyzing the latest research to understand the current status of game-based learning (GBL) in early childhood.

3. RESULTS & DISCUSSION

The application of Game-Based Learning (GBL) to early childhood has had a significant impact on their cognitive development. GBL is an effective educational tool for improving children's executive function, which can help in developing important cognitive and social skills (Liu et al., 2022) and is effective for improving the motivation and academic outcomes of young children (Paul, 2022). Through the use of games specifically designed for educational purposes, children not only actively learn new concepts, but also improve their overall cognitive skills. For example, in games designed to teach letters and numbers, children can develop their visual and auditory processing abilities by recognizing the characters and sounds associated with each letter or number. These digital game-based learning environments show the potential to increase students' interest and confidence in learning mathematics, as well as providing teachers with useful tools to help children with diverse mathematics learning needs (Thai et al., 2022). Additionally, challenging games like puzzles or memory games can also help in improving children's problem-solving abilities and short-term memory.

Game-based learning, especially the use of digital games, can be used as an effective tool to support learning and skill development for children with intellectual disabilities (Dhiyaneshwari, 2023). Apart from that, GBL also encourages children to develop critical and strategic thinking skills. The use of DGBL in early childhood education can have a positive impact on children's learning and thinking skills (Behnamnia et al., 2023). In challenging game situations, they are invited to plan their steps carefully, considering the consequences of each decision they make. This not only improves their ability to solve games but also transfers these critical thinking skills into everyday life, helping them make better decisions and solve problems more effectively. Thus, implementing GBL not only provides a fun learning experience for children but also significantly improves their overall cognitive development. The aim of this research is to look at game-based learning in the cognitive development of early childhood from 2015 to 2023. These findings are discussed in more detail in the following section.



Q1. What are the annual publication trends in the field of game-based learning for early childhood from 2015-2023?

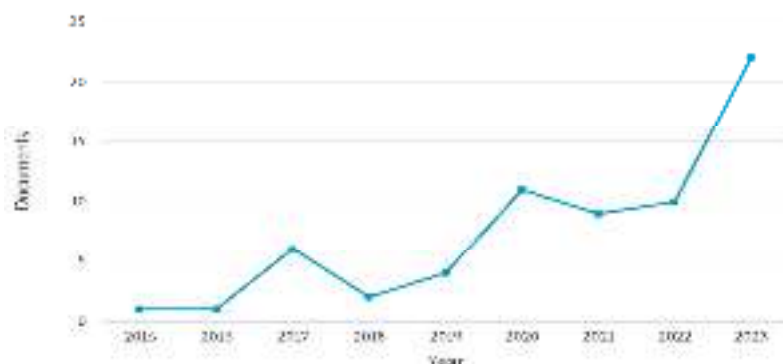


Figure 2. Game-based learning trend graph for early childhood

A total of 66 documents were selected from the SCOPUS (meta) database, all of which were research articles. Analysis of Game-Based Learning (GBL) research trends in early childhood shows a significant growth pattern from 2015 to 2023. In 2015 and 2016, the number of articles published was still low, with only one article for each year. However, starting in 2017, there was a quite sharp increase, with the number of articles published reaching six that year. This growth trend continued into 2018, albeit in slightly lower numbers, with two articles published.

In 2019, there was another increase in the number of articles published, reaching four articles. However, a significant increase occurred in 2020, when the number of published articles increased to eleven, indicating a continued increase in interest in research related to GBL in early childhood. This strong growth trend continued in 2021, with nine articles published. In 2022, the number of published articles reached ten, indicating continued interest in this research. The most striking trend occurred in 2023, when the number of articles published jumped drastically to twenty-two. This reflects increasing recognition of the importance of GBL in early childhood education and increasing interest in exploring its potential.

In conclusion, GBL research trends in early childhood show a significant increase from 2015 to 2023, with the number of publications increasing consistently. This reflects the growing interest in exploring the potential of GBL as an effective educational tool for early childhood. Although there are fluctuations in the number of publications from year to year, general trends indicate that GBL research in early childhood continues to be a relevant and interesting topic for researchers in the field of education.

Furthermore, the distribution of countries with the highest number of published articles about game-based learning for early childhood can be seen in Figure 3.

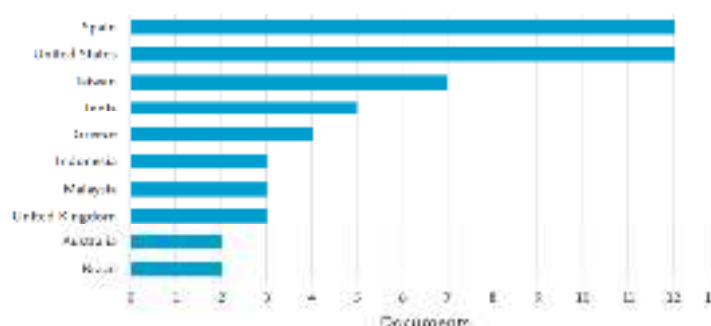


Figure 3. Distribution of Game-based Learning Publications for Early Childhood

Analysis of game-based learning research in early childhood shows that this topic has become a significant research focus in various countries around the world. From the data provided, it can be seen that



developed countries such as Spain and the United States have a high level of research activity with 12 articles each. This reflects the importance of early childhood education in these countries and awareness of the potential of games in enhancing learning in the early stages of life. In addition, countries such as Taiwan, India, and Greece are also involved in this research with a significant number of articles, indicating global attention to the development of effective learning methods for early childhood. However, there are also countries with lower research contributions such as Indonesia, Malaysia, and Australia. This could reflect challenges in resource access or different research priorities in these countries. In conclusion, research on game-based learning in early childhood is an important topic globally, with developed and developing countries alike contributing to developing our understanding of the role of games in children's education.

Q2. Who are the top 10 most influential writers in the field of game-based learning for early childhood based on their citations from 2015-2023?

Based on the 66 documents analyzed, there are the top 10 most influential authors in the field of game-based learning for early childhood based on their citations. More details can be seen in Table 1 below.

Table 1. Top 10 most influential authors

Authors	Title	Year	Cited
Manesis D.	Using a gesture interactive game-based learning approach to improve preschool children's learning performance and motor skills	2016	67
McBride C.; Smith A.; Kalir J.H.	Intrinsic motivation of Chinese learning in predicting online learning self-efficacy and flow experience relevant to students' learning progress	2017	53
González-González C.S.; Del Río N.G.;	Cognitive science in the field: A preschool intervention durably enhances intuitive but not formal mathematics	2017	48
Wilton K.S.; Murphy K.M.; Mahmud A.; Azam S.;	Introducing fundamental object-oriented programming concepts in preschool education within the context of physical science courses	2018	46
Rodríguez-Ferrer J.M.; Manzano-León A.; Aguilar-Parra J.M.	Critically Reviewing GraphoGame Across the World: Recommendations and Cautions for Research and Implementation of Computer-Assisted Instruction for Word-Reading Acquisition	2020	45
Bang H.J.; Li L.; Flynn K.	Does "Measure Up!" measure up? Evaluation of an iPad app to teach preschoolers measurement concepts	2020	24
Jaramillo-Alcázar A.; Arias J.; Alborno I	Games for Teaching Mathematics in Nigeria: What Happens to Pupils' Engagement and Traditional Classroom Dynamics?	2019	21
Espigares-Gámez M.J.; Fernández-Oliveras A.;	Game-based learning and gamification to improve skills in early years education	2020	21
Sarfaty L.; Ben-Eliyahu A.	Video games in the classrooms: Implications of a disruptive innovation to develop the Multiple Intelligences; [Videojuegos en las aulas: Implicaciones de una innovación disruptiva para desarrollar las Inteligencias Múltiples]	2015	20
Magalhães L.F.; Alves R.B.; Cunha L.R.C.	Music learning in preschool with mobile devices	2017	19

Some articles received a significant number of citations, indicating great interest by researchers in the topic. Articles such as "Using a gesture interactive Game-based Learning Approach to Improve Preschool Children's learning performance and Motor Skills" received 67 citations and "Intrinsic Motivation of Chinese



Learning in predicting online Learning Self-efficacy and flow experience relevant to Students' learning progress ” got 53 citations shows the importance of the topic in the academic community.

Q3. What are the documents based on the research subject of game-based learning in early childhood education from 2015 to 2023?

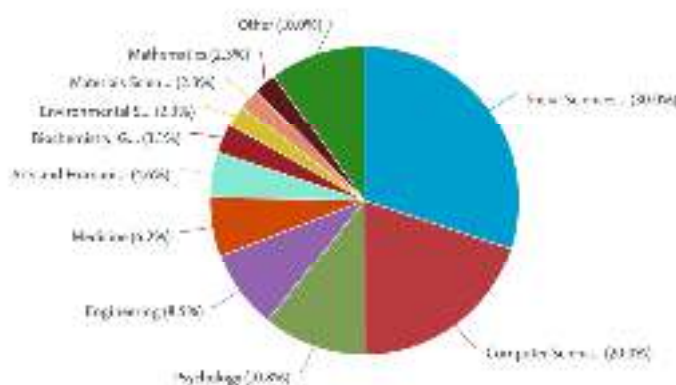


Figure 3. Documents Based on Research Subjects

The data above shows that social sciences have the largest share in related research, reaching 30% of the total articles compiled. This reflects the importance of understanding social and contextual aspects in implementing game-based learning in early childhood education. Furthermore, computer science has a significant contribution with 20%, showing the importance of developing technology and platforms to support game-based learning. The discipline of psychology also has a fairly large share of 10.8%, emphasizing the importance of understanding the cognitive, emotional, and behavioral aspects of children in using games as a learning tool.

Engineering, although not as big as social sciences and computer science, still makes a significant contribution with 8.5%. This reflects an effort to develop technology and design that supports the effectiveness of game-based learning. The medical discipline also made a decent contribution with 6.2%, indicating an interest in understanding the health and child development implications of gaming use in educational contexts. Meanwhile, the disciplines of arts and humanities, biochemistry, genetics, molecular biology, environmental science, materials science, and mathematics make smaller, but still important, contributions in enriching cross-disciplinary understanding of game-based learning in early childhood.

In conclusion, research on game-based learning for early childhood involves varied contributions from various scientific disciplines, emphasizing the importance of cross-disciplinary approaches in understanding and optimizing the use of games as effective learning tools. This confirms that a holistic and collaborative approach from various fields of science is very important in developing best practices in early childhood education through game-based learning.

Q4. What are the benefits of game-based learning research in early childhood education from 2015 to 2023?

Based on the results of a study of 66 articles, there are many benefits shown by game-based learning in early childhood, including:

1) Improved Learning

The research results show that the use of GBL can improve the learning process of early childhood in various contexts, including learning mathematics, language, and science concepts. The use of technology in the form of games can increase children's interest and involvement in their learning process.

2) Cognitive Stimulation



Game-based learning (GBL) can stimulate children's cognitive development, including critical thinking abilities, problem-solving abilities, and creative abilities. The various games and activities in GBL are designed to stimulate various aspects of children's cognitive development.

3) Child-Centered Learning

GBL enables child-centered learning, where the learning experience is personalized according to the child's individual needs and interests. This allows children to learn in a fun and supportive environment.

4) Development of Social and Emotional Skills

Several studies highlight that the use of GBL can also help in the development of children's social and emotional skills, such as cooperation, emotion management, and conflict resolution. Games are often designed to promote social interaction and teamwork.

Q5. The influence of game-based learning on children's cognitive development?

Through the analysis of these articles, it can be concluded that game-based learning (GBL) has great potential to improve the cognitive development of early childhood. GBL can improve learning and learning experiences, both for children and for their educators. The use of GBL can have a positive impact on children's cognitive development, including increased learning motivation, autonomous learning, and understanding of mathematical and language concepts. This shows the importance of integrating technology and innovative approaches in teaching to improve the quality of early childhood education up to the basic education level.

A systematic review shows that GBL can have a positive effect on children's learning, especially in strengthening thinking and learning skills. Additionally, the use of technology, games, and other innovative learning approaches can improve learning outcomes and student engagement in a variety of educational contexts, from early childhood education to higher education. However, to maximize the benefits, it is necessary to pay attention to factors such as teacher support, availability of equipment, child involvement, and adaptation of the curriculum to meet individual learning needs.

4. CONCLUSION

Based on an analysis of various articles regarding the use of game-based learning (GBL) in the cognitive development of early childhood, it can be concluded that this approach has great potential to improve learning in the early stages of children's development. Research results show that GBL can strengthen thinking and learning skills in young children, as well as increase learning motivation and understanding of mathematical and language concepts. Therefore, the use of GBL in early childhood education environments can be an effective strategy in developing their cognitive potential. The first recommendation is the need to integrate technology and innovation in teaching in early childhood education environments. Teachers and educators need to pay attention to the latest technological developments and use them creatively in designing interesting and interactive learning experiences for children. By utilizing GBL, teachers can create a stimulating and enjoyable learning environment for children, thereby increasing their interest and involvement in the learning process.

The second recommendation is the importance of training and support for educators in implementing GBL in the classroom. This training may include an understanding of GBL concepts, utilization of related tools and applications, and effective teaching strategies in the GBL context. In this way, educators will be better prepared to face challenges and maximize the learning potential that can be obtained through this approach. The third recommendation is that there is a need for further in-depth research regarding the effectiveness and implementation of GBL in various early childhood education contexts. This research can cover aspects such as long-term influences on children's cognitive development, curriculum adaptation to meet individual needs, and the role of parents in supporting the use of GBL at home.

The use of game-based learning has great potential to improve the cognitive development of early childhood through interactive, fun, and effective learning. With the right support from educators, technology, and ongoing research, GBL can be an effective solution in improving the quality of early childhood education and preparing them to face future developmental challenges.



5. ACKNOWLEDGMENTS

Pusat Layanan Pendidikan (Puslapdik) and Lembaga Pengelola Dana Pendidikan (LPDP), which are under the Indonesian Ministry of Education, Research and Technology (Kemendikbudristek), funded and supported this research.

REFERENCES

- Allsop, Y., Yildirim, E. Y., & Screpanti, M. (2013). Teachers' beliefs about game based learning: A comparative study of pedagogy, curriculum and practice in Italy, Turkey, and the UK. *Proceedings of the 7th European Conference on Games Based Learning*, 2, 1–10.
- Altun, D. (2019). Investigating Pre-Service Early Childhood Education Teachers' Technological Pedagogical Content Knowledge (TPACK) Competencies Regarding Digital Literacy Skills and Their Technology Attitudes and Usage. *Journal of Education and Learning*, 8(1), 249–263. <https://doi.org/10.5539/jel.v8n1p249>
- Behnamnia, N., Kamsin, A., Ismail, M. A. B., & Hayati, S. A. (2023). A review of using digital game-based learning for preschoolers. *Journal of Computers in Education*, 10(4), 603–636. <https://doi.org/10.1007/s40692-022-00240-0>
- Blackwell, C. K., Lauricella, A. R., Wartella, E., Robb, M., & Schomburg, R. (2013). Adoption and use of technology in early education: The interplay of extrinsic barriers and teacher attitudes. *Computers & Education*, 69, 310–319. <https://doi.org/10.1016/j.compedu.2013.07.024>
- Dalton, G., & Devitt, A. (2019). Gaelige Gaming: Assessing how games can help children to learn Irish. In *Computer-Assisted Language Learning: Concepts, Methodologies, Tools, and Applications* (pp. 1093–1110). IGI Global. <https://doi.org/10.4018/978-1-5225-7663-1.ch052>
- Despeisse, M. (2018). Games and simulations in industrial engineering education: a review of the cognitive and affective learning outcomes. *2018 Winter Simulation Conference (WSC)*, 4046–4057. <https://doi.org/10.1109/WSC.2018.8632285>
- Dhiyaneshwari, R. P. (2023). Understanding the Perspectives and Usability of Digital games for Children with Intellectual Disabilities. *Journal of Applied Engineering and Technological Science (JAETS)*, 5(1), 608–621. <https://doi.org/10.1109/WSC.2018.8632285>
- Divjak, B., & Tomić, D. (2011). The impact of game-based learning on the achievement of learning goals and motivation for learning mathematics-literature review. *Journal of Information and Organizational Sciences*, 35(1), 15–30.
- Doliopoulou, E., & Rizou, C. (2012). Greek kindergarten teachers' and parents' views about changes in play since their own childhood. *European Early Childhood Education Research Journal*, 20(1), 133–147. <https://doi.org/10.1080/1350293X.2012.650016>
- Edwards, S. (2013). Digital play in the early years: A contextual response to the problem of integrating technologies and play-based pedagogies in the early childhood curriculum. *European Early Childhood Education Research Journal*, 21(2), 199–212. <https://doi.org/10.1080/1350293X.2013.789190>
- Fessakis, G., Gouli, E., & Mavroudi, E. (2013). Problem solving by 5–6 years old kindergarten children in a computer programming environment: A case study. *Computers & Education*, 63, 87–97. <https://doi.org/10.1016/j.compedu.2012.11.016>
- Garcia, M. B. (2020). Kinder learns: an educational visual novel game as knowledge enhancement tool for early childhood education. *The International Journal of Technologies in Learning*. <https://doi.org/10.18848/2327-0144/CGP/v27i01/13-34>



- Gee, J. P. (2003). What video games have to teach us about learning and literacy. *Computers in Entertainment (CIE)*, 1(1), 20. <https://doi.org/10.1145/950566.950595>
- Gentry, S. V., Gauthier, A., Ehrstrom, B. L., Wortley, D., Lilienthal, A., Car, L. T., Dauwels-Okutsu, S., Nikolaou, C. K., Zary, N., & Campbell, J. (2019). Serious gaming and gamification education in health professions: systematic review. *Journal of Medical Internet Research*, 21(3), e12994. <https://doi.org/10.2196/12994>
- Gerkushenko, S., & Gerkushenko, G. (2014). The play theory and computer games using in early childhood education. *International Journal of Game-Based Learning (IJGBL)*, 4(3), 47–60. <https://doi.org/10.4018/ijgbl.2014070105>
- Ghoman, S. K., Patel, S. D., Cutumisu, M., von Hauff, P., Jeffery, T., Brown, M. R. G., & Schmölder, G. M. (2020). Serious games, a game changer in teaching neonatal resuscitation? A review. *Archives of Disease in Childhood-Fetal and Neonatal Edition*, 105(1), 98–107. <https://doi.org/10.1136/archdischild-2019-317011>
- Godwin, K. E., Lomas, D., Koedinger, K. R., & Fisher, A. V. (2015). Monster Mischief: Designing a video game to assess selective sustained attention. *International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)*, 7(4), 18–39. <https://doi.org/10.4018/IJGCMS.2015100102>
- Hainey, T., Connolly, T. M., Boyle, E. A., Wilson, A., & Razak, A. (2016). A systematic literature review of games-based learning empirical evidence in primary education. *Computers & Education*, 102, 202–223. <https://doi.org/10.1016/j.compedu.2016.09.001>
- Hatherly, A., Ham, V., & Evans, L. (2009). *Effective learning in early childhood education? The impact of the ECE ICT PL program: A synthesis report*. Wellington: Core Education. Retrieved from <https://www.educationcounts.gov.nz/publications/2009/1/Effective%20learning%20in%20early%20childhood%20education%20-%20The%20impact%20of%20the%20ECE%20ICT%20PL%20program%20-%20A%20synthesis%20report>
- Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, 55, 223–252. <https://doi.org/10.1007/s11423-006-9022-5>
- Hung, H.-T., Chang, J.-L., & Yeh, H.-C. (2016). A review of trends in digital game-based language learning research. *2016 IEEE 16th International Conference on Advanced Learning Technologies (ICALT)*, 508–512. <https://doi.org/10.1109/ICALT.2016.9>
- Ilhmeideh, F. (2009). The role of computer technology in teaching reading and writing: Preschool teachers' beliefs and practices. *Journal of Research in Childhood Education*, 24(1), 60–79. <https://doi.org/10.1080/02568540903439409>
- Ke, F. (2016). Designing and integrating purposeful learning in game play: A systematic review. *Educational Technology Research and Development*, 64, 219–244. <https://doi.org/10.1007/s11423-015-9418-1>
- Koivisto, A., Kiili, K., & Perttula, A. (2011). Designing educational exertion games for young children. *European Conference on Games Based Learning*, 322.
- Konok, V., Liskai-Peres, K., Bunford, N., Ferdinandy, B., Jurányi, Z., Ujfalussy, D. J., Réti, Z., Pogány, Á., Kampis, G., & Miklósi, Á. (2021). Mobile use induces local attentional precedence and is associated with limited socio-cognitive skills in preschoolers. *Computers in Human Behavior*, 120, 106758. <https://doi.org/10.1016/j.chb.2021.106758>
- Lamrani, R., & Abdelwahed, E. H. (2020). Game-based learning and gamification to improve skills in early years education. *Computer Science and Information Systems*, 17(1), 339–356. <https://doi.org/10.2298/CSIS190511043L>



- Lazarinis, F., Alexandri, K., Panagiotakopoulos, C., & Verykios, V. S. (2020). Sensitizing young children on internet addiction and online safety risks through storytelling in a mobile application. *Education and Information Technologies*, 25, 163–174. <https://doi.org/10.1007/s10639-019-09952-w>
- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Annals of Internal Medicine*, 151(4), W-65. <https://doi.org/10.7326/0003-4819-151-4-200908180-00136>
- Lieberman, D. A., Fisk, M. C., & Biely, E. (2009). Digital games for young children ages three to six: From research to design. *Computers in the Schools*, 26(4), 299–313. <https://doi.org/10.1080/07380560903360178>
- Liu, Z.-M., Chen, C.-Q., Fan, X.-L., Lin, C.-C., & Ye, X.-D. (2022). Usability and effects of a combined physical and cognitive intervention based on active video games for preschool children. *International Journal of Environmental Research and Public Health*, 19(12), 7420. <https://doi.org/10.3390/ijerph19127420>
- Lonigan, C. J., Driscoll, K., Phillips, B. M., Cantor, B. G., Anthony, J. L., & Goldstein, H. (2003). A computer-assisted instruction phonological sensitivity program for preschool children at risk for reading problems. *Journal of Early Intervention*, 25(4), 248–262. <https://doi.org/10.1177/105381510302500402>
- Manesis, D. (2018). Obstacles to games-based learning in early childhood education: Cyprus teachers' perceptions. *Proceedings of the 17th European Conference on E-Learning*, 1, 361–369.
- Mouws, K., & Bleumers, L. (2015). Co-creating games with children: A case Study. *International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)*, 7(3), 22–43. <https://doi.org/10.4018/IJGCMS.2015070102>
- Nikolopoulou, K., Akriotou, D., & Gialamas, V. (2019). Early reading skills in English as a foreign language via ict in greece: early childhood student teachers' perceptions. *Early Childhood Education Journal*, 47, 597–606. <https://doi.org/10.1007/s10643-019-00950-8>
- Paul, J. (2022). THE EFFICACY OF STRUCTURED SPATIAL SKILLS VIDEO GAME FOR CHILDREN-PARENTS AND PHYSIOTHERAPIST PERSPECTIVE. *Suranaree Journal of Science & Technology*, 29(6).
- Prensky, M. (2008). Students as designers and creators of educational computer games: Who else? *British Journal of Educational Technology*, 39(6), 1004–1019. https://doi.org/10.1111/j.1467-8535.2008.00823_2.x
- Qian, M., & Clark, K. R. (2016). Game-based Learning and 21st century skills: A review of recent research. *Computers in Human Behavior*, 63, 50–58. <https://doi.org/10.1016/j.chb.2016.05.023>
- So, H.-J., & Seo, M. (2018). A systematic literature review of game-based learning and gamification research in Asia: The synthesized findings and research gap. *Routledge International Handbook of Schools and Schooling in Asia*. <https://doi.org/10.4324/9781315694382-37>
- Squire, K., & Jenkins, H. (2003). Harnessing the power of games in education. *Insight*, 3(1), 5–33.
- Subhash, S., & Cudney, E. A. (2018). Gamified learning in higher education: A systematic review of the literature. *Computers in Human Behavior*, 87, 192–206. <https://doi.org/10.1016/j.chb.2018.05.028>
- Tan, A. J. Q., Lau, C. C. S., & Liaw, S. Y. (2017). Paper title: Serious games in nursing education: An integrative review. *2017 9th International Conference on Virtual Worlds and Games for Serious Applications (VS-Games)*, 187–188. <https://doi.org/10.1109/VS-GAMES.2017.8056599>
- Tang, J. T. (2020). A study of Taiwanese children's learning and preferences in game-based learning scenarios. *E-Learning and Digital Media*, 2042753020980124. <https://doi.org/10.1177/2042753020980124>



- Thai, K.-P., Bang, H. J., & Li, L. (2022). Accelerating early math learning with research-based personalized learning games: A cluster randomized controlled trial. *Journal of Research on Educational Effectiveness*, 15(1), 28–51. <https://doi.org/10.1080/19345747.2021.1969710>
- Tokac, U., Novak, E., & Thompson, C. G. (2019). Effects of game-based learning on students' mathematics achievement: A meta-analysis. *Journal of Computer Assisted Learning*, 35(3), 407–420. <https://doi.org/10.1111/jcal.12347>
- VerenIkIna, I., HerrIngton, J., Peterson, R., & Mantei, J. (2010). Computers and play in early childhood: Affordances and limitations. *Journal of Interactive Learning Research*, 21(1), 139–159.
- Wouters, P., & Van Oostendorp, H. (2013). A meta-analytic review of the role of instructional support in game-based learning. *Computers & Education*, 60(1), 412–425. <https://doi.org/10.1016/j.compedu.2012.07.018>
- Yien, J.-M., Hung, C.-M., Hwang, G.-J., & Lin, Y.-C. (2011). A game-based learning approach to improving students' learning achievements in a Nutrition course. *Turkish Online Journal of Educational Technology-TOJET*, 10(2), 1–10.
- Zapata-Cáceres, M., Martín-Barroso, E., & Román-González, M. (2021). Collaborative game-based environment and assessment tool for learning computational thinking in primary school: a case study. *IEEE Transactions on Learning Technologies*, 14(5), 576–589. <https://doi.org/10.1109/TLT.2021.3111108>
- Zevenbergen, R., & Logan, H. (2008). Computer use by preschool children: Rethinking practice as digital natives come to preschool. *Australasian Journal of Early Childhood*, 33(1), 37–44. <https://doi.org/10.1177/183693910803300107>



ANALYSIS OF HIGH SCHOOL STUDENTS' LITERACY USING THE PISA FRAMEWORK

Shofa Nabilah^{1*}, Muslim², Lilit Rusyati¹

¹Science Education, Faculty of Mathematics and Science Education, Universitas Pendidikan Indonesia, Indonesia

²Physics Education, Faculty of Mathematics and Science Education, Universitas Pendidikan Indonesia, Indonesia

*shofanabilah@upi.edu

ABSTRACT

The aim of this research is to describe the literacy profiles, including science literacy, mathematical literacy, and reading literacy, among 9th-grade junior high school students and 10th-grade high school students. This study utilizes a descriptive method involving 104 respondents, with data collected through literacy tests based on PISA questions. The results of the research indicate that the average score for overall student literacy achievement is 56.2%. The average score for science literacy is 46.4%, for mathematical literacy is 40.6%, and for reading literacy is 67.9%. The students' science and mathematical literacy abilities are categorized as moderate, while their reading literacy ability is categorized as high. Based on the data obtained, students' overall literacy achievement in science, mathematics, and language is still within the moderate category. The low literacy abilities are caused by students' difficulty in interpreting graphs and tables in science literacy, as well as students' struggles with formulation skills in mathematical literacy. In reading literacy, students lack the ability to read and explore reading materials. Another factor is that students are not accustomed to working on literacy test questions, and evaluation tools have not led to literacy development.

Keywords: *students' literacy, science literacy, mathematical literacy, reading literacy, PISA framework*

1. INTRODUCTION

Scientific literacy has become a widely used term as an important characteristic that every citizen should possess in modern society (Hidayah et al., 2019). In the 21st century, an essential aim of education is to equip students to confront various facets of global existence (Nuryanti et al., 2023). Given the substantial challenges encountered by society, alterations are necessary in the educational framework to furnish students with the requisite components of 21st-century skills (Pratiwi et al., 2019). One of the skills needed is literacy. Literacy is not merely about reading and writing, but involves thinking skills that make individuals literate in learning, including in science education (Armas et al., 2019). Scientific literacy entails comprehending scientific principles and methodologies, and employing scientific knowledge to address challenges (Kartika et al., 2017). According to the Program for International Student Assessment (PISA), scientific literacy is the ability to apply scientific knowledge, identify questions, and determine conclusions based on scientific evidence to understand and make decisions regarding nature and its changes due to human activities. PISA monitors the system outcomes from the perspective of student achievement in each participating country, encompassing three literacies: reading literacy, mathematical literacy, and scientific literacy. PISA assessments are conducted every three years. Each cycle focuses on one of these three major domains of study, though two other domains are also included in the assessment. The focal subject was science in 2006 and 2015, mathematics in 2003, 2012, and 2022 and reading in 2000, 2009 and 2018. The fact that the reading skills are chosen as the focal subject means that PISA 2018 results focus on reading skills rather than mathematics and science literacy. The general aim of PISA is to assess the extent to which students have acquired the appropriate skills in reading, mathematics, and science to make significant contributions to their societies (Khoirudin et al., 2017).

Understanding scientific concepts is crucial for students to comprehend various aspects of the environment, contemporary society, technology, health, and economics (Nuryanti et al., 2023). The ability of students to engage in mathematical literacy is equally important as it requires them to be proficient in formulating, applying, and interpreting various mathematical contexts in life (Nisa & Faradiba, 2023). In order to be successful in science and mathematics, students must first read and understand the text and symbols well, and interpret what they read. Therefore, reading literacy also important for students. Reading literacy involves comprehending,



assessing, utilizing, and interacting with written material to engage with society, accomplish personal objectives, and cultivate knowledge and capabilities (Koyuncu & Firat, 2020). Reading literacy refers to the capacity to comprehend and utilize written language forms essential in society or esteemed by individuals. Proficiency in literacy equips students to confront real-life challenges more effectively and prepares them comprehensively for the demands of 21st-century education (Hassanzadeh & Nikkhoo, 2016). However, in reality, currently students' literacy abilities are still low.

The Organization for Economic Cooperation and Development (OECD) through PISA in 2022 the results of the PISA study of the literacy abilities of Indonesian students from 2000 to 2022 are presented in Table 1. The average achievement scores across various aspects of student literacy still fall within the score range of 359 – 403.

Table 1. Literacy Score of Indonesia from 2000 - 2022

Mean performance	Mathematics	Reading	Science
PISA 2000		371	
PISA 2003	360	382	
PISA 2006	391	393	393
PISA 2009	371	402	383
PISA 2012	375	396	382
PISA 2015	386	397	403
PISA 2018	379	371	396
PISA 2022	366	359	383

Table 1 indicates that the average literacy score of Indonesian students between 2000 and 2022 remains lower than the average score of countries participating in PISA. This suggests that Indonesian students have not yet mastered scientific concepts and processes, nor have they been able to apply their acquired knowledge effectively in their daily lives (Pratiwi et al., 2019). Students also lack in formulating, applying, and interpreting various mathematical contexts in life. There is also a deficiency in students' achievement in reading comprehension. This is also supported by research Ardianto and Rubini (2016) regarding the results of research on students' scientific literacy, students' scientific literacy scores are quite low, an average of 30% overall. The average achievement of student science literacy as a whole was 28.31% in the study (Hidayah et al., 2019). Research by Nuryanti et al. (2023) also found that the average scientific literacy score was 31.58%, falling into the low category.

There are several factors influencing the low level of students' scientific literacy according to Hidayah. These factors include: firstly, the low scientific literacy skills of students may stem from the conventional nature of science learning habits which neglect the importance of reading and writing scientific texts as essential competencies for students. Secondly, students' ability to interpret graphs/tables presented in questions is limited. Students are accustomed to merely filling in tables provided by teachers, thus their ability to interpret graphs/tables is also restricted. Thirdly, students are not accustomed to working on scientific literacy test questions. Fourthly, students do not grasp the basic concepts taught by teachers (Hidayah et al., 2019). The inadequate scientific literacy skills of Indonesian students stem from various factors including the curriculum and educational system, teachers' selection of teaching models and methods, as well as the availability of learning facilities and teaching materials (Anisa et al., 2021; Nuryanti et al., 2023). The low contribution of science education to the success of citizens is due to the detachment of science education from social contexts, emphasis solely on content mastery, and the use of inappropriate assessments, thus preparing citizens only to acquire knowledge. In education, students should understand the relevance of science education to everyday life and community living (Mawardini et al., 2015).



The findings suggest that overall, the literacy levels of Indonesian students are still low, and there are many factors influencing this. Therefore, efforts to improve science education in schools are necessary. Improvement efforts in the quality of education at schools should be supported by accurate information on the extent of students' literacy achievements. Several previous studies have examined students' literacy achievements. Research conducted by Hidayah et al. (2019) on 9th grade junior high school students found that the average achievement of student science literacy as a whole was 28.31%. Nuryanti et al. (2023), in her study, also found that the average scientific literacy score was 31.58% in the low category among 8th grade junior high school students. The mathematical literacy skills of junior high school students investigated by Khoirudin et al. (2017) revealed that students are still in the level 1 category, indicating low mathematical abilities. Mathematical literacy was also examined by Nisa and Faradiba (2023), whose research findings indicated that students with low-level problem-solving abilities could not meet the indicators of mathematical literacy, while students with moderate-level problem-solving abilities did not fully complete the indicators of mathematical literacy.

From previous research, scientific literacy achievement has been more extensively studied, as has mathematical literacy. However, there is still very little discussion regarding reading literacy. Nevertheless, in order to be successful in science and mathematics, the reader must first read and understand the text and symbols well and interpret what they read. Therefore, reading literacy is equally important for students. Hence, this research will address students' literacy in all three aspects: scientific literacy, mathematic literacy, and reading literacy.

2. METHODS

The research method used in this study was descriptive research. Descriptive research aims to provide a systematic, factual, and accurate portrayal of the characteristics of a population or a specific area. Descriptive research does not involve manipulation or alteration of independent variables but rather describes a condition as it is (Creswell, 2012). The population in this study is high school students in Sumedang Regency. The total sample consisted of 104 students, comprising 71 9th grade junior high school students and 33 10th grade high school students.

The instrument used is a literacy test instrument in the form of a multiple-choice test consisting of 24 items. The items are taken from the PISA tests from the years 2015, 2018, and 2022. The data obtained in this research are the results of the literacy test. Data analysis of literacy skills is carried out using the following scoring steps.

The science literacy questions used to measure students' science literacy are multiple-choice questions. The scoring system was carried out with scoring rules giving a score of 1 if the answer is correct and a score of 0 if the answer is incorrect

To determine the value, data obtained from test results that have been scored were then converted into grades. Convert scores to grades using the formula:

$$\text{value} = \frac{\text{score of students}}{\text{Score maximal}} \times 100$$

The value of science literacy achievement obtained was then interpreted based on the criteria presented in Table 2.

Table 2. Science Literacy Achivement Criteria

Range of Values	Criterion
67 - 100	High
33 - 66	Moderate
< 33	Low

(Nuryanti et al., 2023)



3. RESULTS & DISCUSSION

The data analysis shows literacy scores in science literacy based on PISA 2015, reading literacy based on PISA 2018, and mathematical literacy based on PISA 2022 among high school students. The three literacy aspects, the highest score is in reading literacy followed by science literacy, and the lowest score is in mathematical literacy. The average literacy achievement can be seen in Figure 1.

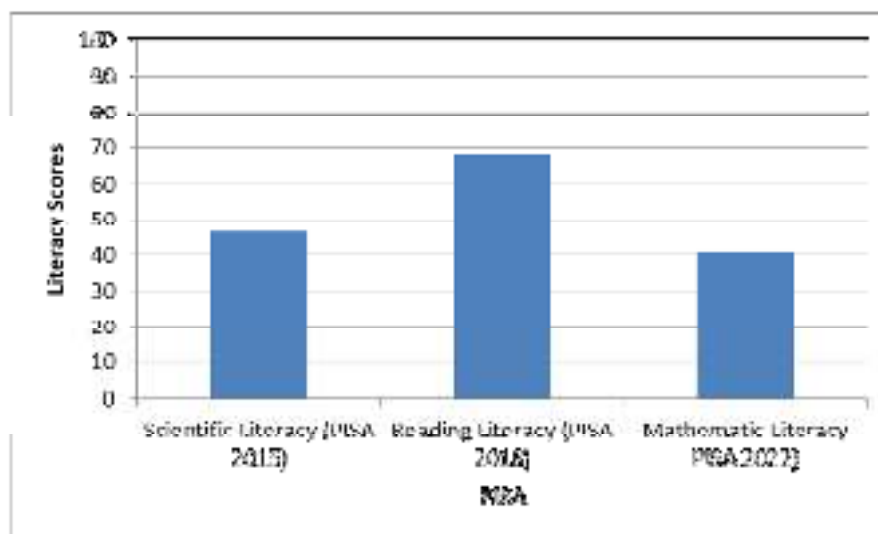


Figure 1. The Achievement of Literacy Scores Among High School Students.

Based on Figure 1, reading literacy obtains a score of 67.9, science literacy is 46.4, and mathematical literacy is 40.6. In terms of literacy achievement criteria, reading literacy falls into the high category, while science and mathematics literacy fall into the medium category. The result of this research different with previous research, research by Nuryanti et al. (2023) found that the average of scientific literacy score was 31.58% in the low category among 8th grade junior high school students. The data distribution in the literacy test results can be seen in Table 3.

Table 3. Students Literacy Test Result

Range of Literacy Scores	Number of Students (%)	Average (%)
67 - 100	26.0	56.2 (moderate)
33 - 66	69.2	
< 33	4.8	

The result of data analysis in Table 3 show that the description of the literacy profile in high school students (9th and 10th grades) can be categorized into the low group at 4.8%, the medium category at 69.2% and the high category at 26.0%. Based on the literacy scores achieved, students are in moderate category with an average score of 56.2%. Based on literacy score that have been obtained, it can be seen that there is still a need to increase to high category. Additionally, regarding the specific aspect of science literacy, it can be observed in Table 4.

Table 4. Students Science Literacy Test Result

Range of Literacy Scores	Number of Students (%)	Average (%)
67 - 100	12.5	46.4



Range of Literacy Scores	Number of Students (%)	Average (%)
33 - 66	72.1	(moderate)
< 33	15.4	

According to the data analysis presented in Table 4, the science literacy profile description of high school students (9th and 10th grades) can be classified as follows: 15.4% into the low category, 72.1% into the medium category, and 12.5% into the high category. Based on the science literacy scores achieved, students are in moderate category with an average score of 46.4%. Although the results fall into the medium category, in this science literacy aspect most students lack competence in interpreting data and evidence scientifically, even at the medium or low levels. Many students struggle to interpret data presented in the form of graphs and tables. This deficiency aligns with Hidayah et al. (2019) that students' ability to interpret graphs/tables presented in questions is limited. Also the inadequate proficiency in scientific literacy among students arises from their incapacity to address scientific literacy queries, which involve comprehending and analyzing the questions (Nuryanti et al., 2023). Considering the science literacy scores obtained, it is evident that there is a necessity to enhance them to reach the high category. Furthermore, specific aspects of reading literacy can be seen in Table 5.

Table 5. Students Reading Literacy Test Result

Range of Literacy Scores	Number of Students (%)	Average (%)
67 - 100	70.2	67.9 (high)
33 - 66	24.0	
< 33	5.8	

The result presented in Table 5 show that the description of the reading literacy profile in high school students (9th and 10th grades) can be categorized into the low group at 5.8%, the medium category at 24.0% and the high category at 70.2%. Based on the literacy scores achieved, students are in high category with an average score of 67.9%. In reading literacy, 70.2% of students fall within the score range of 67 - 100. The high category is also attributed to the majority of questions and students' answer being at level 1. This is consistent with the reading literacy ability of Indonesian students, which is only at level 1, while other OECD countries place the reading literacy level at level 3 (Shara et al., 2021). According to Shara et al. (2021) proficiency in reading literacy is fundamental and serves as a prerequisite for mastering other literacy skills. It demands students to exhibit strong concentration, enabling them not only to read fluently but also comprehend the information and meaning conveyed within the text. The low reading literacy can be caused by students' ability to explore when reading textbooks, reading interdisciplinary, and the ability to read in class are quite lacking (Husna et al., 2016). Therefore, reading literacy among students must be continually improved. Additionally, specific aspects of mathematical literacy can be seen in Table 6.

Table 6. Students' Mathematic Literacy Test Result

Range of Literacy Scores	Number of Students (%)	Average (%)
67 - 100	14.4	40.6 (moderate)
33 - 66	32.7	
< 33	52.9	



The result of data analysis in Table 6 show that the description of the mathematic literacy profile in high school students (9th and 10th grades) can be categorized into the low group at 52.9%, the medium category at 32.7% and the high category at 14.4%. Based on the mathematic literacy scores achieved, students are in moderate with an average score of 40.6 %. Although falling into the medium category, the distribution of students obtaining scores below 33 is quite substantial, reaching 52.9%. In this aspect of mathematical literacy, most students still struggle to reach level 2, facing difficulty when confronted with questions requiring formulation skills. Similar to the previous research, that the mathematical literacy skills of junior high school students investigated by Khoirudin et al. (2017) revealed that students are still in the level 1 category. Also according to Kastberg et al. (2015) for mathematical literacy, 69% of students can reach levels 1-4 and only 1% can reach the highest level 5. Based on mathematics literacy score that have been obtained, it can be seen that there is still a need to increase to high category.

4. CONCLUSION

Based on the results of the students' literacy, it can be concluded that the average score for overall student literacy achievement is 56.2% that indicate moderate category. The average score for science literacy is 46.4%, for mathematical literacy is 40.6%, and for reading literacy is 67.9%. The students' science and mathematical literacy abilities are categorized as moderate, while their reading literacy ability is categorized as high. Although categorized as moderate, there are still students from each literacy aspect who fall into the low category, with scores below 33, especially in mathematical literacy. Low literacy abilities are caused by students' difficulty in interpreting graphs and tables in science literacy, as well as students' struggles with formulation skills in mathematical literacy. In reading literacy, students lack the ability to read and explore reading materials. Another factor is that students are not accustomed to working on literacy test questions, and evaluation tools have not led to literacy development. The advice the author offers for further research is for other researchers to develop literacy instruments so that students become accustomed to literacy questions. Additionally, it is necessary to develop teaching materials that help students understand and apply science easily in everyday life.

5. ACKNOWLEDGMENTS

The researcher expresses gratitude to the respondents who willingly took part in this study.

REFERENCES

- Anisa, A. R., Ipungkarti, A. A., & Saffanah, K. N. (2021). Pengaruh Kurangnya Literasi serta Kemampuan dalam Berpikir Kritis yang Masih Rendah dalam Pendidikan di Indonesia. *Conference Series Journal*, 01(01), 1–12.
- Ardianto, D., & Rubini, B. (2016). Comparison of Students' Scientific Literacy in Integrated Science Learning through Model of Guided Discovery and Problem based Learning. *Jurnal Pendidikan IPA Indonesia*, 5(1), 31–37. <https://doi.org/10.15294/jpii.v5i1.5786>
- Armas, A. R. K., Ramlawati, R., & Syahrir, M. (2019). Hubungan antara Literasi Sains dengan Prestasi Belajar Peserta Didik pada Pembelajaran Kimia Kelas XI MIPA SMA Negeri Se-Kota Makassar. *Chemistry Education Review (CER)*, 2(1), 1–15.
- Creswell, J. W. (2012). *Educational Research Planning, Conducting, and Evaluating Quantitative and Qualitative Research* (M. Buchholtz (ed.); Fourth Ed.). Pearson Education, Inc., <https://www.ptonline.com/articles/how-to-get-better-mfi-results>
- Hassanzadeh, S., & Nikkhoo, F. (2016). Reading Literacy Development of Deaf Students in Special School in



- Iran. *International Journal of Special Education*, 31, 1–143.
- Hidayah, N., Rusilowati, A., & Masturi, M. (2019). Analisis Profil Kemampuan Literasi Sains Siswa SMP/MTs di Kabupaten Pati. *Phenomenon*, 09(1), 10–20.
- Husna, I. N., Mulyani, S., & Rahman, S. (2016). *Readign Literacy, Mathematical Literacy, and Self-Confidence of Junior High School Students in Singkawang*. 5(2), 253–262.
- Kartika, I., Kurniasih, S., & Pursitasari, I. D. (2017). Pengembangan Bahan Ajar Berbasis Socio-Scientific Issues pada Materi Bioteknologi untuk Meningkatkan Literasi Sains Siswa. *Journal of Science Education And Practice*, 1–12.
- Kastberg, D., Chan, J., Murray, G., & Gonzales, P. (2015). Performance of U.S. 15-Year-Old Students in Science, Reading, and Mathematics Literacy in an International Context. *National Center for Education Statistics*, 1–42. <https://files.eric.ed.gov/fulltext/ED570968.pdf>
- Khoirudin, A., Styawati, R. D., & Nursyahida, F. (2017). Profil Kemampuan Literasi Matematika Siswa Berkemampuan Matematis Rendah dalam Menyelesaikan Soal Berbentuk Pisa. *AKSIOMA: Jurnal Matematika Dan Pendidikan Matematika*, 8(2), 33–42.
- Koyuncu, İ., & Fırat, T. (2020). Investigating Reading Literacy in PISA 2018 Assessment. *International Electronic Journal of Elementary Education*, 13(2), 263–275. <https://doi.org/10.26822/iejee.2021.189>
- Mawardini, A., Permanasari, A., & Sanjaya, Y. (2015). Profil Literasi Sains Siswa SMP pada Pembelajaran IPA Terpadu Tema Pencemaran Lingkungan. *Prosiding Seminar Nasional Fisika (E-Journal) SNF 2015, IV(1996)*, 49–56. <http://snf-unj.ac.id/kumpulan-prosiding/snf2015/>
- Nisa, F., & Faradiba, S. S. (2023). Profil Literasi Matematis Peserta Didik Berdasarkan Level Kemampuan Pemecahan Masalah Soal PISA. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 7(2), 1003–1019. <https://doi.org/10.31004/cendekia.v7i2.2211>
- Nuryanti, T., Pursitasari, I. D., & Rubini, B. (2023). Science Literacy Profile of Junior High School Students on Climate Change Material. *Jurnal Penelitian Pendidikan IPA*, 9(11), 9391–9396. <https://doi.org/10.29303/jppipa.v9i11.5208>
- Pratiwi, S. N., Cari, C., & Aminah, N. S. (2019). Pembelajaran IPA abad 21 dengan Literasi Sains Siswa. *Jurnal Materi Dan Pembelajaran Fisika*, 9, 34–42.
- Shara, M. A., Andriani, D., Ningsih, A. W., & Kisno. (2021). Correlating Reading Literacy and Writing Literacy. *Journal of English Education*, 1.



COMPARISON OF CONTINUOUS TIME MARKOV CHAIN (CTMC) SIRS AND SIQRS EPIDEMIC MODEL SIMULATION RESULTS ON THE SPREAD OF MONKEYPOX DISEASE

Safitri Febriana Opsarini^{1*}, Respatiulan², Muhammad Bayu Nirwana³

^{1,2,3}Sebelas Maret University, Indonesia

*safitriefbriana1485@student.uns.ac.id

ABSTRACT

The uncontrolled spread of infectious diseases over a long period of time can cause epidemic. The pattern of spread of an infectious disease can be described through a mathematical model called an epidemic model. The development of the SIR epidemic model which assumes that recovered individuals have temporary immunity so that they can be re-infected is called the SIRS epidemic model. Quarantine is an effort to restrict movement to prevent the transmission of disease among individuals in a society. The SIQRS epidemic model is a modification of the SIRS model which assumes a quarantine phase for infected individuals. The SIQRS epidemic model that follows the Markov process and changes in the number of individuals are viewed in continuous time is the SIQRS continuous time Markov chain (CTMC) epidemic model. Monkeypox or monkeypox is an infectious disease that has hit several countries in Central and West Africa. The aims of this research are to explain the CTMC SIQRS epidemic model and compare the simulation results between the CTMC SIQRS and CTMC SIRS epidemic models on the spread of monkeypox. The research's method is literature study by discussing relevant theories and previous research. The results of this research are the CTMC SIQRS model in the form of transition probabilities. The simulation of CTMC SIRS epidemic model on the spread of monkeypox shows that the end of epidemic occur at $t = 8768.42$ days = 24 years, whereas in the CTMC SIQRS model, the end of epidemic occur at $t = 1046.98$ days = 2.8 years. Therefore, it was concluded that the quarantine phase can speed up the end of the epidemic.

Keywords: Epidemic Model, CTMC, SIQRS, SIRS, Monkeypox

1. INTRODUCTION

Infectious diseases are diseases that can be transmitted from infected individuals to healthy individuals through direct or indirect contact (Notoatmodjo, 2003). The uncontrolled spread of infectious diseases for a long period of time can cause epidemic. An epidemic is the emergence of an infectious disease in a certain population, within a certain time period, with a high rate of spread and causing many losses (Kemenkes RI, 2022). The pattern of spread of an infectious disease can be described through a mathematical model called an epidemic model (Kasbawati, 2011).

The SIR epidemic model was initially introduced in 1927 by Kermack and Mckendrick. The population in this epidemic model is divided into three groups including susceptible (S), infected (I), and recovered (R). The disease transmission in the SIR epidemic model occurs when individuals in the susceptible group come into contact with infected individuals. Once individuals become infected, they remain in the infectious group for a period of time before recovering. After recovering, they will have a permanent level of immunity. The development of the SIR epidemic model which assumes that recovered individuals have temporary immunity so that they can be re-infected is called the SIRS epidemic model (Ma & Li, 2009).

A quarantine is an effort to restrict the movement of exposed and infected individuals to prevent disease transmission in society (Hossain et al., 2020). The purposes of quarantine are to restrict the movement of people who have been exposed to an infectious disease and periodically monitor whether they are likely to become



infected. According to The Law of the Republic of Indonesia Number (No). 11 of 2018 concerning health quarantine, a quarantine process for individuals who have been infected and need health services is called isolation. The SIQRS epidemic model is a modification of the SIRS model which assumes a quarantine phase for infected individuals (Fatimatuazzahroh et al., 2021).

Epidemic models can be viewed deterministically or stochastically. The stochastic epidemic model is formulated as a stochastic process from a collection of random variables and the result is a probability distribution (Allen, 2008). In the stochastic epidemic model, the spread of disease is seen as a random process. Epidemic models that are reviewed stochastically and follow the Markov process are continuous-time Markov chain (CTMC) and discrete-time Markov chain (DTMC). The CTMC epidemic model reviews changes in the number of individuals in each group over continuous time.

The research conducted by Fatimatuazzahroh et al. (2021) discusses the CTMC SIQRS epidemic model and its application in understanding the spread of tuberculosis disease. In this research, the quarantine phase for infected individuals is symbolized by Q . The results of this research are transition probabilities for the CTMC SIQRS epidemic model and numerical simulations. Based on numerical simulations, it is known that increasing the quarantine rate will reduce the estimated time of disease extinction, R_0 and m (the expected value of the number of infected individuals).

Another example of an infectious disease is monkeypox. Monkeypox is an infectious disease that has hit several countries in Central Africa (Democratic Republic of Congo, Cameroon, and Gabon) and West Africa (Nigeria, Liberia, and Benin). This disease is caused by a virus from the *Poxviridae* family called *monkeypox* virus (MPXV). This virus was first discovered in 1958 in captive monkeys in Copenhagen (Husna & Wicaksono, 2020). In 1970, the first case of this disease was reported in the Democratic Republic of Congo affecting a nine-month-old toddler with a history of never having received the smallpox vaccine (Budiarto et al., 2023). Since 2003, several cases of monkeypox have been reported outside Africa, such as America, England, Israel, and Singapore. Transmitted by citizens of endemic countries who traveled abroad or through the import of wild animals. Many cases of monkeypox reemerged in early May 2022 across several countries in North America and Europe. The number of cases of monkeypox increased every week until June 23, 2022, when this disease was declared a global health emergency by the World Health Organization (Amato et al., 2022). As of September 10, 2023, there were 90,302 cases of monkeypox with 157 deaths reported (Mathieu et al., 2022).

The transmission from human to human can occur through direct or indirect contact (World Health Organization, 2023). Direct transmission occurs through physical contact with an infected individual. The virus can spread through lesions on the skin or body fluids (droplets). In general, symptoms that appear in exposed individuals include skin rashes, fever, muscle aches, sore throat, headache, and backache. These symptoms usually appear 1 to 21 days following exposure and may persist for 2 to 4 weeks.

The spread of monkeypox can be controlled by tracing contact between infected individuals and the people around them (Budiarto et al., 2023). Restricting movement for individuals who have contact with infected individuals and implementing isolation for infected individuals will reduce the rate of transmission. A specific vaccine to prevent monkeypox infection has not yet been found. However, the smallpox vaccine is believed to have a cross-protective effect against the monkeypox virus so it can be used in monkeypox. Smallpox vaccination was The vaccination of smallpox officially stopped in 1979 by WHO after global success in eradicating the disease. However, in 2007, a new smallpox vaccine called ACAM2000 was produced (Britannica, 2024). Stopping smallpox vaccination for a long period is thought to result in decreased immunity against the smallpox virus and other viruses in the same genus such as monkeypox virus.



Similar to smallpox, monkeypox infection stimulates the human immune system to generate antibodies that can offer long-term protection against possible reinfection (Musumeci et al., 2023). In addition, the cross-immunity reaction in the smallpox vaccine has an 85% success rate in preventing monkeypox infection and can last for years. However, based on research conducted by Musumeci et al. (2023), several cases of monkeypox reinfection were found to be reported in 2022 with varying time periods after the first infection. Two cases occurred in Milan, one case in Geneva, Paris, and London. The five cases occurred in men in their 30s who had a history of having gay-sex after recovering from the first infection. Musumeci et al. (2023) stated that these cases reveal that long-term natural immunity does not appear to guarantee avoidance of reinfection. However, research on reinfection with monkeypox is still being carried out due to the small number of reinfection cases (Carstens, 2023).

The research conducted by Peter et al. (2022) discusses the SEICR-SEI deterministic epidemic model on the spread of monkeypox in Nigeria. In this research, there is a quarantine phase denoted by "C" for individuals who are infected and require medical care. The numerical simulation results indicate that high contact rates potentially result in a higher number of individuals becoming infected. Therefore, contact between susceptible individuals and infected individuals must be controlled by considering quarantine factors.

This research discusses the CTMC SIQRS stochastic epidemic model and compares the simulation results of CTMC SIQRS and CTMC SIRS epidemic models on the spread of monkeypox.

2. METHODS

The research's method is a literature study by discussing epidemic models, monkeypox disease, and theories relevant to the problems in this research through various references such as journals, articles, books, and other sources. This research aims to explain the continuous-time Markov chain susceptible-infected-quarantined-recovered-susceptible (CTMC SIQRS) epidemic model and to compare the simulation results of CTMC SIRS and CTMC SIQRS epidemic models on the spread of monkeypox. The following are several steps implemented in this research.

1. Explaining the CTMC SIRS and CTMC SIQRS epidemic model.
 - a. Explaining the phenomenon of disease spread on the CTMC SIRS and CTMC SIQRS epidemic model.
 - b. Determining the assumptions of the CTMC SIRS and CTMC SIQRS epidemic model.
 - c. Determining the parameters and random variables of the CTMC SIRS and CTMC SIQRS epidemic model.
 - d. Determining the transition probability of the CTMC SIRS and CTMC SIQRS epidemic model.
2. Simulating and interpreting CTMC SIRS and CTMC SIQRS epidemic models on the spread of monkeypox.
 - a. Determining the parameter values of transmission rate (β), recovery rate without quarantine (ϵ), quarantine rate (δ), recovery rate with quarantine (α) and rate of return to susceptibility (γ).
 - b. Determining the population size N and the initial values of each group $S(0)$, $I(0)$, $Q(0)$, $R(0)$.
 - c. Determining the number of individuals in each group at each time t by generating random numbers with uniform distribution.
 - d. Interpreting and comparing simulation results of the CTMC SIRS and CTMC SIQRS epidemic models on the spread of monkeypox.



3. RESULTS & DISCUSSION

a. Continuous Time Markov Chain (CTMC)

A stochastic process $\{X(t) : t \in T\}$ is a collection of random variables X indexed by t , which represents time or another index parameter (Taylor & Karlin, 1998). The collection of possible values of the random variable X in a stochastic process is called the state space, usually denoted by S . The time index and the state space in a stochastic process can be a continuous or discrete.

A stochastic process is called a Markov process when given the value $X(t)$, the value $X(s)$ is not influenced by $X(u)$ for $u < t < s$. In other words, the probability of states in the future depends only on the current state and is not influenced by states in the past. A Markov process $\{X(t)\}$ with a discrete state space $S = \{0, 1, 2, \dots\}$ and continuous time index $T = [0, \infty)$ is called continuous time Markov chain (CTMC). Let n is integer in the time index set $T = \{t_0, t_1, t_2, t_3, \dots, t_{n-1}, t_n, t_{n+1}\}$ and the state space $S = \{i_0, i_1, i_2, \dots, i_{n-1}, i, j\}$, therefore :

$$P\{X(t_0) = i_0, X(t_1) = i_1, \dots, X(t_{n-1}) = i_{n-1}, X(t_n) = i\} = P\{X(t_n) = i\} \quad (1)$$

b. CTMC SIRS epidemic model

The spread of disease can occur when susceptible individuals come into contact with infected individuals, causing the individual to become infected with the disease. After a certain period of time, infected individuals will recover and have immunity to the disease. Immunity to a disease can be temporary or permanent. Permanent immunity is long-term, so there is little chance of re-infection. Meanwhile, temporary immunity is short-term. The body's defense ability against disease only lasts in a short time and will decrease over time, so that the body will become susceptible to disease again. Epidemic models that consider the existence of temporary immunity are called SIRS epidemic models (Ma & Li, 2009). The following are the assumptions used in the SIRS epidemic model.

1. The population size is constant, meaning that no individuals enter or leave the population.
2. Populations are homogeneous, meaning that each individual in the population has the same probability of being infected.
3. Death rates and birth rates are ignored.
4. There is only one type of disease that spreads in the population.
5. Recovered individuals have temporary immunity so they can become susceptible individuals again and have the potential to be infected again.

The population in the SIRS epidemic model is categorized into three groups including susceptible group (S), infected group (I), and recovered group (R). The spread of disease in the SIRS epidemic model occurs if there is a transmission of individuals from the susceptible to the infected group with a contact rate of β , from the infected to the recovered group with a natural recovery rate of ε , and from the recovered to the susceptible group with a contact rate of γ . The pattern diagram of the SIQRS epidemic model is shown in Figure 1.

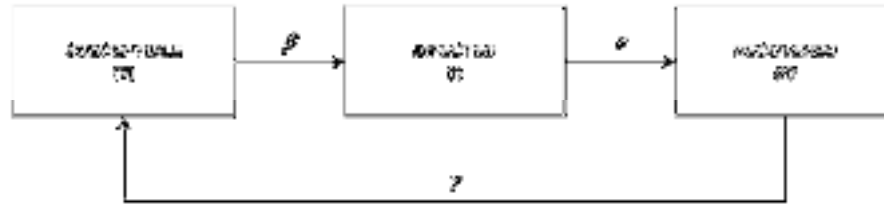


Figure 1. Diagram pattern of the SIRS epidemic model

According to Koepke et al., (2016), the CTMC SIRS epidemic model is the transition probability of individuals in the susceptible, infected, and recovered groups at time to t . SIRS epidemic model have population assumptions N constant with three random variables $S(t)$, $I(t)$, and $R(t)$, so that the total population is $N = S(t) + I(t) + R(t)$. The number of individuals in the susceptible, infected, and recovered groups at each time t are $S(t) = s$, $I(t) = i$, and $R(t) = r$. Therefore, based on Koepke et al., (2016), CTMC SIRS epidemic model can be written in equation (2).

$$\begin{aligned}
 P_{(s+j,i+k,r+l),(s,i,r)}(\Delta t) &= \left\{ \beta \frac{i}{N} s \Delta t + o(\Delta t) \right\} (j, k, l) = (-1, 1, 0) \epsilon i \Delta t + o(\Delta t) (j, k, l) \\
 &= (0, -1, 1) \gamma r \Delta t + o(\Delta t) (j, k, l) \\
 &= (1, 0, -1) 1 - \left[\beta \frac{i}{N} s + \epsilon i + \gamma r \right] \Delta t + o(\Delta t) (j, k, l) = (0, 0, 0) o(\Delta t) \text{ lainnya}
 \end{aligned}
 \tag{2}$$

c. CTMC SIQRS epidemic model

SIQRS epidemic model is a modification of the SIRS epidemic model with the quarantine phase (Fatimatuzzahroh et al., 2021). The main cause of disease outbreaks in a population is due to contact between infected individuals who have not carried out quarantine and susceptible individuals (Agustianingsih et al., 2020). Therefore, the SIRS epidemic model emerged with the quarantine assumption called the SIQRS epidemic model. The pattern of disease spread in the SIQRS epidemic model is not much different from the SIRS epidemic model. The difference lies in the way infected individuals recover. In the SIQRS epidemic model, infected individuals can recover from the disease in two ways, through the quarantine phase or without going through the quarantine phase. The assumptions from the SIRS epidemic model are used in this model, but there are two additional assumptions as follows:.

1. Infected individuals can recover in two ways, by going through the quarantine phase or without going through the quarantine phase.
2. Infected individuals who quarantine cannot infect susceptible individuals.

The population in the SIQRS epidemic model is categorized into four groups including susceptible group (S), infected group (I), quarantined group (Q), and recovered group (R). The spread of disease in the SIQRS epidemic model occurs if there is transmission of individuals from the susceptible to the infected group with a contact rate of β , from the infected to the recovered group with a natural recovery rate of ϵ , from



the infected to the quarantined group with a quarantine rate of δ , from the quarantined to the recovered group with a recovery rate with quarantine of α , and from the recovered to the susceptible group with a contact rate of γ . The pattern diagram of the SIQRS epidemic model is shown in Figure 2.

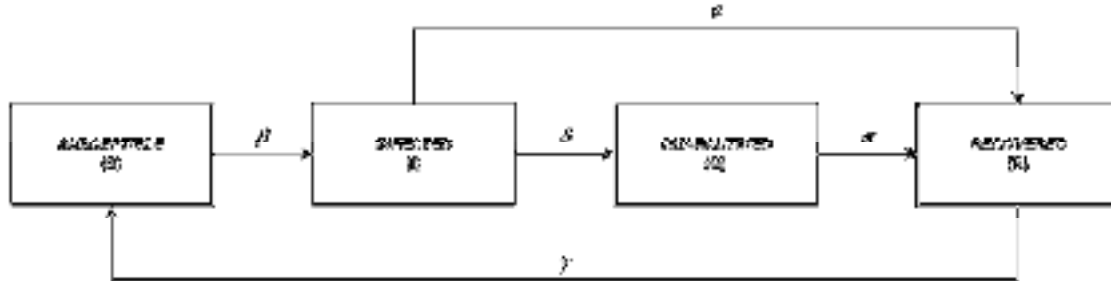


Figure 2. Diagram pattern of the SIQRS epidemic model

The CTMC SIQRS epidemic model is the transition probability of individuals in the susceptible, infected, quarantined and recovered groups over time t . SIQRS epidemic model have population assumptions N constant with four random variables $S(t), I(t), Q(t)$ and $R(t)$, so that the total population is $N = S(t) + I(t) + Q(t) + R(t)$. The number of individuals in the susceptible, infected, quarantined and recovered groups at each time t is $S(t) = s, I(t) = i, Q(t) = q$, and $R(t) = r$. The joint probability function of $S(t), I(t), Q(t)$ and $R(t)$ can be written in equation (3).

$$P_{(s,i,q,r)}(t) = P[S(t) = s, I(t) = i, Q(t) = q, R(t) = r] \quad (3)$$

The movement of individuals from one group to another at time t causes a change in state which is called a transition. The change in the number of susceptible individuals in the time interval Δt is j . The change in the number of infected individuals in the time interval Δt is k . The change in the number of quarantined individuals in the time interval Δt is l . The change in the number of recovered individuals in the time interval Δt is m . Therefore, the transition probability of state s to state $s + j$, from state i to state $i + k$, from state q to state $q + l$, from state r to state $r + m$ in the time interval Δt can be written in equation (4)

$$\begin{aligned} P_{(s+j,i+k,q+l,r+m),(s,i,q,r)}(\Delta t) &= P\{(S(t + \Delta t), I(t + \Delta t), Q(t + \Delta t), R(t + \Delta t)) \\ &= (s + j, i + k, q + l, r + m) | (S(t), I(t), Q(t), R(t) = (s, i, q, r))\} \end{aligned} \quad (4)$$

The change in state (s, i, q, r) become state $(s - 1, i + 1, q, r)$ shows that there is a transition of one individual from the susceptible to the infected group. The contact rate or transmission rate from the susceptible to the infected group is β and s is the number of susceptible individuals. If i is the number of infected individuals in population N , then the probability that the number of individuals in the infected group who can make contact with individuals in the susceptible group is equal to $\frac{i}{N}$. Therefore, the transition probability of state (s, i, q, r) become state $(s - 1, i + 1, q, r)$ can be written in equation (5).



$$P_{(s-1,i+1,q,r),(s,i,q,r)}(\Delta t) = \beta \frac{i}{N} s \Delta t + o(\Delta t) \quad (5)$$

The change in state (s, i, q, r) become state $(s, i - 1, q + 1, r)$ shows that there is a transition of one individual from the infected to the quarantined group. This is caused by infected individuals who are quarantined to prevent interactions with susceptible individuals. The quarantine rate from the infected to the quarantined group is δ and the number of infected individuals is i , then the transition probability of the state (s, i, q, r) become state $(s, i - 1, q + 1, r)$ can be written in equation (6).

$$P_{(s,i-1,q+1,r),(s,i,q,r)}(\Delta t) = \delta i \Delta t + o(\Delta t) \quad (6)$$

The change in state (s, i, q, r) become state $(s, i - 1, q, r + 1)$ shows that one individual moves from the infected to the recovered group. This is caused by individuals who have recovered from an illness naturally without going through a quarantine phase. The natural recovery rate from the infected group to the recovered group is ε and the number of individuals in the infected group is i , then the transition probability of the state (s, i, q, r) become state $(s, i - 1, q, r + 1)$ can be written in equation (7).

$$P_{(s,i-1,q,r+1),(s,i,q,r)}(\Delta t) = \varepsilon i \Delta t + o(\Delta t) \quad (7)$$

The change in state (s, i, q, r) become state $(s, i, q - 1, r + 1)$ shows that there is a transition of one individual from the quarantined to the recovered group. This is caused by individuals who have recovered from an illness after going through the quarantine phase. The recovery rate with quarantine from the quarantined group to the recovered group is α and the number of quarantined individuals is q , then the probability of transition from state (s, i, q, r) become state $(s, i, q - 1, r + 1)$ can be written in equation (8).

$$P_{(s,i,q-1,r+1),(s,i,q,r)}(\Delta t) = \alpha q \Delta t + o(\Delta t) \quad (8)$$

The SIQRS epidemic model assumes that recovered individuals have temporary immunity, so that they can become susceptible individuals again. The change in state (s, i, q, r) become state $(s + 1, i, q, r - 1)$ shows that one individual moves from the recovered to the susceptible group. The rate of recovered individuals become susceptible individuals is γ and the number of individuals in the recovered group is r , then the transition probability of the state (s, i, q, r) become state $(s + 1, i, q, r - 1)$ can be written in equation (9).

$$P_{(s+1,i,q,r-1),(s,i,q,r)}(\Delta t) = \gamma r \Delta t + o(\Delta t) \quad (9)$$

When there is no change in state or no individual moves from one group to another, it can be said that state (s, i, q, r) remain become state (s, i, q, r) . Therefore, the transition probability of the state (s, i, q, r) become state (s, i, q, r) can be written in equation (10).



$$P_{(s,i,q,r),(s,i,q,r)}(\Delta t) = 1 - \left[\beta \frac{i}{N} s + \delta i + \varepsilon i + \alpha q + \gamma r \right] \Delta t + o(\Delta t) \quad (10)$$

The transition of an individual from one state to another occurs within a very small time interval, therefore, only one individual can make the transition at a time. The probability of more than one or equal to two individuals transitioning at one time is very small, approaching zero. Therefore, the probability that there are more than one or equal to two individuals transitioning within the Δt time interval is $o(\Delta t)$ where $\frac{o(\Delta t)}{\Delta t} = 0$. Based on equations (5) – (10), the transition probability of the CTMC SIQRS epidemic model can be written in equation (11).

$$\begin{aligned} P_{(s+j,i+k,q+l,r+m),(s,i,q,r)}(\Delta t) &= \left\{ \beta \frac{i}{N} s \Delta t + o(\Delta t) \right\} (j, k, l, m) \\ &= (-1, 1, 0, 0) \delta i \Delta t + o(\Delta t) (j, k, l, m) = (0, -1, 1, 0) \varepsilon i \Delta t + o(\Delta t) (j, k, l, m) \\ &= (0, -1, 0, 1) \alpha q \Delta t + o(\Delta t) (j, k, l, m) = (0, 0, -1, 1) \gamma r \Delta t + o(\Delta t) (j, k, l, m) \\ &= (1, 0, 0, -1) 1 - \left[\beta \frac{i}{N} s + \delta i + \varepsilon i + \alpha q + \gamma r \right] \Delta t + o(\Delta t) (j, k, l, m) \\ &= (0, 0, 0, 0) o(\Delta t) \text{ lainnya} \end{aligned} \quad (11)$$

- d. Interpreting and comparing simulation results of the CTMC SIQRS and SIRS epidemic models on the spread of monkeypox.

Application of the CTMC SIQRS and SIRS epidemic model simulations on the spread of monkeypox using parameters β , ε , δ , and α referring to the Peter et al., (2022). In the research conducted by Peter et al., (2022), parameter values were estimated based on cumulative data on monkeypox cases in Nigeria from January – December 2019. The parameters used based on the research Peter et al., (2022) included $\beta = 61 \times 10^{-6}$, $\varepsilon = 242 \times 10^{-6}$, $\delta = 1369 \times 10^{-6}$ and $\alpha = 99 \times 10^{-6}$.

The parameters for the rate of re-infected individuals in the susceptible group (γ) were estimated based on data cases of monkeypox re-infection from Britannica (2024) in four countries, Italy, France, England and Switzerland, where in these four countries there were reinfected cases or repeated infections after the first infection. Two cases occurred in Milan (Raccagni et al., 2023), and one case each occurred in Paris (Zeggagh et al., 2023), London (Golden et al., 2023) and Geneva (Musumeci et al., 2023). These five cases occurred in 2022. The estimated results of the rate of return of individuals in vulnerable groups from the four countries were averaged and a value was obtained $\gamma = 15 \times 10^{-7}$. The population size is assumed to be constant $N = 100$ at the initial values $S(0) = 90$, $I(0) = 10$, $Q(0) = 0$, and $R(0) = 0$. The simulation result of CTMC SIRS on the spread of monkeypox is shown in Figure 3.

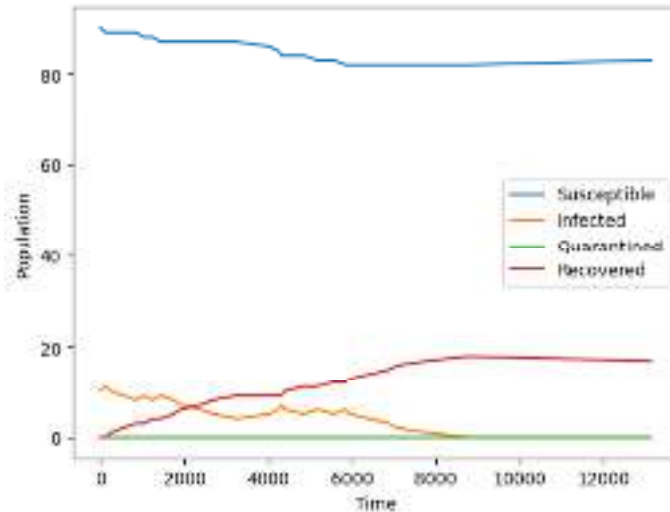


Figure 3. Simulation results of the CTMC SIRS epidemic model

Figure 3. shows that the number of individuals in the infected group decreased slowly over time until it reached the zero line at the time of $t = 8768.42$ day. Meanwhile, the number of individuals in the susceptible group decreased, although not significantly. This is caused by the presence of individuals in the susceptible group who are infected with the disease. On the other hand, the number of individuals in the recovered group has increased slowly since the initial time due to the presence of individuals in the infected group who have recovered from the disease and moved to the recovered group. Therefore, it can be inferred that the monkeypox epidemic ended on $t = 8768.42$ days when there were no infected individuals. Meanwhile, the simulation result of CTMC SIQRS on the spread of monkeypox is shown in Figure 4.

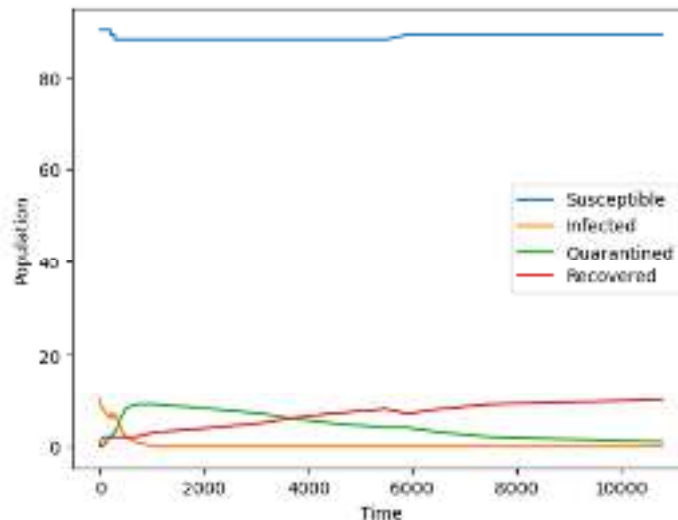


Figure 4. Simulation results of the CTMC SIQRS Epidemic Model

The simulation result in Figure 4 show that the number of susceptible individuals decrease at time $t = 202.18$ and $t = 281.50$ because there is two individual who is infected. At time $t = 5902.81$, the graph



increases because there is one individual who loses immunity and becomes susceptible again. After that, the graph of susceptible individual tend to be stable at 89 until the end of the observation time.

The number of individuals in the infected group has decreased significantly since the beginning of time until it reaches zero at $t = 1046.98$ due to the movement of infected individuals to quarantined and recovered groups. There is a little increased over time $t = 202.18$ and $t = 281.50$ because of the movement from the susceptible group to the infected group. Furthermore, the number of infected individuals undergoing quarantine increased at the beginning until it reached a peak at that time $t = 671.25$ and then slowly decreased again until it approached zero because there were individuals who recovered from the disease.

The number of individuals in the recovered group increased slowly from the beginning until $t = 10796.64$, it is because there were individu in the infected and quarantined groups who recovered from monkeypox. Based on the simulation results, it can be concluded that the monkeypox epidemic ended on $t = 1046.98$ days when there were no infected individuals.

From Figure 3 and Figure 4, it can be inferred that the quarantine phase helps accelerate the decline in the number of infected individuals so that the epidemic ends more quickly. In the CTMC SIQRS model the epidemic ends on $t = 1046.98$ days = 2.8 years, while in the CTMC SIRS model the epidemic ends on the $t = 8768.42$ days = 24 years. This is caused by the large rate of quarantine resulting in the movement of individuals from the infected group to the quarantined group. Infected individuals who undergo quarantine are assumed not to have had contact with individuals in the susceptible group, so they cannot transmit the disease.

4. CONCLUSION

In conclusion, it can be inferred that the CTMC SIRS and CTMC SIQRS epidemic models can be denoted in the form of transition probabilities shown in equations (2) and (11). The CTMC SIQRS and SIRS epidemic models can be applied to the spread of monkeypox. In the CTMC SIQRS epidemic model it is concluded that the epidemic ends at $t = 1046.98$ days = 2.8 years, whereas in the CTMC SIRS model the epidemic ends at $t = 8768.42$ days = 24 years. Quarantine can prevent contact between infected individuals and susceptible individuals so that disease transmission does not occur. Therefore, the number of infected individuals is decreasing and the pandemic will end sooner.

REFERENCES

- Agustianingsih, S., Reorita, R., & Renny, R. (2020). Optimal control for SIR Model with The Influence of Vaccination, Quarantine and Immigration factor. *Jurnal Matematika, Statistika Dan Komputasi*, 16(3), 311. <https://doi.org/10.20956/jmsk.v16i3.6942>
- Allen, L. J. S. (2008). An Introduction to Stochastic Epidemic Models. In F. Brauer, P. van den Driessche, & J. Wu (Eds.), *Mathematical Epidemiology. Lecture Notes in Mathematics* (Vol. 1945, pp. 81–130). Springer. https://doi.org/10.1007/978-3-540-78911-6_3
- Amato, M., Spirito, F. Di, Boccia, G., Fornino, D., D'Ambrosio, F., & Caro, F. De. (2022). Human Monkeypox: Oral Implications and Recommendations for Oral Screening and Infection Control in Dental Practice. *Journal of Personalized Medicine*, 12(2), 2000.
- Britannica. (2024). *Smallpox*. Britannica. <https://www.britannica.com/editor/The-Editors-of-Encyclopaedia-Britannica/4419>



- Budiyarto, L., Sabila, A. A., & Putri, H. C. (2023). Infeksi Cacar Monyet (MONKEYPOX). *Jurnal Medika Hutama*, 4(2). <http://jurnalmedikahutama.com>
- Carstens, A. (2023). *Five Men Appear to Have Acquired Mpox Twice. The Body*. <https://www.thebody.com/article/five-men-mpox-twice>
- Fatimatuzzahroh, F., Sumarno, H., & Sianturi, P. (2021). An Analysis of CTMC Stochastic Models with Quarantine on the Spread of Tuberculosis Diseases. *Journal of Mathematical and Fundamental Sciences*, 53(1), 31–48. <https://doi.org/10.5614/j.math.fund.sci.2021.53.1.3>
- Golden, J., Harryman, L., Crofts, M., Muir, P., Donati, M., Gillett, S., & Irish, C. (2023). Case of apparent mpox reinfection. *Sexually Transmitted Infections*, 99(4), 283–284. <https://doi.org/10.1136/sextrans-2022-055736>
- Hossain, M. M., Sultana, A., & Purohit, N. (2020). Mental health outcomes of quarantine and isolation for infection prevention: A systematic umbrella review of the global evidence. *Epidemiology and Health*, e2020038. <https://doi.org/10.4178/epih.e2020038>
- Husna, F., & Wicaksono, A. (2020). Informasi tentang penyakit infeksi Cacar Monyet (Monkeypox) yang menyerang manusia. *Jurnal Farmaka*, 18(1).
- Kasbawati. (2011). Analisis Numerik Model Epidemiologi SIR dengan Faktor Difusi. *Jurnal Matematika, Statistika, & Komputasi*, 7(2), 98–107.
- Kemenkes RI. (2022, August 5). *Pandemi ke Endemi Covid-19*. https://Yankes.Kemkes.Go.Id/View_artikel/1112/Pandemi-Ke-Endemi-Covid-19#:~:Text=2.%20Epidemi%20adalah%20penyakit%20menular,Suatu%20di%20area%20geografis%20tertentu
- Koepke, A. A., Longini, Jr., I. M., Halloran, M. E., Wakefield, J., & Minin, V. N. (2016). Predictive modeling of cholera outbreaks in Bangladesh. *The Annals of Applied Statistics*, 10(2). <https://doi.org/10.1214/16-AOAS908>
- Ma, Z., & Li, J. (2009). *Dynamical Modeling and Analysis of Epidemics*. WORLD SCIENTIFIC. <https://doi.org/10.1142/6799>
- Mathieu, E., Spooner, F., Dattani, S., Ritchie, H., & Roser, M. (2022). *Mpox (Monkeypox)*. Our World in Data. <https://ourworldindata.org/monkeypox>
- Musumeci, S., Najjar, I., Amari, E. B. El, Schibler, M., Jacquerioz, F., Yerly, S., Renzoni, A., Calmy, A., & Kaiser, L. (2023). A Case of Mpox Reinfection. *Clinical Infectious Diseases*, 77(1), 135–137. <https://doi.org/10.1093/cid/ciad147>
- Notoatmodjo, S. (2003). *Ilmu Kesehatan Masyarakat : Prinsip - Prinsip Dasar* (Vol. 10). Rineka Cipta.
- Peter, O. J., Kumar, S., Kumari, N., Oguntolu, F. A., Oshinubi, K., & Musa, R. (2022). Transmission dynamics of Monkeypox virus: a mathematical modelling approach. *Modeling Earth Systems and Environment*, 8(3), 3423–3434. <https://doi.org/10.1007/s40808-021-01313-2>
- Peter, O. J., Oguntolu, F. A., Ojo, M. M., Olayinka Oyeniyi, A., Jan, R., & Khan, I. (2022). Fractional order mathematical model of monkeypox transmission dynamics. *Physica Scripta*, 97(8). <https://doi.org/10.1088/1402-4896/ac7ebc>
- Raccagni, A. R., Canetti, D., Mileto, D., Tamburini, A. M., Candela, C., Albarello, L., Bracchitta, F., Mancon, A., Micheli, V., Gismondo, M. R., Castagna, A., & Nozza, S. (2023). Two individuals with potential monkeypox virus reinfection. *The Lancet Infectious Diseases*, 23(5), 522–524. [https://doi.org/10.1016/S1473-3099\(23\)00185-8](https://doi.org/10.1016/S1473-3099(23)00185-8)
- Taylor, H. M., & Karlin, S. (1998). *An Introduction to Stochastic Modeling, Third Edition* (3rd ed.). Academic Press Limited.
- World Health Organization. (2023). *Mpox (Monkeypox)*. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/monkeypox>



Zeggagh, J., Ferraris, O., Salmona, M., Tarantola, A., Molina, J.-M., & Delaugerre, C. (2023). Second clinical episode of hMPX virus in a man having sex with men. *The Lancet*, 401(10388), 1610. [https://doi.org/10.1016/S0140-6736\(23\)00509-3](https://doi.org/10.1016/S0140-6736(23)00509-3)



UTILIZATION OF DIGITAL-BASED LEARNING MEDIA IN THE INDEPENDENT CURRICULUM IN ELEMENTARY SCHOOLS

Ilham Ifliadi¹, Suhaidi², Imam Prasetyo³, Lola Ineswenty Mendrofa⁴, Elida Susianing Hendrawati⁵
^{1,2,3,4,5}Universitas Jambi, Indonesia
*ilhamifliadi98@gmail.com

ABSTRACT

The utilization of digital-based learning media in elementary schools is becoming increasingly important in supporting the implementation of the Free Curriculum. Digital media such as interactive multimedia, e-learning, instructional videos, augmented reality (AR), and virtual reality (VR) have the potential to enhance active student participation, facilitate contextual and meaningful learning, and develop 21st-century skills. However, its implementation faces challenges such as limited technological infrastructure, educator skill shortages, lack of quality content, and insufficient stakeholder support.

This research deeply examines the utilization of digital-based learning media in the Free Curriculum at Indonesian elementary schools, identifies influencing factors, and proposes optimization strategies. The method used is a literature review by analyzing and synthesizing information from relevant literature sources. The research results show that optimizing the utilization of digital media requires a comprehensive approach, including infrastructure development, educator training, provision of quality content, stakeholder collaboration, supportive policies, adequate funding, and the implementation of best practices. This research contributes to the development of effective implementation strategies to support the use of digital media in elementary school learning and to achieve the goals of the Free Curriculum in creating meaningful learning processes and developing 21st-century skills.

Keywords: Digital Learning Media, Free Curriculum, Elementary School

1. INTRODUCTION

Learning media is one of the crucial components in the teaching and learning process. Learning media serves as a tool used by educators to deliver subject matter to students. The appropriate use of learning media can help enhance motivation for learning, facilitate information delivery, and create a more interactive and engaging learning environment (Ylsan & Kamal, 2022). In the current digital era, the advancement of information and communication technology (ICT) has brought significant changes to the world of education, including the use of learning media.

The progress of ICT has enabled the creation of various digital-based learning media that can be integrated into the teaching and learning process. Digital-based learning media encompass various types of media such as interactive multimedia, e-learning, educational applications, instructional videos, and others. These media utilize digital technology such as computers, the internet, mobile devices, and sophisticated software to present subject matter in a more engaging, interactive, and efficient manner (Fransisca, et.al, 2023).

One of Indonesia's new concepts in the education sector is the Merdeka Curriculum. The Merdeka Curriculum is a new policy from the Ministry of Education and Culture aimed at giving schools the freedom to develop a curriculum that suits the needs and characteristics of students as well as the local environment (Kemendikbud, 2021). The Merdeka Curriculum emphasizes a student-centered learning approach and integrates the use of digital technology in learning (Kemendikbud, 2021).

In the context of the Merdeka Curriculum, the utilization of digital-based learning media is highly relevant and important. Digital-based learning media can facilitate a learner-centered approach to teaching, create a more interactive and engaging learning environment, and assist learners in developing 21st-century skills such as digital literacy, collaboration, and self-directed learning (Kemendikbud, 2021).



At the elementary school level, the use of digital-based learning media has great potential to enhance the quality of learning. Learners at the elementary school age tend to have a strong curiosity, are easily attracted to new things, and enjoy learning that involves visual and interactive elements as stated by Lestari, et.al. (2022). Rachmawati, et.al (2023) stated that digital-based learning media such as interactive multimedia, educational applications, and instructional videos can capture the interest and attention of learners, as well as help them understand abstract concepts through visualization and simulation.

However, the utilization of digital-based learning media in elementary schools also faces several challenges and obstacles. Rohim & Rigianti (2023) stated that one of the main challenges is the availability of adequate technological infrastructure, such as computers, mobile devices, and stable internet access. Additionally, other factors such as educators' skills in using digital technology, availability of resources and adequate training, and support from schools and the government are also challenges that need to be addressed (Sukardi, et.al, 2023).

Nevertheless, if these challenges can be overcome, the utilization of digital-based learning media in elementary schools can provide many benefits. Some benefits that can be obtained include increasing learners' motivation, facilitating more interactive and meaningful learning, and helping learners develop 21st-century skills such as digital literacy, collaboration, and self-directed learning. Moreover, Rohim & Rigianti (2023) stated that the use of digital-based learning media can also support the implementation of the Merdeka Curriculum by providing rich and diverse learning resources for learners.

Several previous studies have examined the utilization of digital-based learning media in the context of education, but few have focused on the elementary school level and its relation to the Merdeka Curriculum. Research conducted by Nenotek, et.al (2023) and Rezeki, et.al (2023) examined the factors influencing the use of technology in education in developing countries, including Indonesia. Their research findings indicated that the availability of technological infrastructure, educators' skills, and government support are key factors determining the success of technology integration in education.

Another study conducted by Farida, et.al (2023) examined the challenges and opportunities in the use of ICT in schools in developing countries. This research emphasized the importance of human resource capacity, supportive policies, and collaboration among stakeholders to ensure effective ICT utilization in education.

Although these studies provide valuable insights, there are still gaps that have not been extensively explored, especially in the context of the utilization of digital-based learning media in elementary schools in Indonesia and its relation to the Merdeka Curriculum. Therefore, this research aims to thoroughly examine the utilization of digital-based learning media in the Merdeka Curriculum in elementary schools in Indonesia.

The main objectives of this research are to identify the types of digital-based learning media used in elementary schools, analyze the factors influencing their utilization, and evaluate the impact of using digital-based learning media on the quality of education and the achievement of the goals of the Merdeka Curriculum. This research is expected to provide valuable insights for stakeholders in the education sector, such as the government, schools, educators, and parents, about the importance of utilizing digital-based learning media in elementary schools and strategies that can be employed to optimize their usage.

Furthermore, this research is also expected to contribute to the development of theory and practice in the use of digital-based learning media within the context of the Merdeka Curriculum. The findings of this research can serve as the basis for the development of more effective policies, training programs, and implementation strategies to support the utilization of digital-based learning media in elementary schools across Indonesia.

By optimizing the utilization of digital-based learning media, it is hoped that the quality of education in elementary schools can be enhanced, and the primary goals of the Merdeka Curriculum in creating meaningful, enjoyable learning experiences and developing 21st-century skills can be achieved. This research is important and urgent to support the government's efforts in realizing the vision of quality education that is relevant to the changing times.



2. RESEARCH METHODS

This research will use the literature review method to thoroughly examine the utilization of digital-based learning media in the Merdeka Curriculum in elementary schools in Indonesia. The literature review method involves collecting, reading, analyzing, and synthesizing information from various relevant literary sources, such as books, scientific journals, research reports, and trustworthy online sources.

The steps to be taken in this literature review method include:

1. Identifying and collecting relevant literary sources on the research topic, such as books, journals, research reports, and online sources.
2. Reading and critically analyzing the content of literary sources to understand the concepts, findings, and perspectives related to the utilization of digital-based learning media in the Merdeka Curriculum in elementary schools.
3. Synthesizing and integrating information from various literary sources to identify patterns, similarities, and differences among existing findings.
4. Criticizing and evaluating the strengths and weaknesses of the literary sources used, as well as identifying gaps or areas that still require further research.
5. Drawing comprehensive conclusions and recommendations based on the analysis and synthesis of literary sources.

In conducting the literature review, this research will utilize various literary sources such as textbooks, scientific journals, research reports, dissertations, and relevant and trustworthy online sources. Literary sources will be systematically traced through searches in academic databases, digital libraries, and scholarly search engines.

3. RESULTS AND DISCUSSIONS

Types of Digital-Based Learning Media in Elementary Schools

a) Interactive Multimedia

Interactive multimedia is one of the most widely used types of digital-based learning media in elementary schools. Interactive multimedia combines various media elements such as text, images, audio, video, and animations into one interactive digital application. Learners can interact directly with interactive multimedia, control the flow of learning, explore content, and receive real-time feedback. Educational apps, educational games, and simulations are some examples of interactive multimedia commonly used in elementary schools. Educational apps are specifically designed to deliver specific learning materials, such as apps for learning to read, count, or recognize shapes and colours. Educational games combine game elements with learning content, making the learning process more enjoyable and engaging for learners. Meanwhile, simulations allow learners to experience specific situations or environments virtually, such as science simulations, space travel simulations, or natural resource management simulations. Interactive multimedia has characteristics that appeal to elementary school learners, such as attractive visual displays, interactive sounds and animations, and enjoyable game elements. Learners can learn while playing, explore concepts concretely, and actively engage in the learning process.

b) E-Learning

E-learning, or electronic learning, is a type of digital-based learning media that utilizes internet and web technology. In elementary schools, e-learning can be implemented in the form of online courses, virtual classes, or Learning Management Systems (LMS). Online courses provide learning materials in digital format that



learners can access independently via the internet. Virtual classes allow direct interaction between teachers and learners online, such as through video conferences or virtual discussion rooms. Meanwhile, an LMS is a platform that integrates various features such as content delivery, assignments, assessments, and communication between teachers and learners. E-learning in elementary schools is generally used as a supplement or support to classroom learning, rather than a complete replacement. With e-learning, learners can access learning materials anytime and anywhere as long as they are connected to the internet. This provides flexibility and convenience for learners to review materials covered in class or expand their knowledge independently.

c) Instructional Videos

Instructional videos are visual media that present information in audio and visual formats simultaneously. In elementary schools, instructional videos can include recorded lectures or presentations by teachers, step-by-step tutorials, or animations explaining specific concepts. Instructional videos have the advantage of visualizing abstract concepts or processes that are difficult to explain with words alone. For example, animated videos can explain the process of photosynthesis in plants or the water cycle more concretely and engagingly for learners. Tutorial videos can also help learners understand the steps involved in an activity, such as conducting science experiments or creating artworks. In the context of learning in elementary schools, instructional videos can be used as support to explain concepts, trigger discussions, or assign tasks to learners. Instructional videos can also be accessed independently by learners outside of class hours, allowing them to review materials they may not have fully understood or expand their knowledge.

d) Augmented Reality (AR) and Virtual Reality (VR)

Augmented Reality (AR) and Virtual Reality (VR) are modern technologies that are beginning to be used in the field of education, including in elementary schools. AR combines virtual objects with the real environment, while VR creates a fully immersive virtual environment. In elementary schools, AR and VR can be used to visualize abstract or difficult-to-observe concepts. For example, AR can be used to display three-dimensional models of the human body or the solar system, while VR can create simulations of natural environments or trips to places that are difficult to reach physically. AR and VR provide more interactive, immersive, and contextual learning experiences for learners. They can explore virtual objects or environments, interact with elements within them, and gain a deeper understanding of the concepts being learned.

e) Characteristics and Examples of Use in Elementary Schools

Each type of digital-based learning media has different characteristics and potentials in supporting the teaching and learning process in elementary schools. Interactive multimedia is suitable for providing engaging and interactive learning experiences, while e-learning offers flexibility and easy access for learners. Instructional videos help visualize abstract concepts, while AR and VR create immersive and contextual learning environments. In practice, teachers in elementary schools can combine various types of digital-based learning media according to learning objectives, learner characteristics, and resource availability. For example, teachers can use interactive multimedia or educational apps to introduce basic concepts, then utilize instructional videos to explain more complex concepts, and use AR or VR to provide more concrete and immersive learning experiences.

Factors Influencing the Utilization of Digital-Based Learning Media

a) Technology Infrastructure

Adequate technology infrastructure is a key factor influencing the utilization of digital-based learning media in elementary schools. Technology infrastructure includes the availability of digital devices such as computers,



laptops, tablets, or mobile devices that can be used to access and interact with digital-based learning media. Additionally, stable and high-speed internet connectivity is also crucial to facilitate access to online learning resources and cloud-based applications. Other supporting facilities such as multimedia classrooms, projectors, and audio-visual equipment can also help create a more interactive and conducive learning environment for the use of digital-based learning media. Without adequate technology infrastructure, the utilization of digital-based learning media will be limited and less effective.

b) Educators' Skills and Competencies

Another crucial factor is educators' skills and competencies in using and integrating technology into the teaching and learning process. Educators who are skilled in operating digital devices, using online learning applications and platforms, and designing learning activities that utilize digital-based learning media will be more prepared and confident in implementing them in the classroom. On the other hand, educators who are less skilled or even have a fear of technology (technophobia) are likely to struggle in effectively implementing digital-based learning media. Therefore, training and professional development for educators in the field of instructional technology are crucial to support the utilization of digital-based learning media in elementary schools.

c) Availability of Quality Content and Learning Resources

The availability of quality digital-based learning content and resources that align with the curriculum is also a significant factor influencing the utilization of such media. Engaging, interactive learning content that can facilitate the achievement of learning objectives will be more effective in supporting the teaching and learning process compared to monotonous or irrelevant content. Quality digital-based learning resources can include educational applications, interactive multimedia, instructional videos, or online resources that have been verified and align with curriculum standards. The availability of these resources enables educators and students to optimize the utilization of digital-based learning media according to their learning needs.

d) Support from Schools, Parents, and Stakeholders

The utilization of digital-based learning media in elementary schools is also greatly influenced by the support and involvement of schools, parents, and other stakeholders. Schools, such as principals and administrators, play a crucial role in providing adequate technology infrastructure, offering training for educators, and creating a culture that supports the use of technology in learning. Additionally, support and involvement from parents are also crucial, especially in facilitating students' access to digital-based learning media at home and encouraging them to use it positively and responsibly. Other stakeholders such as local governments, community organizations, and industry partners can also play a role in providing resources, training, or programs that support the utilization of digital-based learning media in elementary schools.

e) Government Policies and Regulations

Finally, government policies and regulations related to the use of technology in education also influence the utilization of digital-based learning media in elementary schools. Governments can establish clear standards and guidelines for the use of technology in learning and provide support such as funding, infrastructure, or training programs for educators and schools. Government policies and regulations can also encourage the development and provision of quality digital-based learning content and resources that align with the national curriculum. With supportive policies and regulations in place, elementary schools will be better equipped to effectively implement digital-based learning media and integrate them with the applicable curriculum.



Benefits and Impact of Using Digital-Based Learning Media

Enhancing active participation and engagement of students: The use of interactive and engaging digital-based learning media can enhance the active participation and engagement of students in the learning process. Digital media allows students to interact with learning content directly, answer questions, simulate scenarios, or engage in more dynamic and multisensory learning activities. This can increase motivation and interest in learning, as well as make students more actively involved in constructing their own knowledge. Digital-based learning media can provide broader access to resources and information relevant to students' real-life contexts. For example, students can explore learning materials through videos, simulations, or applications that connect abstract concepts with real-world situations. This can facilitate more contextual and meaningful learning, helping students build connections between acquired knowledge and its application in everyday life.

Helping students develop digital literacy and 21st-century skills: The use of digital-based learning media can help students develop digital literacy and 21st-century skills that are crucial for their future success. Skills such as critical thinking, collaboration, communication, creativity, and problem-solving can be facilitated through the appropriate use of digital media. Students can learn to use technology effectively, access and critically evaluate information, and develop the ability to communicate and collaborate digitally. Digital-based learning media allows for flexibility in the learning process. Students can access learning materials anytime and anywhere, and adjust their own pace and learning styles. Additionally, digital media also enables personalized learning, where content and activities can be tailored to the needs, interests, and abilities of each student.

Increasing motivation and interest in learning: Engaging and interactive digital-based learning media can increase motivation and interest in learning among students. The use of up-to-date technology, rich multimedia content, and varied learning activities can make the learning process more enjoyable and engaging for students. This can encourage their involvement and active participation in the learning process, as well as increase curiosity and interest in learning more.

Impact on academic achievement and learning goals attainment: Effective and well-integrated use of digital-based learning media in the learning process can have a positive impact on academic achievement and the attainment of learning goals for students. Research has shown that well-designed digital media can improve understanding of concepts, higher-order thinking skills, and knowledge retention in students. However, this impact is highly dependent on how digital media is integrated into the overall learning design, as well as other factors such as content quality, teaching strategies, and student characteristics.

Challenges and Obstacles in Implementation

One of the main challenges in implementing digital-based learning media is the limitation of technological infrastructure in schools. Many schools, especially in rural or less developed areas, face shortages in terms of stable internet access, adequate hardware (computers, tablets, or mobile devices), and other supporting facilities such as multimedia classrooms or computer laboratories. These limitations can hinder the adoption and utilization of digital media in the learning process.

Another challenge is the lack of skills and competencies among educators in effectively integrating technology and digital media into the learning process. Many educators feel less confident or undertrained in using digital technology, which can hinder the optimal adoption and utilization of digital-based learning media. Adequate training and professional development programs are needed to help educators improve their skills and competencies in this area.

The availability of quality learning content and resources that align with the curriculum and local context is also a challenge. Although there are many digital resources available online, not all of them are relevant or suitable for the needs and learning objectives in schools. Efforts are needed to develop or adapt quality and contextual learning content and resources and to ensure easy access for educators and students.



The implementation of digital-based learning media requires support and involvement from various stakeholders, such as the government, schools, parents, and the community. Lack of support and collaboration from these stakeholders can be a barrier to the effective adoption and utilization of digital media. Efforts are needed to increase awareness, commitment, and involvement from all relevant parties.

Implementing digital-based learning media also requires significant financial investment, both for hardware procurement, software, infrastructure, and maintenance and update costs. Many schools, especially in areas with limited resources, face challenges with inadequate funding to meet these needs. Efforts are needed to allocate a sufficient budget and seek alternative funding sources, such as partnerships with private sector or non-profit organizations.

The use of digital technology in learning may also face technical challenges and security issues. Issues such as hardware damage, internet connection disruptions, software compatibility issues, or cyber security threats can disrupt effective learning processes. Efforts are needed to ensure the availability of adequate technical support, training on safe technology use, and implementation of appropriate security measures to protect the data and privacy of students and educators.

Considering the benefits and challenges, the implementation of digital-based learning media in the Free Curriculum at elementary schools requires thorough planning, close collaboration among various stakeholders, and sustainable efforts to overcome barriers and maximize the potential of digital media in supporting quality learning processes that are relevant to the needs of students in the 21st century.

Strategies and solutions for optimizing utilization

To optimize the utilization of digital-based learning media in the Free Curriculum at elementary schools, comprehensive strategies and solutions involving various stakeholders are necessary. These efforts are crucial to ensure effective and sustainable implementation so that the benefits of digital media in learning can be maximized. Some strategies and solutions that can be considered include the development of adequate technological infrastructure, educator training, and competency development programs, development and provision of quality learning content/resources, engagement and collaboration with stakeholders, supportive policies and regulations facilitating the use of technology in education, adequate budget allocation and funding, as well as the implementation of best practices and learning from successful experiences

The development of adequate technological infrastructure is a key factor for the successful implementation of digital-based learning media. This includes stable and high-speed internet access, hardware such as computers, laptops, tablets, or mobile devices, and supportive facilities such as multimedia classrooms or computer laboratories. Strategies that can be implemented include collaborating with the government and private sector to develop technology infrastructure in schools, allocating sufficient budget, leveraging cloud computing technology, and forming partnerships with internet and technology service providers (Kemendikbud, 2020).

Educators play a central role in effectively implementing digital-based learning media. Therefore, comprehensive educator training and competency development programs are required. Strategies that can be implemented include providing pre-service and in-service training for educators, developing certification or specific credentials programs, establishing practice communities or learning groups among educators, and encouraging educators to participate in continuous professional development programs related to digital media and technology in education (Kemendikbud & USAID, 2019).

The availability of quality learning content and resources that align with the curriculum and local context is a crucial factor in maximizing the benefits of digital-based learning media. Strategies that can be considered include developing quality and contextual digital learning content, collaborating with publishers or educational content developers, leveraging open educational resources (OER), and establishing centralized repositories of digital learning resources (Aruan & Wibowo, 2020).



The implementation of digital-based learning media requires engagement and collaboration from various stakeholders, including the government, schools, educators, parents, and the community. Strategies that can be implemented include forming committees or working groups involving representatives from various stakeholders, involving parents and the community in decision-making processes, collaborating with a private sector or non-profit organizations, and organizing workshops or discussion forums involving various stakeholders (Kemendikbud, 2021).

The presence of supportive policies and regulations facilitating the use of technology in education is crucial to ensure effective and sustainable implementation. Strategies that can be considered include formulating national or regional policies and regulations supporting the use of digital media in learning, developing standards and guidelines to ensure the quality, security, and accessibility of digital media used, establishing policies on data privacy and copyright protection, and involving various stakeholders in the policy formulation process and related regulations (Kemendikbud, 2018).

The implementation of digital-based learning media requires significant financial investment, both for infrastructure procurement, hardware, software, and operational and maintenance costs. Strategies that can be considered include allocating sufficient budget from government funds or other education funding sources, seeking alternative funding sources such as partnerships with private sector or non-profit organizations, developing sustainable funding models such as cost-sharing schemes or crowdfunding, and conducting cost-benefit analysis and prioritizing investments that have a large impact on learning quality (Kemendikbud & Bank Dunia, 2021).

In implementing digital-based learning media, it is crucial to learn from best practices and successful experiences that have been implemented elsewhere. Strategies that can be considered include studying and adopting best practices from schools, regions, or countries that have successfully implemented digital media in learning, participating in international practice networks or communities focusing on the use of technology in education, conducting benchmarking or visits to schools or educational institutions that have succeeded in implementing digital media, and inviting experts or experienced practitioners to provide training, consultation, or share insights on best practices (Kemendikbud & UNICEF, 2020).

By implementing comprehensive strategies and solutions as described above, it is expected that the utilization of digital-based learning media in the Free Curriculum at elementary schools can be optimized. This will provide significant benefits to the learning process, such as increasing active participation and engagement of students, facilitating contextual and meaningful learning, developing digital literacy and 21st-century skills, facilitating flexible and personalized learning, as well as enhancing motivation and interest in learning for students. Furthermore, optimizing the utilization of digital media can also have a positive impact on academic achievement and overall learning goal attainment.

However, it should be emphasized that the implementation of digital-based learning media is not just about integrating technology into the learning process, but also requires a change in mindset, thorough planning, close collaboration among various stakeholders, and ongoing efforts to address challenges and obstacles. With strong commitment and efforts from all involved parties, the utilization of digital media in learning can become a catalyst for a more quality, relevant, and student-centric education transformation in the 21st century.

4. CONCLUSIONS

Digital-based learning media is an essential tool for improving the quality of education in elementary schools. These media come in various types, such as interactive multimedia, e-learning, and instructional videos, as well as augmented reality (AR) and virtual reality (VR). Each type has its uniqueness and potential to facilitate more engaging, contextual, and meaningful learning experiences for students. The utilization of digital media in elementary schools can provide significant benefits, including increasing active participation and engagement of students, developing digital literacy and 21st-century skills, facilitating flexible and personalized learning, as well



as enhancing motivation and interest in learning. Furthermore, effective use of digital media can also positively impact academic achievement and overall learning goal attainment.

However, the utilization of digital-based learning media in elementary schools is influenced by various factors such as technological infrastructure, educator skills, and competencies, availability of quality learning content and resources, support from schools, parents, and stakeholders, as well as government policies and regulations. Additionally, there are challenges and obstacles to be overcome, such as limited technology infrastructure in schools, educator skill, and competency shortages, lack of suitable learning content and resources, inadequate support and engagement from stakeholders, cost, and funding issues, as well as technical and security issues in technology usage.

To optimize the utilization of digital-based learning media in the Free Curriculum at elementary schools, comprehensive strategies and solutions are required. This includes the development of adequate technology infrastructure, educator training, and competency development programs, development and provision of quality learning content/resources, engagement and collaboration with stakeholders, supportive policies and regulations, adequate budget allocation and funding, as well as the implementation of best practices and learning from successful experiences. The implementation of digital-based learning media requires a change in mindset, thorough planning, close collaboration among various stakeholders, and ongoing efforts to address emerging challenges and obstacles. With strong commitment and efforts from all involved parties, the utilization of digital media in learning can become a catalyst for a more quality, relevant, and student-centric education transformation in the 21st century.

REFERENCES

- Farida I, A A, Purnomo A, M M, Nila Juwita M., & Rinova D. (2023). Pentingnya Literasi Digital untuk Anak Usia Dini di Pekon Sukarame, Kec. Balik Bukit, Kab. Lampung Barat. *Jurnal Pengabdian Masyarakat Tapis Berseri*, 2(2), 169–73.
- Fransisca, M., Saputri, R. P., & Yunus, Y. (2023). Implementasi teknologi digital dalam kegiatan pembelajaran di tingkat sekolah dasar. *DEDIKASI SAINTEK: Jurnal Pengabdian Masyarakat*, 2(3), 249-257.
- Lestari, S., Untari, M. F. A., & Fajriyah, K. (2022). Peningkatan motivasi dan hasil belajar siswa melalui media audio visual berbasis aplikasi zoom pada pembelajaran IPS di Kelas IV Sekolah Dasar. *Jurnal Penelitian dan Pengembangan Pendidikan*, 6(1), 56-63.
- Nenotek, S. A., de Haan, A. E., Nifu, L. L., & Lindimara, E. (2023). Kesiapan Guru Dalam Pembelajaran Berbasis Teknologi di Perbatasan Indonesia-Timor Leste. *EDUKATIF: JURNAL ILMU PENDIDIKAN*, 5(5), 1975-1984.
- Rachmawati, D. N., Kurnia, I., & Laila, A. (2023). Multimedia interaktif berbasis articulate storyline 3 sebagai alternatif media pembelajaran materi karakteristik geografis Indonesia di Sekolah Dasar. *Jurnal Pemikiran Dan Pengembangan Sekolah Dasar (JP2SD)*, 11(1), 106-121.
- Rezeki, S., Rahayu, E., & Nazara, F. (2023). Analisis Efektivitas Pemakaian Media Teknologi Pembelajaran dalam Pelayanan Transformatif Gereja untuk Mengatasi Kemiskinan di Indonesia. *JURNAL KADESI*, 5(2), 1-19.
- Rohim, D., & Rigiati, H. A. (2023). Hambatan guru kelas IV dalam mengimplementasi kurikulum merdeka di Sekolah Dasar. *Jurnal Basicedu*, 7(5), 2801-2814.
- Sukardi, S., Aminah, S., & Dewi, I. O. (2023). Peran Kompetensi Guru, Literasi Digital, Dan Ketersediaan Sarana Teknologi Terhadap Peningkatan Mutu Pembelajaran (Study Pada Guru Sekolah Dasar Se Kecamatan Kandeman, Kabupaten Batang). *Serat Acitya*, 12(1).



Ylsan, D. T., & Kamal, R. (2022). Pengaruh penggunaan media pembelajaran flipbook dalam meningkatkan motivasi belajar siswa. Waniambey: *Journal of Islamic Education*, 3(1), 24-30.



UNLOCKING NVDA: TEACHERS' VIEWS ON ENHANCING LISTENING SKILLS FOR VISUALLY IMPAIRED STUDENTS

Diana Achmad^{1*}, Syamsul Bahri YS², Muhammad Saidinas³

^{1,2,3}Universitas Syiah Kuala, Indonesia

*diana.achmad@usk.ac.id

ABSTRACT

This study aims to investigate the teachers' perceptions towards the implementation of Non-Visual Desktop Access (NVDA) in enhancing English listening skills among visually impaired students at SLB Negeri Banda Aceh, Indonesia. Visually impaired students often face unique challenges in language acquisition due to limited access to visual cues. This research seeks to address this critical issue by examining the implementation of NVDA as an assistive technology to facilitate English language learning done by teachers. The research employed a qualitative method and used semi structure interview as the instrument. Three teachers at this school were chosen as the respondents. The results show that the teachers used this tool because it has benefits. This can motivate students to learn English better, especially listening skills. NVDA is believed to be able to increase the students' ability in mastering English, beside this tool is also free and easy to operate. The findings are expected to inform educational policies and practices to better support the language development of visually impaired individuals and, in turn, promote inclusivity and accessibility in the educational system.

Keywords: listening skills, NVDA, SLB, visually impaired students

1. INTRODUCTION

The contemporary digital era has brought about a significant evolution in the role of media within the realm of education, particularly influencing English language learning. Language educators are increasingly leveraging a diverse range of media tools and resources to enhance teaching methodologies and elevate students' language proficiency levels. This paradigm shift is guided by the Technological Pedagogical Content Knowledge (TPACK) framework, initially proposed by Mishra and Koehler (2006), which underscores the crucial integration of technology, pedagogy, and content knowledge to facilitate effective teaching and learning.

Within the TPACK framework, Technological Knowledge (TK) stands as a pivotal dimension. TK entails educators' adept comprehension of various technologies and their functional capacities, as highlighted by Pappas (2023), emphasizing the understanding and application of technological resources in teaching. Specifically, in the context of English language learning, digital learning media have revolutionized methods for enhancing listening skills through innovative activities, as outlined by Richards and Rodgers (2014), including audio recordings, videos, group discussions, and online comprehension exercises.

However, despite these advancements, there remains a notable gap in the application of digital learning media within special schools, particularly for visually impaired students. Traditional lecture methods persist as the predominant approach to English language instruction, characterized by teacher-centric delivery and limited student engagement, as noted by Gregorius (2017).

Moreover, the issue is compounded by the scarcity of materials and resources tailored to the needs of visually impaired students, leading to inadequate modifications in instruction, as evidenced by studies conducted by Susanto and Nanda (2018). The absence of accessible English language textbooks and learning materials in braille further exacerbates the challenges faced by blind students, necessitating reliance on verbal instructions and assistance from others.

Nevertheless, there is potential for leveraging assistive technologies, such as screen readers, to address these challenges. Screen readers, such as Non-Visual Desktop Access (NVDA) and Job Access with Speech (JAWS), offer visually impaired individuals' alternative means of interacting with computers and technological devices, as elucidated by McCarthy et al. (2013). Research by Wiyanah (2016) has demonstrated the efficacy of



screen readers in facilitating English language learning by converting text into clear speech, thereby enhancing legibility for blind students.

The lack of accessible resources and learning media for blind and visually impaired students often leads to a decline in their academic performance, particularly in the area of listening skill. One possible solution is the use of screen reader technology as a learning media by the teacher. In light of these considerations, recent efforts have been made to introduce screen readers, particularly NVDA, as a digital learning medium for English language instruction in special schools like SLB Negeri Banda Aceh. However, the full potential of this assistive technology remains untapped, necessitating further exploration through qualitative research. Therefore, the aim of this study is to interview teachers implementing NVDA screen readers as a learning medium for English language instruction, particularly focusing on its efficacy for visually impaired students in the classroom. Therefore, this study aims to investigate the teachers' perceptions towards the use of NVDA to improve the listening skills of visually impaired students at one of the special schools in Banda Aceh, Indonesia. Based on the objective above, the research question is formulated as follows: "What are the teachers' perceptions towards the use of NVDA to improve the listening skills of visually impaired students at SLB Negeri Banda Aceh?"

2. METHODS

This qualitative study employed a phenomenological approach to delve into teachers' perceptions regarding the utilization of NVDA (Non-Visual Desktop Access) for enhancing the listening skills of visually impaired students. Phenomenology was chosen for its ability to explore individuals' subjective experiences within a specific context, providing valuable insights into the phenomena under examination. The research was conducted at SLB Negeri Banda Aceh, focusing on the experiences of three teachers who implemented NVDA screen readers in English language instruction for visually impaired students.

Data collection involved semi-structured interviews with the participating teachers. The interviews were designed to gather detailed accounts of teachers' experiences and their views related to the integration of NVDA in English learning. Additionally, interviews were aligned with the research question, focusing on the implementation of NVDA as a digital learning medium for enhancing listening skills. Data analysis followed an inductive approach, involving data reduction, display, and drawing conclusions (Miles et al., 2020). Through this methodology, the study aimed to provide comprehensive insights into the effectiveness of using NVDA to support English language learning among visually impaired students in special education settings.

3. RESULTS & DISCUSSION

All respondents demonstrated familiarity with using screen readers in educational settings. Respondent 1 tailored NVDA to individual student needs, adjusting voice preferences to suit their preferences. Respondent 2, having transitioned from JAWS to NVDA, emphasizes the importance of staying updated with technological advancements. Respondent 3, while primarily a counseling teacher, utilized NVDA in teaching various subjects, indicating its widespread use across different educational contexts.

In the context of Technological Pedagogical Content Knowledge (TPACK), respondents' experiences underscore the significance of educators' technological proficiency. Respondent 1's adaptation of NVDA aligns with TPACK's emphasis on understanding technology's capabilities to meet diverse student needs. Respondent 2's transition highlights the need for continuous technological learning among educators. Respondent 3's use of NVDA to enhance learning across subjects exemplifies how technological knowledge aids in selecting suitable media for effective instruction, consistent with TPACK principles.

Moreover, respondents cited various reasons for choosing NVDA as a learning medium. Respondent 1 appreciated NVDA's portability, facilitating seamless usage across different devices. Respondent 2 highlighted NVDA's cost-effectiveness compared to paid alternatives like JAWS. Respondent 3 emphasized NVDA's efficiency in delivering electronic materials compared to traditional Braille methods. Their preferences align with principles outlined by Hikmah (2019) and Astriani (2018), emphasizing effectiveness, flexibility, time, and cost



when selecting learning media. NVDA's attributes make it a viable choice, addressing key considerations for effective instructional delivery.

In addition, respondents outlined their methods for implementing NVDA in English listening sessions, emphasizing structured lesson formats and NVDA's role in delivering text materials audibly. Adjustments to NVDA settings, particularly speech rate and voice selection, were tailored to individual student abilities. Their experiences underscore the importance of accommodating students' needs when implementing NVDA. Slow speech rates and clear voices were preferred to enhance comprehension. Despite challenges, such as students' initial difficulty in adapting to new voices, NVDA's use significantly improved students' English proficiency and computer literacy.

Finally, respondents favored NVDA over traditional methods for teaching English, particularly in listening sessions. NVDA's ability to offer diverse accents for pronunciation practice was noted as a significant advantage. Additionally, NVDA's accessibility features, such as digital book access, were highlighted as beneficial for students in special schools. Their observations highlight NVDA's superiority in providing inclusive and effective English instruction, especially for teachers without English-major backgrounds. The ease of use and accessibility of NVDA further contribute to its preference over traditional methods. The findings suggest that NVDA effectively enhances English listening skills among visually impaired students, offering numerous advantages over traditional teaching methods. Educators can leverage NVDA's features and flexibility to create inclusive learning environments that cater to diverse student needs.

4. CONCLUSION

In The contemporary digital era has ushered in a transformative shift in education, particularly in English language learning, with educators increasingly embracing diverse media tools to enhance teaching methodologies and elevate students' language proficiency levels. Guided by the Technological Pedagogical Content Knowledge (TPACK) framework, teachers navigate the integration of technology, pedagogy, and content knowledge to foster effective teaching and learning experiences. Despite significant advancements in digital learning media, a notable gap persists in catering to visually impaired students within special schools. Traditional lecture methods remain prevalent, characterized by limited student engagement and inadequate alignment with principles of active learning. Moreover, the scarcity of accessible resources exacerbates challenges faced by blind students, hindering their academic performance, particularly in listening skills.

However, there is promise in leveraging assistive technologies such as screen readers to address these challenges. Screen readers like Non-Visual Desktop Access (NVDA) offer alternative means for visually impaired individuals to interact with computers, facilitating English language learning through text-to-speech conversion. Recent efforts have sought to introduce NVDA as a digital learning medium in special schools, particularly for enhancing listening skills among visually impaired students.

The qualitative study conducted at SLB Negeri Banda Aceh shed light on teachers' perceptions regarding the implementation of NVDA for English language instruction. Findings revealed a positive reception toward NVDA, with teachers citing its efficacy in enhancing listening skills through structured lesson formats and tailored adjustments to accommodate individual student needs. NVDA's advantages over traditional methods were evident, particularly in its ability to offer diverse accents for pronunciation practice and provide accessibility features such as digital book access.

In conclusion, NVDA emerges as a valuable tool for improving English listening skills among visually impaired students, offering numerous advantages over traditional teaching methods. Educators are encouraged to further explore the potential of NVDA and other assistive technologies to create inclusive learning environments that cater to the diverse needs of all students.

REFERENCES

- Astriani, R. (2018). Pengembangan Media Pembelajaran Interaktif Berbasis Mobile Learning. *Jurnal Pendidikan Teknologi dan Kejuruan*, 24(1), 1-13.



- Gregorius, R. M. (2017). Performance of Underprepared Students in Traditional versus Animation-Based Flipped-Classroom Settings. *Chemistry Education Research and Practice*, 18(4), 841-848.
- Hikmah, N. (2019). Pembelajaran Kontekstual dengan Teknologi Informasi Dan Komunikasi. *Jurnal Teknologi Pendidikan*, 21(3), 259-270.
- McCarthy, T., Pal, J., & Cutrell, E. (2013). The “voice” Has it: Screen Rader Adoption and Switching Behavior among Vision Impaired Persons in India. *Assistive Technology: The Official Journal of RESNA*, 25(4), 222–229.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook (4th ed.)*. SAGE Publications, Inc.
- Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record*, 108(6), 1017–1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Pappas, C. (2023). TPACK: Using the Technological Pedagogical Content Knowledge Framework in Classrooms. eLearning Industry. Retrieved from <https://elearningindustry.com/tpack-using-technological-pedagogical-content-knowledge-framework-classrooms>
- Richards, J. C., & Rodgers, T. S. (2014). *Approaches and Methods in Language Teaching*. Cambridge University Press.
- Susanto, S., & Nanda, D. (2018). Teaching and Learning English for Visually Impaired Students: *An Ethnographic Case Study*. *English Review: Journal of English Education*. 7(1), 83-92. DOI.10.25134/erjee.v7i1.1530.
- Wiyannah, S. (2016). Developing English Electronic Module Using Job Access with Speech (Jaws) as Screen Reader to Empower Learning Autonomy of Students with Special Need. *Ahmad Dahlan Journal of English Studies*. 3(1), 28-37. 10.26555/adjes.v3i1.3623.



EMPLOYABILITY SKILL "POSITIVE SELF CONCEPT" MODULE DEVELOPMENT FOR FINAL-YEAR STUDENTS AT FACULTY OF TEACHER TRAINING AND EDUCATION UNIVERSITAS LAMPUNG

Ajeng Pratiwi¹, Ratna Widiastuti^{2*}

^{1,2}Bimbingan dan Konseling, FKIP, Universitas Lampung, Indonesia

*ratnaw.unila@gmail.com

ABSTRACT

Employability skills are really needed in facing the competitive world of work. However, there are no communicative modules available yet to improve students' employability skills. This shows the need for efforts to develop modules that can improve students' employability skills; focusing on positive self-concept that can be used independently. The aim of this research is to develop a module to improve the employability skills of "positive self-concept" in final year students. The method used is ADDIE (analysis, design, development, implementation, and evaluation). Research data was obtained from a team of employability and media experts; and 15 students in semesters 6-8 who were selected using purposive sampling technique. The data collection technique is using a questionnaire to determine the ADDIE validation of the module. The results of expert validation research for module material show an overall average = 0.73. In the assessment from media experts, the overall average value = 0.87. The results of the student validation assessment reached an average score = 73.75. Based on these results, it can be concluded that this positive self-concept employability skills module can be a communicative learning tool to increase student work readiness.

Keywords: employability skills, work readiness, positive self-concept, students, modules

1. INTRODUCTION

In the globalization era, economic growth is increasingly rapid, accompanied by competition in various fields, including job searching. These changing conditions require an already competent workers in accordance with their field of expertise; so that they can face the challenges of the ever-growing world of work. University students who are currently studying are considered to be able to think about employability skills and develop the skills they need. Based on research conducted by Lippman et al. (2015) under the Child Trends USA agency, there are several employability skills that a person must have in facing the competitive world of work, including positive self-concept skills, self-control skills, and social skills (social skills), communication skills, and high order thinking skills.

This research will focus on improving positive self-concept as employability skills of final year student at university. Students who have a high positive self-concept will be better prepared when facing the competitive world of work. Students who have a low self-concept will tend to feel anxious easily and have low competence which will result in failure in finding work (Rachmawati & Wulan, 2019). Previous research on the employability of final year students in teacher training and education showed the lack of employability skills (Nurrofifah et al., 2018; Puri, et al., 2018; Safitri et al., 2018; Zunita et al., 2018).

In this case, there is a need for a module with a systematic and ordered learning media that can help students as users to understand and to improve their positive self-concept employability skills. There was some research showed that increasing employability skills could improve self-concept for vocational high school (Almaida & Febriyanti, 2019; Evioni et al., 2022). Another research by Baiti et al. (2017) and also by Wijikapindho and Hadi (2021) told us that employability skills had a positive correlation with career self-efficacy for university students. Research by Kirana (2014) showed that self-control skills could improve by using support group. Therefore, the researcher wants to design for the development of a module to improve Positive Self-



Concept Employability Skill for Final Year Students at the Faculty of Teacher Training and Education, University of Lampung.

In this research, the researcher will focus on improving the positive self-concept employability skills of final year students. Final year students who have a high self-concept will be better prepared when facing the competitive world of work compared to final year students who have a low self-concept who will tend to feel anxious easily and have low competence which will result in failure in finding work (Rachmawati & Wulan, 2019). Previous research on the readiness of final year students to face the world of work was viewed from the self-concept of students majoring in social studies education, where the results were that 24% of students majoring in social studies education, FKIP, Lampung University still did not have positive self-concept employability skills. Based on this, it can be said that the lack of awareness among final year students regarding the importance of employability skills, especially positive self-concept in work readiness, has become a problem in the field of career guidance. The implementation of career guidance should be supported by communicative learning media so that it can help students understand the concept of preparing for their future career, especially in improving employability skills, positive self-concept. In this case, the module was chosen as a systematic and ordered learning media with various features that can help users understand the content of the material contained therein. This is also supported by the unavailability of training learning modules to improve employability work readiness skills for final year students at FKIP Lampung University. Module development can also guide students independently with or without tutors as an effort to help final year students at FKIP Lampung University improve employability skills with positive self-concept. Based on the research before, the researcher wants to develop an employability skills module for university student in the form of a communicative, adaptive, and communicative module so that it can be held easily and independently by the facilitator. Therefore, the researcher wanted to conduct a research study "Development of a Positive Self-Concept Employability Skills Module for 5 Final Year Students at the Faculty of Teacher Training and Education, University of Lampung".

2. METHODS

The module created by adapting the previous employability module by Amalee (2016) with the title "Employability Skills Program from Save The Children". The research data used in this research is quantitative data from five stages in the ADDIE development model (Rayanto & Sugianti, 2020). The ADDIE model usually used to develop module or another educational material on paper (Cahyadi, 2019; Daryanto, 2013), The five steps used in this research are analysis, design, development, implementation, and evaluation. The validation will be taken from module material expert, media experts, and students as users. The module validations are based on content validity criteria.

The first stage is an analysis, this is done with determining the students' needs for improving positive self-concept employability skills. The second stage in the ADDIE development model is the design stage. At this stage, there were four steps which are preparing the module framework, collecting and selecting the right references, preparing the module layout design and assessment instrument. The third stage is the stage where development is carried out by creating learning media, as well as designs, and displays that adaption according to the needs of module users. The fourth stage of the ADDIE development model is the implementation stage. At this stage, the modules then validated and revised and finally tested on a small group final student. The fifth stage, namely evaluation, aims to determine the strengths and weaknesses of the positive self-concept employability skills based on student comments and suggestions. This module revision shows the weaknesses and deficiencies that have been corrected.

After the module development process has been carried out, the quality of the module development was determined by two criteria, namely validity and practicality. The validity of the module developed is known based on the assessment of media experts and material experts. The validity of the module was assessed before the researchers conducted a module trial. The validation of the module was done by three employability experts and two media experts. The module trial was carried out on 15 students in semesters 6, 7, and 8 at Faculty of Teacher Training and Education, Universitas Lampung. Students are asked to do the activities contained in the module, and taking the pretest and posttest to evaluate the module.



3. RESULTS & DISCUSSION

In this ADDIE process, it is found the need to change the cover design and layout. The appearance of the module cover is more attractive in colors, more representing the content contained in the module, as showed below.



Figure 1. Module Cover View Before and after revision

Some adjustments are made from the previous module designed by Amalee (2016); which are the cover that illustrate the content, language selection, and presentation techniques. The characteristics of this module are expected to be self-instructional, self-contained, stand alone, adaptive, and also user friendly in accordance with employability skills theories (Daryanto, 2013). In the third process, namely development, researchers begin to realize the module preparation framework by starting to create and arrange modules into one complete unit so that they are ready to be implemented. Preparation and development of printed and electronic teaching module components which include content, language selection and presentation techniques are carried out by paying attention to the characteristics of the module which is self-instructional, self-contained, stand alone, adaptive and user friendly in accordance with theory (Daryanto, 2013). The characteristics of self-instruction is in accordance with the purpose of the illustration itself, including these are explaining or decorating a story, writing poetry, or filling other written information. The module is said to be self-contained because all the required material is already contained in the module. The aim of this concept is to provide participants to study the material thoroughly by paying attention to their abilities and based on their age. The module development can also stand alone. This is demonstrated by the existence of activities in the module that can be done without needing or using other teaching materials. Apart from that, the module development is adaptive because the module is not only in printed form but can also be digitally form to adapting with today's digital era. Furthermore, the module is user friendly because it is easy to understand and use with or without the facilitator.

The content validity of the module is done by two media experts and three material experts. Based on the assessment of material experts in terms of appropriateness of content, presentation, and language; validation figures obtained was $v = 0.73$; $v \geq 0.67$. The value validation of media experts is $v = 1$; $v \leq 0.87$ and the design validation value is $v = 0.83$; $v \leq 0.87$. Therefore, the module that has been developed in terms of media is in the very valid category according to the Aikens' v table. So, it can be concluded that the module is practical enough to use by students.

For implementation stage; the module trial was carried out online with students. As the results there is an increase in the positive self-concept. This illustrates that employability skills of the students who have carried out the module had been increase. From the results obtained, it is known that there is an increase in the work readiness attitude value or score through the self-concept module after testing the module. This illustrates that individuals who have carried out the employability skills module will have an awareness of the skills that must be possessed for work readiness. This is in accordance with the results of research conducted by Lippman et al. (2015) that there are several work readiness skills needed by a worker to be successful in work life, including positive self-concept employability skills.



The evaluation stage results were obtained from students, and it was used as a means for further module development so that the module development is able to achieve the expected goals. The assessment given by the validator is then followed up with revisions so that the module development is able to achieve the expected goals.

Employability skills module needs to be supported by the environment, in the form of collaboration involving students that is expected to help each other. This is in line with peer counselling or support group which explaining that peers group or peer group can help the process of good adjustment between students. Based on the results of this discussion, this module can be a means to help final year students improve their intrapersonal skills, positive self-concept. This is in line with research by Widiastuti et. al (2023).

4. CONCLUSION

The module that has been developed in terms of material and media is in the very valid category. Based on the results of research conducted on students in the final semester of the Counseling Guidance study program, Faculty of Teacher Training and Education, University of Lampung, the researchers concluded that the quality of the employability skills module "positive self-concept" in students in the final year of the Faculty of Teacher Training and Education at the University of Lampung met valid and practical criteria. It can be concluded that the module can be a means for University students to improve positive self-concept skills.

REFERENCES

- Almaida, D. S., & Febriyanti, D. A. (2019) Hubungan antara Konsep Diri dengan Kematangan Karir pada Siswa Kelas XI SMK Yayasan Pharmasi Semarang. *Jurnal Empati*, 8(1), 87-92.
- Amalee, I. (2016). *Program Kesiapan Kerja bagi Siswa SMK*. Bandung: Save The Children.
- Rayanto, Y. H., & Sugianti. (2020). *Penelitian Pengembangan Model Addie Dan R2d2: Teori & Praktek*. Pasuruan: Lembaga Academic & Research Institute
- Baiti, R. D., Abdullah, S. M., & Rochwidowati, N. S. (2017) Career Self- Efficacy dan Kesiapan Kerja pada Mahasiswa Semester Akhir. *Jurnal Psikologi Integratif*, 5(2), 128-141.
- Cahyadi, R. A. H. (2019) Pengembangan Bahan Ajar Berbasis Addie Model. *HALAQA*, 3(1), 35-42.
- Daryanto. (2013). *Menyusun Modul Bahan Ajar untuk Persiapan Guru dalam Mengajar*. Malang: Guava Media.
- Evioni, E., Ahmad, B., & Harmalis, H. (2022). Hubungan antara Self Concept dan Self Efficacy terhadap Kesiapan Kerja Siswa Kelas Xii di Smk Negeri 5 Kerinci. *Indonesian Journal of Counseling And Development*, 4(1), 31-43.
- Kirana, H. A. (2014) Support Group Therapy untuk Meningkatkan Self Control pada Pengguna Narkoba. *Jurnal Procedia: Studi Kasus dan Intervensi Psikologi*, 2(2), 27-32.
- Lippman, L. H., Ryberg, R., Carney, R., & Moore, K. A. (2015). *Key "Soft Skill" that Foster Youth Workforce Success: Toward A Consensus across Fields*. Maryland: Child Trends Publication.
- Nurrofifah, H., Widiastuti, R. & Mayasari, S. (2018). *Analisis Kesiapan Kerja Mahasiswa Tingkat Akhir BK dan Penjaskesrek*. (Unpublished Thesis). Universitas Lampung-Bandar Lampung.
- Puri, T. D., Yusransyah, & Widiastuti, R. (2018). *Analisis Tingkat Kesiapan Kerja Mahasiswa Tingkat Akhir Jurusan MIPA*. (Unpublished Thesis). Universitas Lampung-Bandar Lampung.
- Rachmawati & Wulan, M. S. (2019). Kesiapan Mahasiswa Tingkat Akhir Menghadapi Dunia Kerja Ditinjau dari Konsep Diri dan Kompetensi yang Dimiliki. *Psikovidya*, 22(2), 190-196.



- Safitri, K., Mayasari, S., & Widiastuti, R. (2018). *Analisis Tingkat Kesiapan Kerja Mahasiswa Tingkat Akhir Program Studi Pendidikan Seni Tari FKIP Universitas Lampung*. (Unpublished Thesis). Universitas Lampung-Bandar Lampung.
- Widiastuti, R., Maharani, C. A., Kurniawati, E., & Oktariana, Y. (2023). Development of Employability Skill Modules to Improve the Employability Readiness of Final-Year Students. *Edunity*, 2(4), 494-500
- Wijikapindho, R. A., & Hadi, C. (2021). Hubungan antara Self-Efficacy dengan Kesiapan Kerja pada Mahasiswa Semester Akhir. *Jurnal Buletin Riset Psikologi dan Kesehatan Mental*, 1(2), 1313-1318.
- Zunita, M., Yusmansyah, Y., & Widiastuti, R. (2018) Analisis Kesiapan Kerja Mahasiswa Tingkat Akhir. (Unpublished Thesis). Universitas Lampung-Bandar Lampung.



QUESTIONING DIGITAL CITIZENSHIP IN DEVELOPING SCIENTIFIC CULTURE: PROBLEMS AND CHALLENGES IN INDONESIAN SCHOOLS

Hastangka^{1*}, Adison Sihombing², Iskandar Agung³, Benny Widaryanto⁴, Herlinawati⁵, Etty Sisdiana⁶, Heni Waluyo Siswanto⁷, Ibnu Salman⁸, Sulhi⁹, Marga Surya Mudhari¹⁰

¹²³⁴⁵⁶⁷⁸⁹¹⁰The Research Group on Educational Policy, Civic Engagement, and School Diversity, Research Center for Education, National Research and Innovation Agency

*hastangka@brin.go.id

ABSTRACT

The topic of digital citizenship has gained significant attention from the academic community due to the rapid development and widespread use of digital technology across various sectors. Education is one such area that has been impacted by the diverse models and applications of digital technology, which can enhance users' skills and knowledge. However, this has also led to a diminished importance of humanity in society. Digital technology remains a problematic concern without clear guidelines, instructions, or indications of permissible and credible sources of knowledge. This raises the question of how digital citizenship, an integral part of society's lifestyle, supports citizens in developing a scientific culture. Digital technology has had a significant impact on the methods and behaviors used to develop a scientific culture in education. This study aims to describe and analyze the challenges of digital citizenship as a societal paradigm in nurturing a scientific culture in schools. A systematic literature review of literature on digital citizenship and the challenges of establishing a scientific culture in schools is employed in this study. The findings indicate that digital citizenship has not received significant attention in shaping science-based character in schools and developing a scientific culture. The study focuses on Indonesia and its schools.

Keywords: Citizen, Digital, Indonesia, Scientific Culture, School.

1. INTRODUCTION

Several studies on digital citizenship have demonstrated its dynamics and evolution. Felice's study discusses the crisis in digital citizenship due to the neglected role and involvement of humans. Digital technology has led to inadequate interaction beyond technology usage. In another study, a review of the dynamics and developments indicates that previous studies on digital citizenship perspectives have largely focused on issues of digital health, technocracy, digital literacy, technical competence, and the use of digital technologies (Di Felice: 2022). Research themes and discussions on digital citizenship have been directed toward issues of citizen participation and involvement in adapting to, using, and accessing technology that impacts citizens' lives (Aydoğan: 2022). Digital citizenship is generally defined as "the ability to navigate our digital environments in a way that's safe and responsible and to actively and respectfully engage in these spaces". The concept of digital citizenship has evolved and emerged alongside the increasingly widespread adoption of technology and the provision of various information (Media: 2024). Information technology has influenced the quality of knowledge and the way people acquire knowledge for various purposes. The issue that arises regarding the relationship between citizens and digital technology places more emphasis on the use of digital technology and its role in improving the quality of human life. In the field of education, digital citizenship is studied as an emerging approach, but the curriculum does not include the results of the learning process or understanding of digital citizenship material in various sections. The study conducted by Uğur Başarmak, Hamza Yakar, Erhan Güneş, and Zafer Kuş provides ample material and references for obtaining teaching and learning materials using a digital approach. The study introduces students to digital technology, as was done in the curriculum study for secondary



schools in Turkey. However, it falls short of covering rights, responsibilities, and building a digital ecosystem that fosters critical and ethical thinking. Other subject materials also lack a sufficient digital citizenship context. The study conducted by Victoria Palacin et al. (2021) analyses and describes citizen participation in using digital technology through the perspective of value orientation, sustainability, and the quality of interaction with digital technology (Basamak, et.al: 2014). The development of digital technology through the digital citizenship approach faces challenges, as highlighted by the study. To succeed as citizen scientists, it is important to ensure clear and logical communication, avoid biased language, and use precise technical vocabulary. The study conducted by Palacin, et al. (2021) analyses and describes citizen participation in using digital technology through the perspective of value orientation, sustainability, and the quality of interaction with digital technology. The study conducted by Palacin et al. (2021) analyses and describes citizen participation in using digital technology through the perspective of value orientation, sustainability, and the quality of interaction with digital technology. The study was conducted in Finland between 2018 and 2019. The study suggests a relationship between people's value orientation, sustainability, and the quality of digital technology interaction in shaping citizen science. The data indicates that individuals with higher levels of openness-to-change (OTC) values were more likely to use the mobile application to review others' submissions, even when they had no submissions of their own. Conversely, those with stronger security values tended to use the application only when they had relevant submissions (Palacin et al.: 2021). A scientific ecosystem is created to shape society's understanding and mastery of scientific knowledge and technology. It is an integral part of a scientist's lifestyle. This study investigates the position and role of digital citizenship in developing a scientific culture in schools, as well as the challenges and issues faced in Indonesian schools (Wang, 2018).

2. METHODS

This study adopts a qualitative approach, data yielded from a review of documents of previous research and phenomena occurring in schools, as well as interviews with secondary school students. Data analysis employs deductive and inductive approaches emphasising the themes of digital citizenship and scientific culture.

3. RESULTS & DISCUSSION

The topic of digital citizenship has been extensively discussed in Google Scholar data searches. As of 2 March 2024, there were approximately 1,590,000 titles on digital citizenship covering various issues and cases. When combined with the search term "scientific culture," there were 470,000 titles. Using the specific keyword "digital citizenship and scientific culture in Indonesian school," 28,400 titles were found. According to Wang, the goal of developing a scientific culture is to enable individuals to work and live according to scientific principles and methods, fostering more knowledgeable citizens in science and technology and striving to enhance the quality of society (Wang: 2018).

A study conducted by Prasetyo Wibowo Heru et al. revealed trends in digital citizenship in the educational context based on a thematic analysis of data from Scopus, Google Scholar, and ProQuest. The analysis yielded important keywords related to the development and dynamics of digital citizenship, focusing on issues of digital competence, digital literacy, and ICT skills. More specifically, the study discussed digital readiness, digital citizenship competencies, and educational policies (Prasetyo, et.al : 2021).



The perspective of digital citizenship in the context of school education emphasizes educating, empowering, and protecting students in the context of digital development. According to research conducted by Kokom Komalasari, Aim Abdulkarim, and Dede Iswandi, (Komalasari, et.al: 2023) that secondary school students in Bandung, Indonesia demonstrated a satisfactory level of understanding and awareness of digital citizenship. The study found that aspects of digital citizenship, such as digital etiquette, rights and responsibilities, digital security, digital communication, and health, were well-developed. However, the study only examined indicators of digital citizenship without linking them to the development of a scientific ecosystem. Nine indicators were used to assess secondary school students' understanding and awareness of digital citizenship in Bandung (Komalasari,et.al: 2023). These indicators included digital access, digital commerce, digital communication, digital literacy, digital etiquette, digital law, digital rights and responsibility, digital rights and wellness, and digital security. Another study focused specifically on strengthening digital literacy to foster scientific literacy in primary schools. The findings show that improving digital literacy aids the development of scientific literacy (Sari, et.al: 2022).

Approaches to understanding digital citizenship have largely focused on digital literacy and access. Studies and research are increasingly thematic, aiming to demonstrate improvements in literacy in specific areas through the use of digital technology. A study on improving scientific literacy through thematic learning based on ethnoscience has shown that it can enhance citizenship literacy. However, studies examining the role and position of digital citizenship in developing a scientific culture in secondary schools are yet to emerge (Muliadi, et.al.: 2023). Results from interviews indicate that:

“Schools are not adequately providing students with the necessary materials and guidance to adapt to digital technology. Furthermore, schools have not provided orientation or guidance on how to use technology to enhance the scientific ecosystem within schools.” (Zalika, 2024)

Schools, as institutions that guide young people, particularly students, towards understanding scientific culture as part of fostering citizen science, have yet to establish this as a customary practice. Students lack comprehension of research methods and scientific methods when conducting research or analyzing readings. They are unsure of what methods and scientific principles to employ to obtain sufficient scientific data and information. Observations in schools also revealed that students struggle to understand scientific methods and how to design them. For instance, students do not fully grasp how to use scientific methods to collect data through qualitative or quantitative approaches. On the other hand, the digital era and the use of digital technology have not been leveraged to shape a scientific culture and ecosystem in schools.

Challenges and issues persist in developing scientific culture in the digital age and environment. A fundamental problem is the lack of awareness and understanding of the role of digital technology and information in advancing science and technology. This unawareness stems from the prevalent use of digital technology for entertainment and self-expression, neglecting its potential for fostering scientific culture. One of the challenges is to establish and institutionalize a scientific culture by promoting scientific thinking methods, scientific knowledge, and a scientific environment. However, schools often prioritize completing curricula and meeting academic obligations.

4. CONCLUSION

Digital citizenship in the context of education continues to raise questions and challenges in the effort to realise a scientific culture. The dynamism and development of digital citizenship as a theme and issue have not



yet led to a scientific culture. The transfer of knowledge and knowledge-building in schools through adequate education about digital citizenship has not yet occurred in the teaching and learning process in the classroom.

The current position of digital citizenship is simply the understanding and comprehension of an era in which citizens exist in the digital world and information technology. The process of shaping digital citizens capable of creating a scientific ecosystem in educational institutions has not yet been adequately realised. This study provides a comprehensive description of the issues of digital citizenship that have not yet been directed towards strengthening scientific culture.

5. ACKNOWLEDGMENTS

On this occasion, the researcher would like to express gratitude to the parties who have supported the completion of the writing and study on digital citizenship and scientific culture. Thank you to Nazwa Zalika, a high school student in Yogyakarta, who provided information and insights related to the dynamics and development of digital citizenship in schools.

REFERENCES

- Aydoğan, F. (2022). Digital citizenship: Beyond big data, technical skills, industry 4.0, and COVID-19. *OMICS: A Journal of Integrative Biology*, 26(11), 589-593.
- Başarmak, U., Yakar, H., Güneş, E., & Zafer, K. U. Ş. (2019). Analysis of digital citizenship subject contents of secondary education curricula. *Turkish Online Journal of Qualitative Inquiry*, 10(1), 26-51.
- C. C. f. D. L. Media. (2024). "What is Digital Citizenship?," Canada Centre for Digital Literacy Media, 2 March 2024. [Online]. Available: <https://mediasmarts.ca/digital-media-literacy/general-information/digital-media-literacy-fundamentals/what-digital-citizenship>. [Accessed 29 February 2024].
- Di Felice, M. (2022). Digital citizenship and the end of an idea of world. *Journal of e-Learning and Knowledge Society*, 18(3), 22-28.
- Komalasari, K., Abdulkarim, A., & Iswandi, D. (2023, August). Students' Digital Citizenship at Junior High School in Bandung Indonesia. In 4th Annual Civic Education Conference (ACEC 2022) (pp. 885-892). Atlantis Press.
- Muliadi, A., Rokhmat, J., Hakim, A., & Sukarso, A. A. (2023). Profile of Attitudes of Science Teacher Candidates Towards Indigenous Science-Based Science Learning. *Prisma Sains: Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram*, 11(2), 642-652.
- N. Zalika. (2024). Interviewee, Digital Citizenship and Scientific Culture. [Interview]. 2 March 2024.
- Pakpahan, Y. R., & Gunawati, D. (2023, September). The Implementation of Digital Literacy as an Effort to Build Digital Citizenship in SMP Negeri 4 Percut Sei Tuan. In *Proceeding of International Conference on Social Sciences and Education* (Vol. 3, No. 1).
- Palacin, V., Ferrario, M. A., Hsieh, G., Knutas, A., Wolff, A., & Porras, J. (2021). Human values and digital citizen science interactions. *International Journal of Human-Computer Studies*, 149, 102605.



- Prasetyo, W. H., Naidu, N. B. M., Tan, B. P., & Sumardjoko, B. (2021). Digital Citizenship Trend in Educational Sphere: A Systematic Review. *International Journal of Evaluation and Research in Education*, 10(4), 1192-1201.
- Sari, S. P., Fazilla, S., & Milfayetty, S. (2022, May). Strengthening Digital Literacy Through Scientific Literacy For Indonesian Emas 2045 In Elementary School. In *ICONSEIR 2021: Proceedings of the 3rd International Conference of Science Education in Industrial Revolution 4.0*, ICONSEIR 2021, December 21st, 2021, Medan, North Sumatra, Indonesia (p. 103). European Alliance for Innovation.
- Wang, C. (2018). Scientific culture and the construction of a world leader in science and technology. *Cultures of Science*, 1(1), 1-13.



OPTIMIZING ONLINE LEARNING CONTENT: PERSPECTIVES OF UNIVERSITAS TERBUKA POSTGRADUATE SCHOOL STUDENTS

Sendi Ramdhani^{1*}, Tita Rosita¹, Amalia Sapriati¹

¹Universitas Terbuka, Tangerang Selatan, Indonesia

*sendi@ecampus.ut.ac.id

ABSTRACT

Online Tutorials are an important learning process for Universitas Postgraduate students including Master of Basic Education because they contribute as much as 60% to the final grade of the course. Online tutorials are conducted over the Internet (online) and must be followed by students. However, based on preliminary studies, the intensity of UT Master of Basic Education students in accessing the material is very low because they consider the contribution to the tutorial value to be small. This research was conducted using the survey research method, which is a research approach that uses questionnaires and interview instruments, to collect data from respondents. Based on the results of the study shows that: 1) the majority of students open online tutorials on Saturdays and Sundays. As for the time of opening online tutorials, the majority are in the evening. Each time you open an online tutorial, students spend about 60 – 120 minutes. Students at the beginning of opening tutorials usually open attendance first, then essential materials, and then various enrichments, discussions, and assignments; 2) students consider introductions and closings, essential and enrichment materials, and greeting videos to be important and very important parts of online tutorials, although many students also consider closing less important; 3) students who rarely or never access essential materials and enrichment materials are reasonable because essential materials are the same as subject matter books or modules and the same materials can be searched on the internet, and enrichment can also be searched on the internet; 4) students are of the view that they prefer essential material to be presented in the form of PPT and/or video. As for the form of enrichment, students also think that they prefer the form of PPT and/or video; 5) The form of discussion that students like the most is one issue that all students comment on; 6) The form of assignment that students like the most and are considered the best is the problem with an open answer; 4) the majority of students think that webinar tutorials (synchronous tutorials) are very important and important; 7) The majority of students think it is more comfortable if webinar tutorials are held on weekends and in the morning' 8) The majority of students think that the form of webinar tutorials should be in the form of delivering material by tutors and discussing problems or problems

Keywords: Distance Education, E-Learning, Online Tutorial, Postgraduate Students

1. INTRODUCTION

Universitas Terbuka (UT) is a university that implements a distance learning system. Learning at UT is not carried out face-to-face, but uses media, both print (module) and non-print media (audio/video, computer/internet, radio broadcasts, and television) (UT, 2021). The distance learning system is also applied in the UT Postgraduate Program which includes Master of Basic Education (MPDr). The learning process consists of self-study and tutorials. Tutorial activities are carried out in combination mode (hybrid or blended) in graduate student learning. The combination tutorial mode integrates asynchronous tutorial mode (online tutorials or Tuton) with synchronous tutorials (Face-to-Face Tutorials/TTM or Webinar Tutorials/Tuweb) as a single, continuous, and whole tutorial activity (UT T. K., 2021).

Tuton is an important learning process for UT graduate students including MPDr because it contributes as much as 60% to the final grade of the course. Online tutorials are conducted over the Internet (online) and must be followed by students. Tuton lasts for 12 weeks in the form of giving 12 (twelve) times material and discussions and 3 (three) assignments that must be done by students (UT T. K., 2021). Then the tutorial value comes from 10% access to the material, 20% participation in discussions, and 70% working on tutorial assignments (UT T. K.,



2021). However, based on the preliminary study, the intensity of UT Master of Basic Education students in accessing the material is very low because they consider the contribution to the tutorial value to be small.

Students think that it is important to participate in discussions and work on assignments because they contribute as much as 90%. Accessing the material is considered not very important. In fact, the intensity of material access affects the increase in learning outcomes by 47% (Oftika, Jalmo, & Marpaung, 2015). In another study, it was also mentioned that access to the material had an effect of 10.7% on learning outcomes (Gustina, Zulhendra, & Jufri, 2014).

Tuton UT uses a Learning Management System (LMS), namely Moodle. LMS is an application software used to help the learning process in e-learning (Rusli, Hermawan, Supuwiningsih, & Bali, 2017). The main functions of an LMS include student management, course management, skill assessment or evaluation, collaboration support, learner-centered tracking & personalization systems, enrollment, and administration (Lestari, 2014). While Moodle LMS is an open-source LMS that can be customized for selected learning. The benefit of using an LMS using Moodle is that it can reduce the limitations of online learning (Simanullang & Rajagukguk, 2020). UT's LMS Moodle Graduate Program contains essential materials, enrichment, discussions, and assignments.

Based on the findings of previous research, the majority of students do not access essential and enrichment materials, even though there is a significant effect Course Hits has on the value of online tutorials. Likewise, there is a significant influence of Resources with Access on the value of online tutorials. Then there was Days' significant influence with access to Tuton's value. With the significant influence of Course Hits, Days with Access, and Resources with Access, on the value of online tutorials, the effect was 24% (Rosita et al, 2023). This article is an overview of the perspectives of Master of Basic Education students on introduction, closing, essential materials, enrichment materials, discussions, assignments, greeting videos, and webinar tutorials.

2. METHODS

This research was conducted using the survey research method, which is a research approach that uses questionnaires and interview instruments, to collect data from respondents. Questionnaires and inter-perspectives are used to 1) find out the time and length of time students access online tutorials; 2) the order in which students access online tutorials, student perspectives on introductions, closing, essential materials, enrichment materials, discussions, assignments, and greeting videos; 3) the perspectives of students regarding the form of essential materials, enrichment materials, discussions, and assignments; and student perspectives regarding the implementation of webinar tutorials.

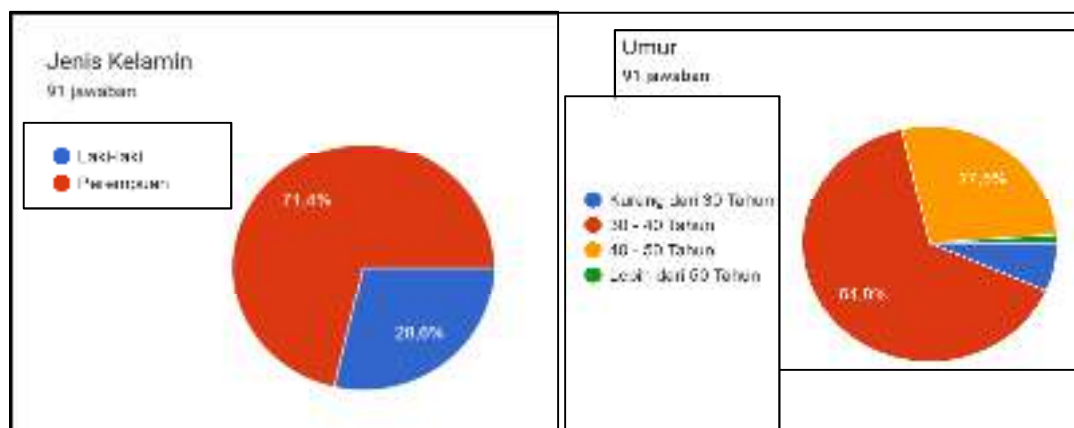


Figure 1a. Distribution of Student Respondents by Age and Gender



In a study involving 91 respondents of Master of Basic Education students of the Open University Graduate School, there was a dominance of women as much as 71.4%, while men reached 28.6%. This is also in accordance with all Master of Basic Education students who are the majority of women. There was also a variation in the age of respondents, where as many as 64.8% were aged between 30-40 years, while 27.5% were aged between 40-50 years. Respondents were also spread across all regions of Indonesia, namely, the Western region: Bandung, Batam, Bogor, Jakarta, Jember, Malang, Medan, Padang, Palembang, Pekanbaru, Pontianak, Semarang, Surabaya, and Yogyakarta Central Region: Banjarmasin, Makassar, Mataram, Samarinda, Eastern Region: Kupang.

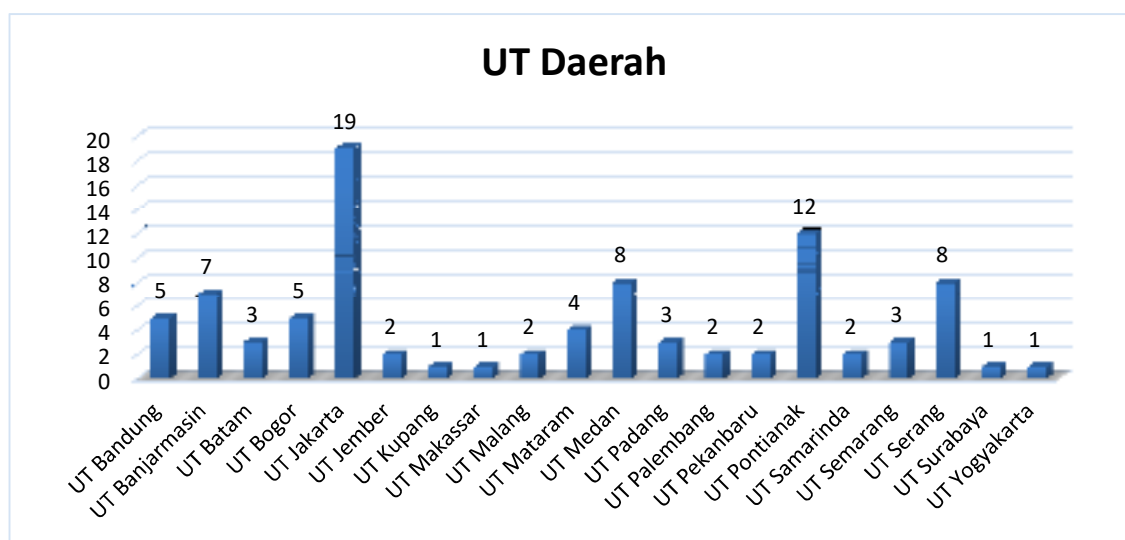


Figure 1b. Distribution of Student Respondents Based on UT Regions

3. RESULTS & DISCUSSION

3.1 Result

3.1.1. Time and Length of Access to Tutorials

More than 50% of student respondents open online tutorials every day and more than 70% of student respondents open online tutorials on Fridays, Saturdays, and Sundays. The majority of student respondents open online tutorials at night (19.00 – 22.00), which is above 70%. Student respondents who open online tutorials during the day, afternoon, and late at night are around 40%. While the morning is about 20% and the middle of the night is about 10%. The length of time used by the majority of students every time they open an online tutorial is around 60-120 minutes.

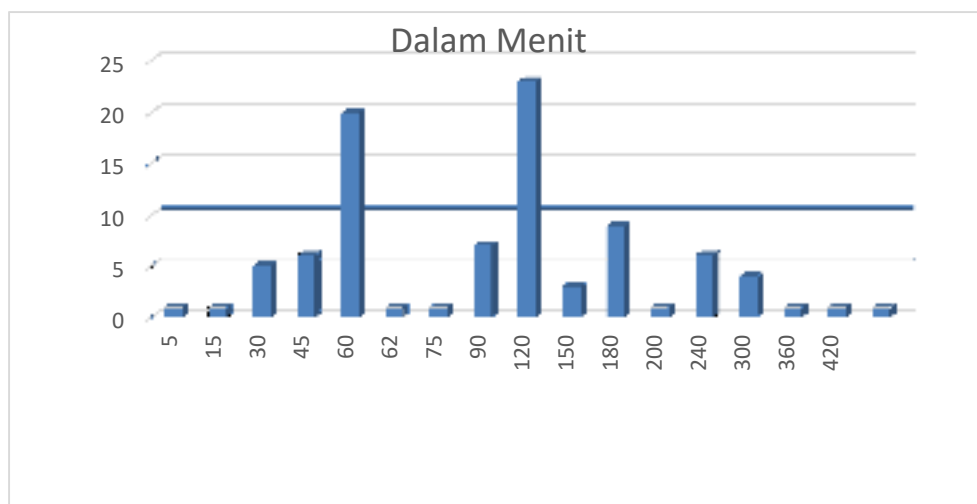


Figure 2. Time and Length of Students Access Online Tutorials

3.1.2. Introduction, Closing, Essential Materials, Enrichment Materials, and Greeting Videos

Student respondents considered that the Introduction was important by 56% of students important and 36.3% very important to read. While 7.7% of students consider that less important. The Closing is considered important by 61.5% and 17.6% of students consider it very important to read. 20.9% of college students consider closing reading less important.

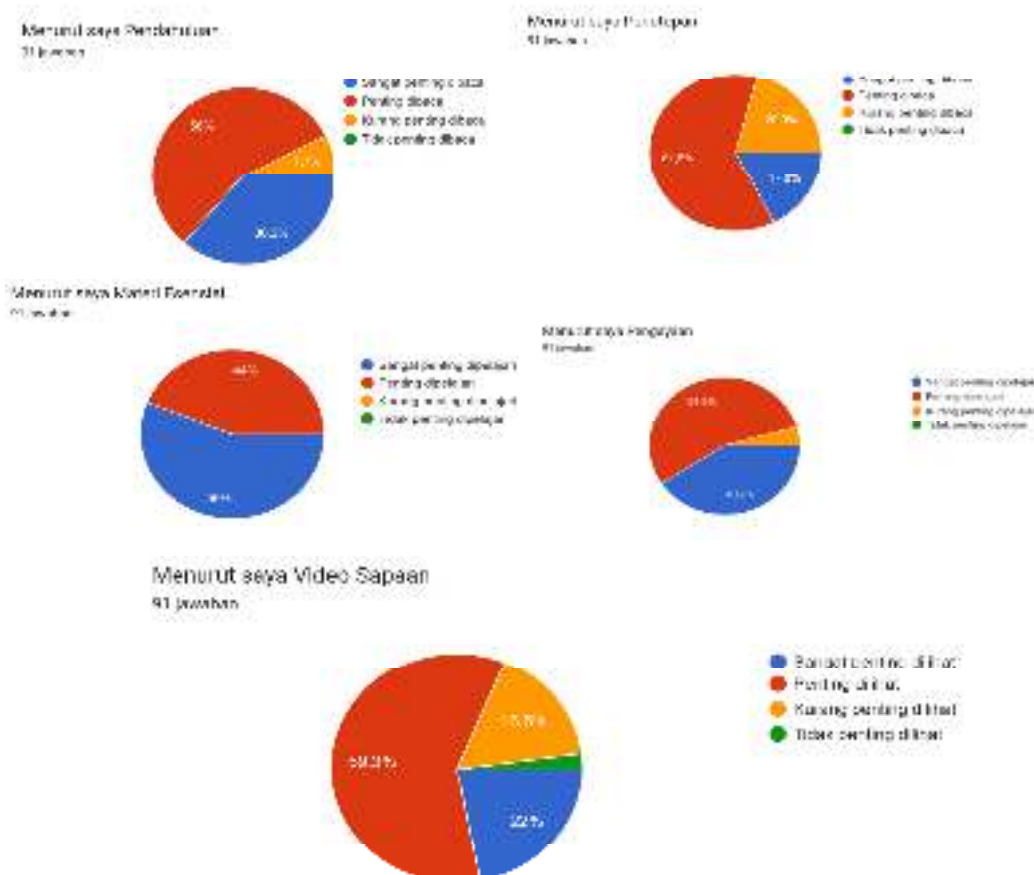


Figure 3. Student views on essential materials, enrichment, greeting videos, introduction, and closing



As for 100% of students consider that Essential material is very important and important to learn. While 95% of students say that Enrichment is important and very important, there are 4% of students who consider Enrichment less important. While related to Greeting Videos, 81% of students consider it important and very important to see and 19% of students consider that it is less important and not important to see.

The reason students rarely study Essential material is because according to 61.5% consider that the content of essential material is the same as the material of the Basic Material Book. Then also 56% of student respondents think that material can be searched through the internet and 26% feel that it can be searched in other books.

The reason students rarely study enrichment material is because according to 60.4% think that material can be searched through the internet content. Furthermore, 26.4% considered that the material of enrichment material was the same as the material of the Subject Matter Book and could be found in other books.

3.1.3 Forms of Essential Materials, Enrichment, Discussion, and Tasks

73.6% of students prefer Essential Materials in the form of PPT and 62.6% of students like it in the form of videos. While 36.2% prefer PDF forms and 17.6% Word forms. While related to Enrichment, 63.7% of students prefer Enrichment in the form of PPT, and 57.1% of students like it in the form of videos. While 33% prefer PDF forms and 23% Word forms.

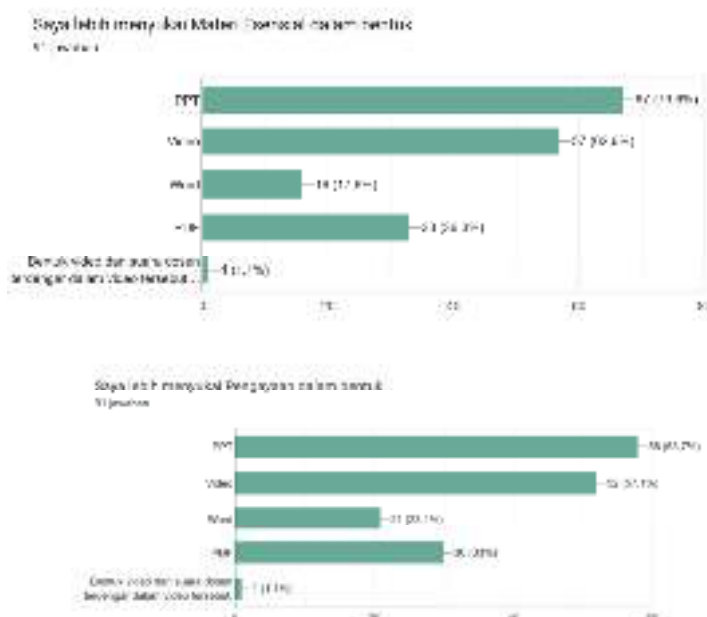


Figure 4. Student Views Regarding the Form of Essential Materials and Enrichment

The form of discussion that 85% of students liked was the form of "one problem that all students commented on". While 24% of students like the form "more than one problem and students are divided to comment on one of them" and 26% of students like the form "students should comment on the opinions of friends too".

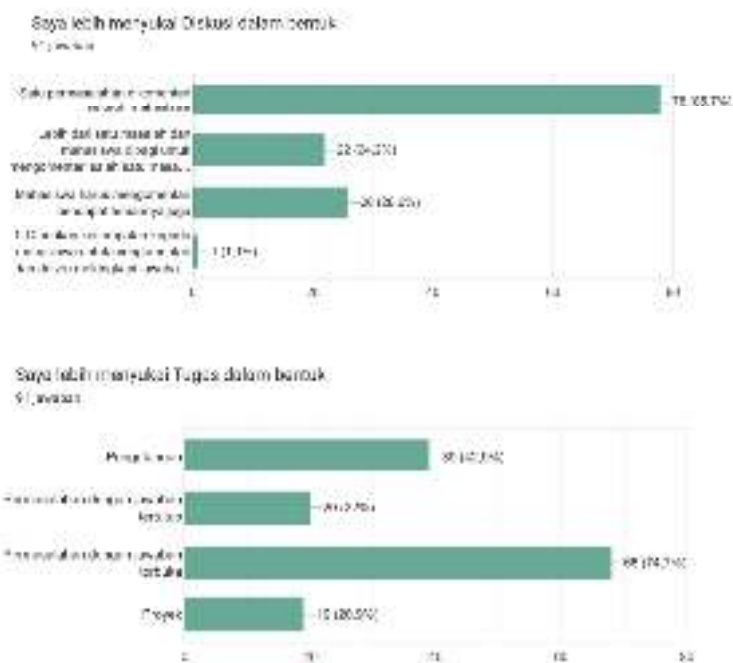


Figure 5. Student Perspectives Regarding the Form of Discussion and Assignment

3.1.4 Tutorial Webinar

When student respondents were asked how important Webinar Tutorials were, 83% of students considered them very important and important while students considered them mediocre, less important, and unimportant.

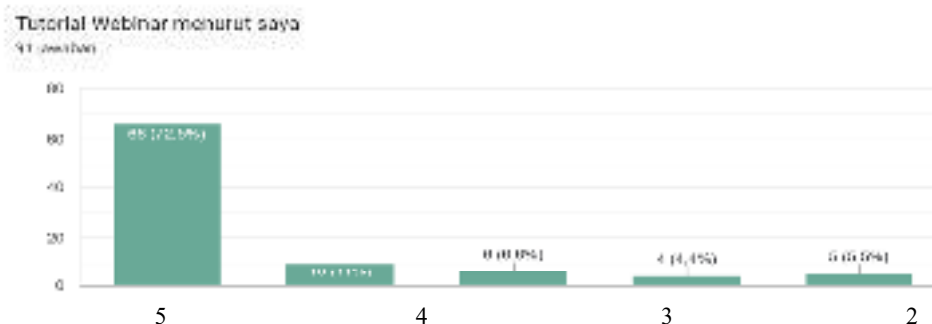


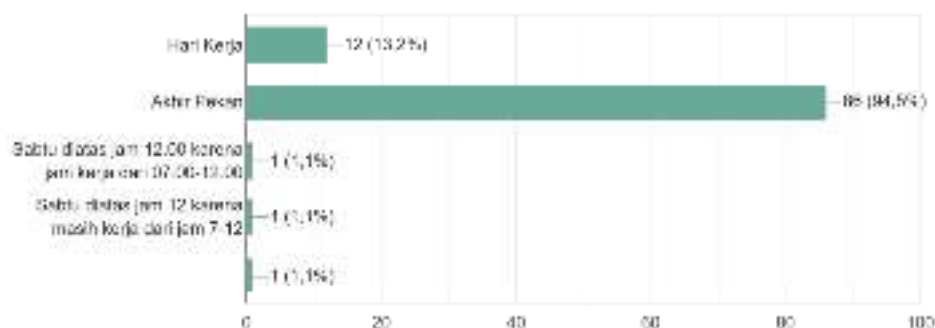
Figure 6. Student Views Related to Webinar Tutorials

As for the timing of the Webinar Tutorial, 94.5% of students revealed that it was more convenient to carry out on weekends. 75% of students feel comfortable in the morning and 46% feel comfortable during the day.



Tutorial Webinar lebih nyaman dilaksanakan pada

91 jawaban



Tutorial Webinar lebih nyaman dilaksanakan pada

91 jawaban

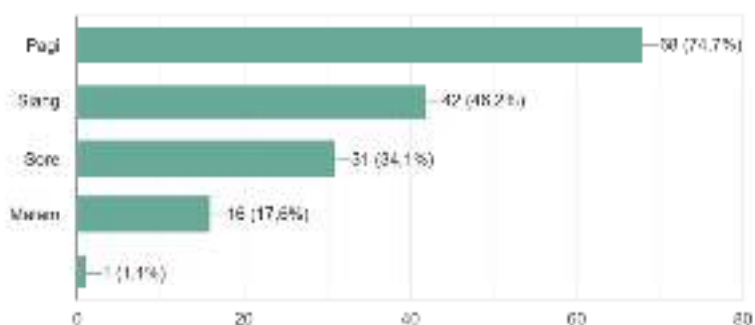


Figure 7. Student Perspectives Regarding the Time of the Webinar Tutorial

Furthermore, the form of webinar tutorials that are preferred by 78% of students is the delivery of material by Tutors, and 62% of students like to also discuss problems or problems. Group discussions are preferred by 45% of students, class discussions are preferred by 40% of students, and 36% of students like student presentations.

Saya menyukai tutorial webinar dalam bentuk

91 jawaban

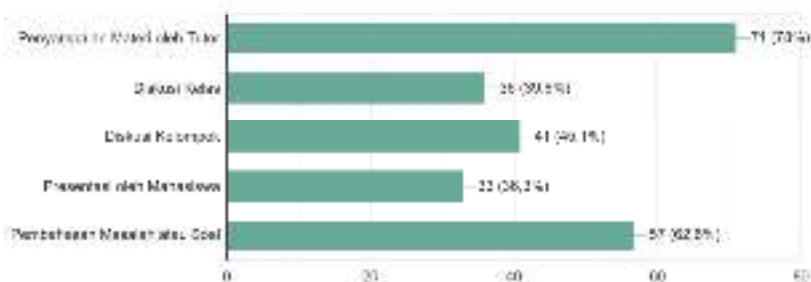




Figure 8. Student Perspectives Related to the Form of Webinar Tutorials

3.2 Discussion

3.2.1 Time and Length of Time and Tutors Access Online Tutorials

The majority of students open online tutorials on Saturdays and Sundays. As for the time of opening online tutorials, the majority are in the evening. Each time you open an online tutorial, students and tutors spend about 60 – 120 minutes. Students are encouraged every day to open online tutorials because based on the results of previous research show that there is an influence on many days students access with the value of the tutorial. This is in line with research conducted by Oftika et al. (2015); Halim, et al. (2021); Loeneto & Kurniawan (2021); Shah & Barkas (2018); and Gustin et al. (2014) who stated that the intensity of material access affects the improvement of learning outcomes.

3.2.2 Student Perspectives on Introduction, Closing, Essential Materials, Enrichment Materials, Discussions, Assignments and Greeting Videos

Students consider the introduction and closing part of the online tutorial important and very important to read, although many students also think that the closing is less important to read. The essential and enrichment materials are considered important and very important by all students. As for the greeting video, students consider it important and very important.

Students who rarely or never access essential materials and enrichment materials are reasonable because essential materials are the same as the Subject Material Book or Modules and the same materials can be searched on the internet, and enrichment can also be searched on the internet. Based on other research (Sahin et al., 2010) revealed that the priority order of students in finding sources is as follows: First priority: Search engines (Google and Yahoo); Second priority: Online databases and e-magazines; Third priority: Online library, e-encyclopedia, e-book; Fourth priority: e-journal; and Fifth priority: email and forums.

Some students and tutors consider that the closing part is not too important so it is necessary to create a form of closure at each session so as to encourage students and tutors to access the closure, preferably in the form of general responses from the results of discussions or assignments and also the results of reflections of both tutors and students. Then also the Greeting Video should not always be in the introduction, it can also be closed, the content of which is the tutor's reflection on the session. Furthermore, regarding the form of essential material, it should not only be the conclusion of the Subject Material Book but also a supplement.

3.2.3 Student Perspectives Related to the Form of Essential Materials, Enrichment Materials, Discussions, and Assignments

Students are of the view that they prefer essential material presented in the form of PPT and/or video. As for the form of enrichment, students also think that they prefer the form of PPT and/or video. The form of discussion that students like the most is one issue that is commented on by all students. Then the form of assignment that students like the most is a problem whose answer is open.

The form of essential material and enrichment can vary and vary in each session to avoid student boredom, namely PPT, Video, and PDF. The form of videos on essential material can be developed because based on the results of research it affects student motivation and involvement (Paradise & Wibowo, 2021). Then also the use of effective and efficient apperception videos in LMS (Octafian, 2022)

As for the form of discussion, students should be required to comment also on the opinions of their friends so that the discussion process will occur. Based on the results of research (Hikmawati et al., 2021) revealed that the discussion process in LMS can encourage students' critical thinking skills and discussion is a fundamental strategy for knowledge construction at universities (Hamann et al., 2012). In the discussion process, students must be able to realize that discussion is for their learning or approach discussion in a coherent way (Han & Ellis (2019).



The form of tasks needs to be multiplied as well as the form of projects. Project assignments in online learning make learning more fun, conducive, active, and creative so that it can foster motivation to be actively involved in the learning process (Widodo & Sriyanto, 2022). Project assignments carried out in groups can promote creative ideas and help students to build confidence in producing innovative work (Zakiah et al., 2020)

3.2.4 Student Perspectives Related to the Implementation of Webinar Tutorials

The majority of students think that webinar tutorials are very important and important. A webinar tutorial that is synchronous learning, according to Phelps & Vlachopoulos (2020) in distance education offers students and tutors a virtual web conference environment where although they may be geographically separated, they are given the flexibility to be virtually present in a shared space in *real-time*.

As for the implementation, the majority of students think it is more comfortable if it is carried out on weekends and in the morning. Then the majority of students think that the form of webinar tutorials is the delivery of material by tutors and discussion of problems or problems, but tutors have diverse perspectives regarding the form of webinar tutorials, namely presentations by students, class discussions, problem discussions, material delivery by tutors, and group discussions. In the research of He et al. (2021), no significant differences were found between synchronous learning and traditional education, even having a higher level of satisfaction than traditional education, but not better or worse than traditional education but preferred.

The implementation of webinar tutorials so far has been appropriate, which is carried out on weekends, although some tutors and students think that there is still a lack of meetings. The form of webinar tutorials can be designed for various presentations by students, class discussions, problem discussions, material delivery by tutors, and group discussions.

4. CONCLUSION

Based on the results of research that the majority of students open online tutorials on weekends, it is recommended that the beginning of the session is on Saturday instead of Monday.

Some students consider that the closing part is not too important so it is necessary to create a form of closure in each session to encourage students and tutors to access the closure, preferably in the form of general responses from the results of discussions or assignments and also the results of reflection of both tutors and students. Then also the Greeting Video should also not always be in the introduction, it can also be closed, the content of which is the tutor's reflection on the session. Furthermore, regarding the form of essential material, it should not only be the conclusion of the Subject Material Book but also a supplement.

The form of essential material and enrichment can vary and vary in each session to avoid student boredom, namely PPT, Video, and PDF. As for the form of discussion, students should be required to comment also on the opinions of their friends so that the discussion process will occur. Meanwhile, related to the form of tasks, it is also necessary to multiply the form of projects. The implementation of webinar tutorials so far has been appropriate, which is carried out on weekends, although some tutors and students think that there is still a lack of meetings.

REFERENCES

- Al-Fraihat, D., Joy, M., & Sinclair, J. (2020). Evaluating E-learning systems success: An empirical study. *Computers in human behavior*, 102, 67-86.
- Bradley, V. M. (2021). Learning Management System (LMS) used with online instruction. *International Journal of Technology in Education (IJTE)*, 4(1), 68-92.
- Gunawan, I. (2011). Evaluasi program pembelajaran. *Jurnal Pendidikan*, 17(1).



- Gustina, F., Zulhendra, Z., & Jufri, A. (2014). Kontribusi motivasi dan pemanfaatan akses internet sekolah sebagai sumber belajar terhadap hasil belajar pada mata pelajaran KKPI siswa kelas XI Multimedia di SMK Negeri 2 Padang Panjang.
- Gustina, F., Zulhendra, Z., & Jufri, A. (2014). Kontribusi motivasi dan pemanfaatan akses internet sekolah sebagai sumber belajar terhadap hasil belajar pada Voteteknika (Vocational Teknik Elektronika dan Informatika), 2(1).
- Halim, A., Yani, E., Mahzum, E., Farhan, A., & Irwandi, I. (2021). Hubungan antara penggunaan internet sebagai sumber belajar dengan hasil belajar fisika. Dalam *Journal of Physics: Conference Series* (Vol. 1882, No. 1, hlm. 012029). IOP.
- Hamann, K., Pollock, P. H., & Wilson, B. M. (2012). Assessing student perceptions of the benefits of discussions in small-group, large-class, and online learning contexts. *College Teaching*, 60(2), 65-75.
- Han, F., & Ellis, R. A. (2019). Identifying consistent patterns of quality learning discussions in blended learning. *The internet and higher education*, 40, 12-19.
- He, L., Yang, N., Xu, L., Ping, F., Li, W., Sun, Q., ... & Zhang, H. (2021). Synchronous distance education vs traditional education for health science students: A systematic review and meta-analysis. *Medical Education*, 55(3), 293-308.
- Hikmawati, H., Sahidu, H., & Kosim, K. (2021). Metode Diskusi Berbasis Learning Management System (LMS) Untuk Meningkatkan Kemampuan Berpikir Kritis Mahasiswa. *ORBITA: Jurnal Kajian, Inovasi dan Aplikasi Pendidikan Fisika*, 7(1), 8-11.
- Lestari, A. S. (2014). Aplikasi Moodle dalam e-learning. Jakarta: Orbit.
- Loeneto, B. A., & Kurniawan, D. (2021). Sikap Guru Prajabatan terhadap Penggunaan Internet dalam Pembelajaran dan Prestasi Akademiknya. *Pendidikan Bahasa Inggris: Jurnal Pengajaran dan Penelitian Bahasa Inggris*, 6(1), 1-12.
- Melda. (2015). Pengaruh Media Massa Terhadap Intensitas Belajar Matematika Di Rumah Pada Siswa Kelas XI IPS MAN Palopo. Skripsi. Palopo: IAIN Palopo.
- Nuryani, E. (2014). Hubungan Intensitas Mengakses Facebook dengan Motivasi Belajar Siswa SMA Negeri 2 Tenggarong Seberang. *E-journal Ilmu Komunikasi*, 2(3): 178–192.
- Oftika, E., Jalmo, T., & Marpaung, R. R. (2015). Pengaruh Intensitas Mengakses Internet Terhadap Hasil Belajar Biologi Pada Konsep Ekosistem. *Jurnal Bioterdidik: Wahana Ekspresi Ilmiah*, 3(8).
- Oktafianus, Y. (2022). Pengembangan video apersepsi sebagai konten learning management system materi getaran dan gelombang Kelas VIII SMP Sriwedari Malang (Doctoral dissertation, Universitas Negeri Malang)
- Paradise, P., & Wibowo, M. (2021). Pengembangan learning management system (LMS) dengan menerapkan video based learning dan gamification dalam meningkatkan motivasi dan keterlibatan mahasiswa. *Jurnal Media Informatika Budidarma*, 5(3), 929-936.
- Phelps, A., & Vlachopoulos, D. (2020). Successful transition to synchronous learning environments in distance education: A research on entry-level synchronous facilitator competencies. *Education and Information Technologies*, 25(3), 1511-1527.
- Rusli, M., Hermawan, D., Supuwiningsih, N. N., & Bali, S. T. (2017). Multimedia pembelajaran yang inovatif: Prinsip dasar dan model pengembangan. Yogyakarta: Penerbit Andi.



- Rosita, T., Ramdhani, S., & Sapriati, A. (2023). Mapping Student Engagement: Analyzing the Nexus of Course Engagement, Resource Utilization, and Online Tutorial Participation. *AL-ISHLAH: Jurnal Pendidikan*, 15(4), 5639-5649.
- Sahin, Y. G., Balta, S., & Ercan, T. (2010). Dia menggunakan sumber daya internet oleh mahasiswa selama proyek kursus mereka elicitation: Sebuah studi kasus. *TOJET: Jurnal Online Teknologi Pendidikan Turki*, 9(2).
- Simanullang, N. H., & Rajagukguk, J. (2020). Learning Management System (LMS) berbasis moodle untuk meningkatkan aktivitas belajar siswa. Dalam *Jurnal Fisika: Seri Konferensi*, 1462(1), 012067.
- Stark, J. S., & Thomas, A. 1994. *Assessment and Program Evaluation*. Needham Heights: Simon & Schuster Custom Publishing.
- Syah, R. K., & Barkas, L. (2018). Menganalisis dampak teknologi e-learning terhadap keterlibatan, kehadiran, dan kinerja siswa. *Penelitian dalam Teknologi Pembelajaran*.
- UT. (2021, Desember 27). Tentang UT. Diperoleh dari Universitas Terbuka: <https://www.ut.ac.id/tentang-ut>
- UT, T. K. (2021). *Katalog Program Pascasarjana UT 2021/2022*. Tangerang Selatan: Penerbit Universitas Terbuka.
- Widodo, F., & Sriyanto, S. (2022). Model Project Based Learning dalam Pembelajaran Daring di SMP Negeri 5 Wadaslintang. *Proceedings Series on Social Sciences & Humanities*, 3, 509-512.
- Zakiah, N. E., Fatimah, A. T., & Sunaryo, Y. (2020). Implementasi project-based learning untuk mengeksplorasi kreativitas dan kemampuan berpikir kreatif matematis mahasiswa. *Teorema: Teori dan Riset Matematika*, 5(2), 285-293.



HELLOTALK: AN APPLICATION TO IMPROVE UNIVERSITY STUDENTS' WRITING SKILLS

¹Fifi Arifida, ²Raihana Diani, ³Sintia Febrianda, ⁴Meta Keumala, and
⁵Marisa Yoestara
^{1,2,3,4,5}Universitas Serambi Mekkah, Indonesia
*meta.keumala@gmail.com

ABSTRACT

This study intends to find out the university students' experience in using the Chat feature in the HelloTalk application. The method used was a mixed method researching 55 university students from several universities in Aceh consisting of 13 male and 42 female students. The instruments used in this research were a questionnaire and an interview with several selected this research, researchers used descriptive analysis to analyse the data from the questionnaire and thematic analysis to analyse the data from the interviews. The result revealed that the university students felt improvement in the writing element while using the chat feature in HelloTalk, especially the vocabulary element.

Keywords: HelloTalk, writing, elements of writing

1. INTRODUCTION

In this globalization era, humans can no longer be separated from technology. According to Putri (2022), technological development is very rapid. In the current era of technological development, many people are already using technology in their daily activities. The role of technology for humans includes facilitating information and communication between individuals or organizations. Apart from that, technology can also help humans by providing access to various learning resources, one of which is the HelloTalk application.

Hermawan and Amri (2022) state that HelloTalk is a language-based application for mobile conversations that creates cultural immersion and language learning, so that language practice becomes easy, interesting, and intuitive because it makes it possible for users to connect and talk with native speakers from all over the world. The HelloTalk application has various features, one of which is the chat feature. With this feature, students can practice their writing skills in English.

Writing is the creation of notes or information on a medium using characters which is usually done on paper using tools such as pens or pencils. Writing is also defined as the act or process of creating a written text, showing how a person communicates his or her thoughts and feelings by visible signs, understandable not only by himself but also by all people (Indrilla, 2018). There are several elements in writing, including mechanics, grammar, vocabulary, and fluency in writing. Mechanics in writing are needed to be considered for producing good writing, such as spelling (Prihatmi, 2017). Spelling is important in writing, particularly to avoid misunderstanding the meaning of the written word. Besides, punctuation as the writing mechanics also plays an important role in a sentence or text. Punctuation includes the use of certain signs in writing to separate sentences, mark breaks, organize the flow of text, and indicate intonation. Some examples of punctuation marks are commas, periods, question marks, exclamation marks, semicolons, and hyphens. The use of punctuation affects understanding, rhythm, and articulation in writing, clarifying the structure and meaning of a text.

Grammar is a set of rules and practices that govern the structure, development, and use of language and that define standards and norms for the structure of sentences and the relationships between different sentence parts. In other words, grammar helps keep language coherent. It contains rules about word order, verb conjugation, punctuation, spelling, and other elements of language use. The Department of grammar is concerned the rules of language and their application in writing, speaking, and listening. Studying grammar can help students improve their writing and communication skills, as well as their overall understanding of the language. Grammar is the science that studies how language works in communication (Takadisihang, 2022).



Vocabulary is the collection of words and phrases that a person knows in a particular language. It is the collection of all words and expressions that a person can understand and use, including the different meanings, definitions, and implications of each word or expression. For effective communication and understanding, it is important to have a wide and varied vocabulary, to be able to express more nuances and precision and to better understand the language. In addition, learning new vocabulary also broadens knowledge and improves thinking and self-expression skills in a specific language.

Fluency is the main thing thing that someone needs to pay attention to when studying English (Sholeh, 2015). Fluency is the ability to communicate ideas and information clearly and effectively in written form. The ability to write confidently, freely, and simply is an essential part of effective communication in writing. Writing fluency can be developed through practice, including writing and revising, reading and analyzing good writing, and receiving feedback and advice from teachers, editors, or peers. It is important to remember that writing fluency is a process and cannot be mastered overnight. With the right practices and resources, writing skills can be improved.

There have been several studies that have examined the application of HelloTalk in improving writing skills, such as research from Solihin et al. (2023) with the title "Improving Writing Skills by Using a Project-Based Learning Model Through the HelloTalk Application", and there is also another research from Safitri (2023) with the title "Using the HelloTalk Application to Improve Students' Writing Skills in Descriptive Texts in First Grade SMA Ma'arif NU 5 Purbolinggo". However, unfortunately, there has been no research focussing on Hellotalk in improving the five aspects of writing. Therefore, researchers were interested in conducting this research to find out how the university students experience in using the chat feature in HelloTalk, particularly in term of the elements of writing improvement.

2. METHODS

A scientific method is a strategy to gather information or accomplish specific goals in a study. The method of this research comprises design, participants or subject, instrument, collected data process, and technique of analyzed data.

Design

The design used in this research was a mixed method with an explanatory sequential design. According to Azhari et al. (2023), explanatory sequential design is a research design that collects and analyzes the quantitative data in the first stage, followed by the collection and analysis of qualitative data in the second stage, to support the findings of the quantitative data carried out in the first stage, aiming to gather more thorough, accurate, dependable, and impartial data. In this research, the researchers described the university students' experience in using the chat feature in HelloTalk to improve the elements of writing skills. In this research, measurable data with a comparative aspect was obtained by quantitative procedures which was by distributing the questionnaire. The obtained quantitative data is then expanded upon, proven, and persuaded by using the qualitative methods, which was through the interview. The quantitative data obtained was used to see how much the contribution of the use of chat feature in the HelloTalk application had on improving the elements of writing skills according to university students' experiences. Meanwhile, the qualitative data was used to strengthen the findings from the quantitative data.

Participant

In this research, there were 55 university students in Aceh as the research participants, consisting of 13 male and 42 female students. They were students from several state and private universities, including 26 students from Serambi Mekkah University, 7 students from Syiah Kuala University, 8 students from UIN Ar-Raniry, 3 students from Abulyatama University, 4 students from Muhammadiyah Aceh University, 1 student from Almuslim University, 2 students from IAIN Lhokseumawe University, 1 students from Lhokseumawe State Polytechnic University, 1 student from Stikes Muhammadiyah Lhokseumawe University, 1 students from



Ubudiyah Indonesia University, and 1 student from Malikussaleh University. Research participants in this research were students from the 2020 to the 2023 academic years. The total of university students for the 2020 academic year was 13, the 2021 academic year was 25, the 2022 academic year was 7, and the 2023 academic year was 10.

Instrument

The instruments the researchers used in this research was questionnaire and interview. A questionnaire is a technique for collecting data or information through forms containing questions that can be addressed to a person or group of people in an organization to get responses or answers that will be analyzed by parties who have a specific purpose, through a questionnaire, the party can study the reciprocal results provided by the respondents and try to measure what can be found in the process of filling out the questionnaire. Besides, it is also to determine how broad or limited the sentiments conveyed in a questionnaire are (Wijaya, 2016). In this research, the questionnaire was in the form of closed statements containing 20 statements regarding university students' experiences in using the Chat feature in the HelloTalk application regarding writing skills elements improvement. The 20 questions covered four aspects/elements in writing, the first five questions were about mechanics, the second five questions were about grammar, the third five questions were about flow in writing and the last five questions were about vocabulary, completed with four Likert-scale answers, namely strongly agree, agree, disagree and strongly disagree. Ten minutes were required to complete the questionnaire. The researchers created a questionnaire bay using Google Forms and distributed the questionnaires via WhatsApp to university students who used the HelloTalk application in Aceh Regency.

Another instrument used to collect data in this mixed-method research was an interview. Data collection techniques using interviews is a face-to-face contact between two or more parties for a specified goal, such as gathering data or obtaining information (Fadhallah, 2021). In this research, the researchers created six questions for interviews related to elements of writing skills improvement through HelloTalk. The questions in the interview included, (1) How long have you used the HelloTalk application? (2) How do you think the mechanics of writing improve when using the Chat feature in the HelloTalk application? (3) How do you think the grammar improves when using the Chat feature in the HelloTalk application? (4) How do you think the fluency of writing improves when using the Chat feature in the HelloTalk application? (5) How do you think the vocabulary improves when using the Chat feature in the HelloTalk application? (6) What elements of writing are most improved while using the Chat feature in the HelloTalk application? This data collection process was carried out by interviewing five university students who used the HelloTalk application from university representatives in Aceh via voice call in WhatsApp.

Procedures

According to Makbul (2021), procedures are approaches or strategies that researchers can employ to get information. In the quantitative research stage of data collection, university students in Aceh who used the HelloTalk application were given an online questionnaire. The researchers gave the university students questionnaires and then waited for 10 days to get responses. The questionnaire was closed by the researcher after ten days. After that, the researchers used online interviews to conduct the second stage of qualitative investigation. To collect information for the second stage, researchers contacted five university students from each university in Aceh who had used the HelloTalk application via voice call. Next, the researchers asked seven questions. The result of the questionnaire and interview obtained were then analysed by the researchers.

Data Analysis

Octaviani and Satriani (2019), say that the goal of data analysis is to categorize and organize data. At this point, efforts are made to set away other sets of data that are similar but not the same, group the same data, equate the same data, and distinguish the different data. The data obtained in this research was then analyzed to



determine the university students' experiences using the Chat feature in the HelloTalk application in terms of the improvement of writing elements.

Data from questionnaires on university students' experiences in using the Chat feature in the HelloTalk application were analyzed using descriptive statistics. Descriptive statistics were used to examine data from questionnaires about university students' experiences by using the Chat feature in the HelloTalk application. According to Solikhah (2016), to provide results, descriptive statistics must organize and analyze facts and figures to present a clear, concise, and organized picture of a symptom, event, or situation. The descriptive statistics used in this study were by calculating the percentage as in the following formula:

$$P = F/N \times 100\%.$$

Explanation:

P = the percentage sought

F = the frequency for which the percentage is being sought

N = number of participants

Data from interview on university students' experiences in using the Chat feature in the HelloTalk application related to the improvement of elements in writing skills were analyzed using thematic analysis. The process of finding, examining, and summarizing themes or patterns in data is known as thematic analysis (Sitasari, 2022). If a researcher wants to closely study qualitative data to identify connections between patterns in the degree to which occurrences occur as perceived by the researcher, this approach works very well.

3. RESULTS & DISCUSSION

The result of this research was presented based on the twenty questions in the questionnaire and seven questions in the interview.

3.1 Questionnaire Result

Table 1. Questionnaire Results of University Students' Experiences to Improve Mechanics in Writing by Using the HelloTalk Application in Chat Feature.

No.	Statement	Answer Alternatives				Average
		Strongly Disagree	Disagree	Agree	Strongly Agree	
1.	The biggest improvement in learning English by using the HelloTalk application in the chat feature is the writing mechanics.	1	1	42	11	96%
2.	Learn English by using the HelloTalk application in the chat feature to help users correct punctuation errors.	0	3	37	15	94%
3.	Learning English using the HelloTalk application in the chat feature helps in forming clearer and more structured sentences.	1	1	36	17	96%
4.	Learning English using the HelloTalk application in the chat feature can improve and perfect spelling.	1	1	37	16	96%
5.	Learning English by using the HelloTalk application in the chat	2	8	34	11	82%



	feature can increase fluency in writing due to the consistency of correct language use.					
	The average percentage of the score					93%

Based on the university students' experiences using the HelloTalk chat feature, the table above shows that writing mechanics experienced a high improvement in English learning, with up to 96% of participants stating this. 94% of university students said that using the chat feature in the HelloTalk application to learn English could help with punctuation correction, 96% of participants felt very helpful in forming clearer and more structured sentences through the chat feature in the HelloTalk application, 96% of respondents stated that learning English using the chat feature on the HelloTalk application can improve and perfect spelling, and 82% of participants found that by consistently using the correct language when learning English through the chat feature of the HelloTalk application, they were able to improve their writing fluency. The use of the chat feature in the HelloTalk application improves the writing mechanism for most university students, as can be seen from the average questionnaire score percentage of 93% which is quite high.

More clearly, the percentage of university students experiences to improve mechanics in writing by using HelloTalk application in chat feature can be seen in the following diagram.

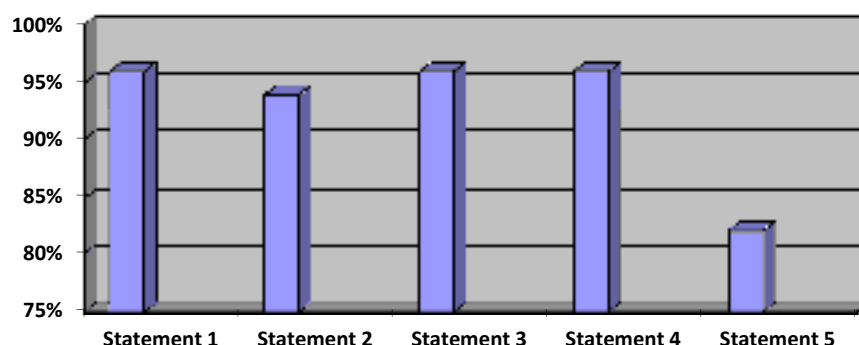


Figure 1. Questionnaire Results of University Students' Experiences to Improve Mechanics in Writing by Using the HelloTalk Application in Chat Feature.

In addition to improving writing mechanics through the use of chat features on the HelloTalk application, university students were also asked to fill in statements that discuss grammar improvement through the use of chat features on the HelloTalk application.

Table 2. Questionnaire Results of University Students' Experiences to Improve Grammar in Writing by Using the HelloTalk Application in Chat Feature.

No.	Statement	Answer Alternatives				Average
		Strongly Disagree	Disagree	Agree	Strongly Agree	
1.	The biggest improvement in learning English by using the HelloTalk application in the chat feature is grammar.	0	4	35	16	93%
2.	Learning English by using the HelloTalk application on the chat feature can help in constructing sentences with correct grammar.	2	3	33	17	91%



3.	Learning English by using the Hellotalk application on the chat feature can correct grammatical errors and improve understanding of correct sentence structure.	2	1	38	14	94%
4.	Learning English by using the Hellotalk application on the chat feature can strengthen learning and application of grammar rules.	1	5	35	14	89%
5.	Learning English by using the HelloTalk application in the chat feature made me interested in learning more about grammar.	2	3	37	13	91%
The average percentage of the score						92%

Based on the table above, it can be seen that most students agreed that learning English by using the Hellotalk application in the chat feature can correct grammar errors and improve understanding of correct sentence structure, 84% of participants stated this. and there were 93% who agreed that the biggest improvement in learning English by using the HelloTalk application in the chat feature was grammar. And there were 93% who agreed that the biggest improvement in learning English by using the HelloTalk application in the chat feature was grammar. Statements 2 and 4 had the same average, which was 91%. It can be seen that students agreed that the HelloTalk application in the chat feature can help in constructing sentences with correct grammar, and made them interested in learning more about grammar. The last statement was about learning English by using the Hellotalk application on the chat feature can strengthen the learning and application of grammar rules, 89% of students agreed with the statement. The survey's average percentile score of 92% indicates that most students felt that using HelloTalk's chat helped their grammar. More specifically, the following graph illustrates the percentage of students who used the HelloTalk chat to improve their grammar.

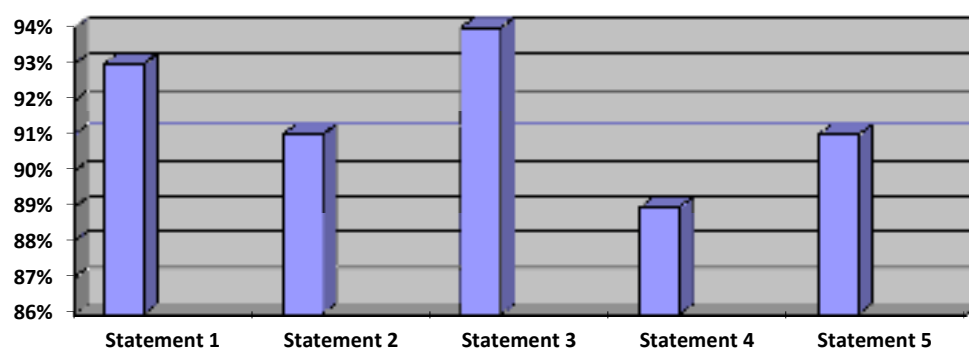


Figure 2. Questionnaire Results of University Students' Experiences to Improve Grammar in Writing by Using the HelloTalk Application in Chat Feature

In addition to improving the elements mentioned, students are also required to fill out a statement regarding vocabulary improvement through the use of the HelloTalk application in the chat feature.

Table 3. Questionnaire Results of University Students' Experiences to Improve Vocabulary in Writing by Using the HelloTalk Application in Chat Feature

No.	Statement	Answer Alternatives	Average
-----	-----------	---------------------	---------



		Strongly Disagree	Disagree	Agree	Strongly Agree	
1.	The biggest improvement in learning English by using the HelloTalk application in the chat feature is vocabulary.	0	5	34	16	91%
2.	Learning English by using the Hellotalk application on the chat feature can help apply the vocabulary received from HelloTalk in daily life.	2	0	38	15	96%
3.	Learning English by using the HelloTalk application in the chat feature can expand your vocabulary by learning new words and everyday phrases.	0	2	33	20	94%
4.	Learning English by using the HelloTalk application in the chat feature can deepen your understanding of meaning and correct usage.	0	3	38	14	94%
5.	Learning English by using the HelloTalk application in the chat feature made me interested in learning more about vocabulary.	1	1	34	19	96%
The average percentage of the score						95%

As seen in the table above, the second and fifth statements were the most selected statements by the university students. 96% of students agreed that vocabulary was the element that improved the most when using the HelloTalk application in the chat feature and made them interested most in learning more about vocabulary. Both statements three and four also had the same percentage amount of 94%. students agreed that the HelloTalk application in the chat feature can expand their vocabulary by learning new words and everyday phrases, and can also deepen their understanding of meaning and correct usage. The last statement was the first statement that sounds like “The biggest improvement in learning English by using the HelloTalk application in the chat feature is vocabulary”, in which 91% of university students agreed with the statement above.

More precisely, the percentage of students who used the HelloTalk chat feature to increase their vocabulary is seen in the following graph.

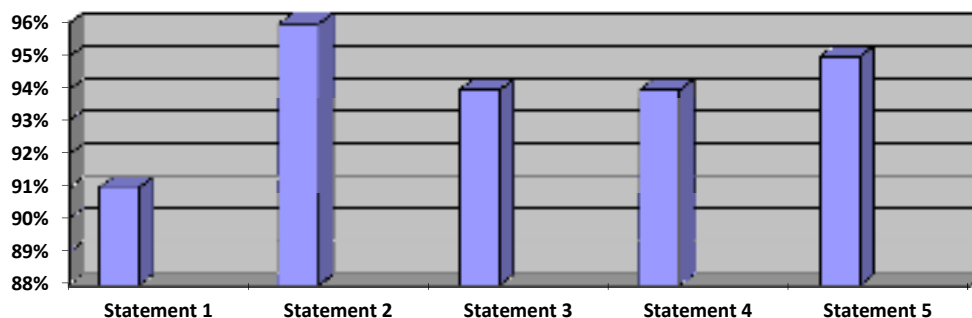




Figure 3. Questionnaire Results of University Students' Experiences to Improve Vocabulary in Writing by Using the HelloTalk Application in Chat Feature.

Moreover, the university students were also required to complete a statement regarding the improvement of the writing flow through using the chat feature on the HelloTalk application.

Table 4. Questionnaire Results of University Students' Experiences to Improve Flow in Writing by Using the HelloTalk Application in Chat Feature.

No.	Statement	Answer Alternatives				Average
		Strongly Disagree	Disagree	Agree	Strongly Agree	
1.	The biggest improvement in learning English by using the HelloTalk application in the chat feature is the flow in writing.	1	6	38	10	87%
2.	Learning English by using the HelloTalk application in the chat feature can help keep writing from being monotonous.	0	6	38	11	89%
3.	Learning English by using the HelloTalk application in the chat feature can help make writing more natural.	2	1	41	11	94%
4.	Learning English by using the HelloTalk application in the chat feature makes writing more logistical and connected.	1	2	39	13	94%
5.	Learning English by using the HelloTalk application in the chat feature can increase fluency in writing due to the consistency of correct language use.	1	1	40	13	96%
The average percentage of the score						92%

Based on university students' experiences using the HelloTalk chat feature, the table above shows that flow in writing experienced the biggest improvement in English learning, with up to 87% of participants stating this. 89% of university students said that using the chat feature in the HelloTalk application to learn English could help keep writing from being monotonous, writing more naturally could be aided by learning English through the HelloTalk application in the chat feature, according to 94% of students, 94% of respondents stated that learning English using the chat feature on the HelloTalk application could makes writing more logistical and connected, and 96% of participants discovered that by consistently employing the proper language when learning English with the HelloTalk application in chat feature, writing fluency may be increased. The average questionnaire score percentage of 92% indicates that most university students find that using the chat feature in the HelloTalk application helps the flow of their writing.

More precisely, the accompanying diagram illustrates the percentage of university students who have used the HelloTalk conversation tool to improve their fluency in writing.

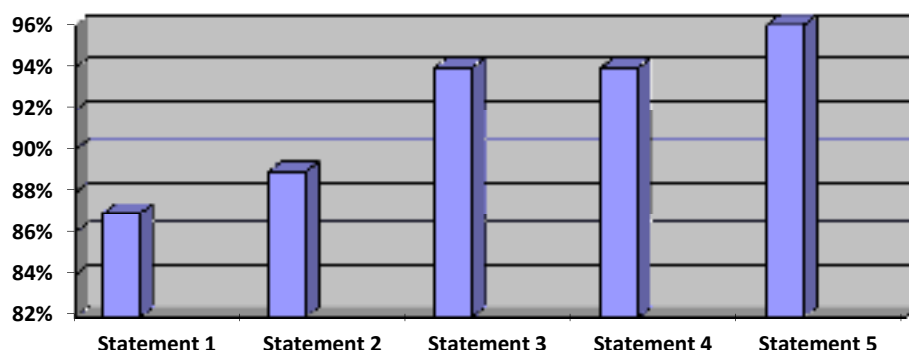


Figure 4. Questionnaire Results of University Students' Experiences to Improve Flow in Writing by Using the HelloTalk Application in Chat Feature.

3.2 Interview Result

The first question was about how long university students have been using HelloTalk Application. Most of the participants said that they have used HelloTalk for one year, and one of them has been using it for almost two years, and the other two have only been using it for about two months and eleven months. The findings are shown in the following excerpt.

Excerpt 1

Q1-P2: I have used HelloTalk app for 1 year.

Excerpt 2

Q1-P4: I have been using HelloTalk for almost 2 years.

However, in the second interview question about how university students think the writing mechanism is improved when using the chat feature in the HelloTalk application. All participants in this research interviews agreed that the writing mechanism is improved when using the HelloTalk application.

Excerpt 3

Q2-P1: Very helpful, especially when I first started using the HelloTalk application.

In terms of the next interview question about what university students think of the grammar improvement when using the Chat feature in HelloTalk application. All participants in this research interviews agreed that the grammar is improved when using the HelloTalk application.

Excerpt 4

Q3-P4: I think the HelloTalk application is very helpful for correcting our grammar when using the application because the grammar checking feature and also translation help us see if there are errors in the writing we write.

The fourth question was about how university students think about writing fluency improvement when using the Chat feature in the HelloTalk application. All participants in this research interviews also agreed that HelloTalk improves the writing mechanics. Some comments can be seen in the following excerpts.

Excerpt 5



Q4-P1: It is good because when I use the HelloTalk app while writing and there are mistakes in writing, they will be automatically corrected.

Excerpt 6

Q4-P4: I think the HelloTalk application is very helpful for improving writing fluency, especially if we have a partner who is suitable for chatting every day.

For the next question about how university students think their vocabulary has improved while using the HelloTalk application. All of the participants agreed that their vocabulary has improved while using the HelloTalk application, as could be seen in the following excerpt.

Excerpt 7

Q5-P1: Very much improved especially during the time I used this application.

Excerpt 8

Q5-P5: while using the HelloTalk app my vocabulary has greatly improved.

For the last question was about what element of university students writing that has improved the most while using Chat feature in HelloTalk, most of the participants said that their vocabulary has improved most when using HelloTalk application, but one of them said grammar is the element that improved most when using HelloTalk application. The comments are shown in the following excerpts.

Excerpt 9

Q6-P5: The element of writing that has improved the most is vocabulary.

Excerpt 10

Q6-P3: The element that improved the most when I used the HelloTalk application was grammar.

The finding in this research revealed that the HelloTalk application is very helpful in improving university students' writing skills, especially vocabulary. Vocabulary is the writing element that has improved the most among the other elements. These findings are similar to the previous study by Solihin et al. (2023) because the researchers were both researching the HelloTalk application to improve students' writing skills. The results of their research show that students can improve their writing skills by using the HelloTalk application. However, there is a difference between this research and previous research, in this research, the researchers examined how the HelloTalk application with chat features could improve writing skills with four elements; meanwhile, in the previous research, researchers only examined how the HelloTalk application could improve writing skills in general, and did not use chat features.

4. CONCLUSION

Based on the results of data that has been carried out through questionnaires and interviews distributed to students, it can be concluded that the writing ability of university students can improve while using the HelloTalk application on the chat feature, especially vocabulary. This research not only discusses vocabulary elements but also discusses other elements such as mechanics, grammar, and fluency. Furthermore, the element that are mostly improved from the results of university students' experience are vocabulary with a total of 94%.



REFERENCES

- Fadhallah, R. A. (2021). Wawancara [The interview]. UNJ Press.
- Hanson, W. E., Creswell, J. W., Clark, V. L. P., Petska, K. S., & Creswell, J. D. (2005). Mixed methods research designs in counseling psychology. *Journal of Counseling Psychology*, 52(2), 224.
- Hasan, H. (2018). Improving students' English vocabulary by using the Tic Tact Toe game at the second Year of SMP Negeri 7 Satap Maiwa Kabupaten Enrekang. *Edumaspul: Jurnal Pendidikan*, 2(2), 77-86.
- Herlisya, D., & Wiratno, P. (2022). Having good English through the TikTok application. *Journal Corner of Education, Linguistics, and Literature*, 1(3), 191-198.
- Hermawan, I. (2019). Educational research methodology (qualitative, quantitative and mixed method). Hidayatul Quran.
- Indrilla, N., & Ciptaningrum, D. S. (2018). An approach in teaching writing skills: does it offer new insight in enhancing students writing ability. *LLT Journal: A Journal on Language and Language Teaching*, 21(2), 124-133.
- Makbul, M. (2021). Metode pengumpulan data dan instrumen penelitian. OSF Preprints.
- Octaviani, R., & Sutriani, E. (2019). Analisis data dan pengecekan keabsahan data. *INA-Rxiv*
- Pratiwi, Z. F., & Education, E. (2022). The impact of using Joox to increase vocabulary and learn how pronounce the word. *Pustakailmu. Id*, 2(2)
- Prihatmi, T. N. (2017). English academic writing bagi mahasiswa di Institut Teknologi Nasional Malang: Hambatan dan solusi. *Prosiding SENIATI*, 3(2), C54-1
- Putra, R., Astuti, I. F., & Kridalaksana, A. H. (2014). Pembelajaran bahasa Inggris dengan analisis grammar. *Informatika Mulawarman: Jurnal Ilmiah Ilmu Komputer*, 9(3), 43-48.
- Putri, E. (2022). An impact of the use Instagram application towards students' vocabulary. *Pustakailmu. id*, 2(2), 1-10.
- Safitri, S. D. (2023). The use of HelloTalk applications to improve students' writing skills in descriptive text at the first grade of SMA Maarif NU 5 Purbolinggo. Universitas Lampung.
- Sholeh, A., & Muhaji, U. (2015). Pronunciation difficulties encountered by EFL students in Indonesia: Sebuah studi kasus pada mahasiswa kelas integrated course semester 1 FKIP Bahasa Inggris Universitas Kanjuruhan Malang. *Jurnal Inspirasi Pendidikan*, 5(2), 698-707.
- Sholikhah, A. (2016). Statistik deskriptif dalam penelitian kualitatif. *KOMUNIKA: Jurnal Dakwah Dan Komunikasi*, 10(2), 342-362.
- Sijabat, H. N., Tampubolon, S., & Sidabutar, U. (2023). An error analysis of using punctuation in writing narrative text of tenth-grade students at SMA Gajah Mada Medan. *Innovative: Journal of Social Science Research*, 3(5), 2560-2573.
- Sitasari, N. W. (2022). Mengenal analisa konten dan analisa tematik dalam penelitian kualitatif. *In Forum Ilmiah*, 19 (1), 77-84.
- Solihin, R. K., Hartono, R., Rukmini, D., & Wahyuni, S. (2023, September). Enhancing writing skills by using the project-based learning model through the Hello Talk application. *In International Conference on Science, Education, and Technology*, 9, 657-665.



- Takadisihang, M., Pamantung, R. P., & Sigarlaki, S. J. (2022). Ucapan langsung dan tidak langsung bahasa Inggris dan bahasa Sangir (suatu analisis kontrastif). *Jurnal Elektronik Fakultas Sastra Universitas Sam Ratulangi*, 30.
- Tiara, A. D., Rahman, M. A., & Handrianto, C. (2021). The student's perception about use of Duolingo application for improving English vocabulary. *International Journal of Education, Information Technology, and Others*, 4(4), 690-701.
- Umbola, H., Maru, M. G., & Hampp, P. (2022). Improving students' vocabulary by using word game applications. *SoCul: International Journal of Research in Social Cultural Issues*, 2(5), 668-675.
- Wijaya, H. O. L., & Mediriansyah. (2016). Perancangan sistem informasi data survei sosia ekonomi daerah (suseda) berbasis web mobile. <https://jurnal.pcr.ac.id/index.php/jkt/article/view/202>.



IMPROVING STUDENTS' DISCUSSION SKILLS AND LEARNING OUTCOMES THROUGH THE IMPLEMENTATION OF THE TSTS TYPE COOPERATIVE LEARNING MODEL IN SMA NEGERI 5 TERNATE CITY

Patima La Peda Peda¹, Hernita Pasongli^{2*}, Endang Purwati³, Susana R. Bahara⁴

^{1,2,3}Geography Education Study Program, Khairun University, Indonesia

⁴English Education Study Program, Khairun University, Indonesia

*mukhtarnita@gmail.com

ABSTRACT

There are many ways to develop students' learning potential, one of which is being able to apply innovative learning models in the classroom. Innovative and interactive learning models can attract students' interest in collaborating and actively discussing in class. One of them is by implementing the TSTS-type cooperative learning model. This research aims to improve discussion skills and student learning outcomes using the Two Stay Two Stray type cooperative model in class X IPS 4 SMA 5 Ternate City. The subjects in this research were class X IPS 4 students at SMA Negeri 5 Ternate City. 30 students. This research method is the classroom action research method (PTK). Based on the research results, it is known that the improvement in discussion skills in cycle I cannot be said to have increased because there were still several group members who were passive during group discussion activities. Then, after making improvements from the results of reflection by looking at the shortcomings of learning in cycle I, in cycle II there was an increase in discussion skills. This is based on the results of observations, where group members are active in expressing opinions, mastering problems, and speaking fluently. Meanwhile, for the learning outcomes of students using the two stay two stray type cooperative model in geography subjects with the main material Hydrosphere Dynamics, it is known that in cycle I, 11 students completed it with a percentage of 37%. Meanwhile, 19 students did not complete with a percentage of 63%. Then the learning outcomes of students in cycle II were 25 students who completed it with a percentage of 83%, while 5 students who did not complete it had a percentage of 17%.

Keywords: Discussion Skills; Learning outcomes; Two Stay Two Stray; Learners.

1. INTRODUCTION

Education is a necessity for humans, where education plays a very important role in modern life to survive. Education is a conscious effort for the development of humans and society, based on certain thoughts (Siswoyo, 2013). Conscious efforts to develop humans are carried out by families, communities and the government through guidance, teaching, and training activities carried out inside and outside of school. Through school activities, students' attitudes, personality, and character will be achieved. Ki Hajar Dewantara, said that education is an effort to increase a child's character, mind (intellect), and body (Samani, 2016). Education not only develops knowledge but also the character of students.

In current educational developments, there are various models applied to optimize learning potential in the learning process. As educators, it is important for teachers to have the skills to apply learning models that can attract students' interest in learning. The teacher is not only a director, but also the main actor in every teaching session or teaching and learning process. Teacher responsibilities involve planning and implementing teaching in the school environment. Lubis 2021 and Amirudid. 2018 emphasizes that a teacher, as a professional, must have several skills, including the ability to apply various learning theories in the teaching context. This involves the ability to choose and apply effective and efficient teaching models, as well as being able to involve students to actively participate in the



learning process. Apart from that, teachers are also expected to have skills in creating a learning atmosphere that supports the achievement of educational goals.

Thus, the role of teachers becomes very crucial in improving the quality of learning in the classroom, especially in developing discussion skills and student learning outcomes. Learning outcomes, as the output achieved by students during learning activities, will ultimately create changes in student behavior. As stated by Hamalik (2013), learning outcomes are the results of a learning evaluation activity for students after going through teaching and learning activities, intending to achieve learning targets.

Based on the results of initial observations and interviews of researchers with the Geography Education teacher for Class Some of these problems include students' lack of enthusiasm in discussing, students' tendency to be passive and have difficulty speaking, and students' lack of courage and activeness in conveying ideas or thoughts during discussion activities. By emphasizing the need for active discussion and critical thinking, especially among Class X IPS 4 students at SMA Negeri 5 Ternate City, It requires the use of learning models that are usually applied by geography subject teachers. The aim is to improve student learning outcomes in the learning process. One model proposed to achieve this goal is to apply the Two Stay Two Stray (TST) type cooperative learning model. Therefore, researchers tried to apply the Two Stay Two Stray learning method as a step to improve students' discussion skills and learning outcomes.

Two Stay Two Stray is a learning method that provides groups with the opportunity to share results and information with other groups. Many teaching and learning activities are characterized by individual activities, even though in the reality of life outside school, humans need each other (Lie, 2010). In the context of discussion skills and learning outcomes, the application of this method is expected to be a bridge between individual learning activities and the need for social interaction in improving discussion skills and achieving student learning outcomes.

The results of research conducted by Ida Pramuwasti (2010) by applying the Two Stay Two Stray Cooperative learning model to class IX A students at SMP Negeri 1 Getasa, Semarang Regency, showed significant improvements in several aspects. An increase was found in: 1) the number of students who were active in appreciation, 2) the number of students who were active in discussion learning, 3) the number of students who were attentive and concentrated in learning, and 4) the number of students who participated in collaborative discussions. Apart from that, there was an increase in the quality of learning, with 18 students completing (56%) in cycle I, increasing to 26 students (76%) in cycle II, and achieving quite a significant increase in cycle III, namely 30 students completing (91%). The average student score also increased, namely 63 in cycle I, 68 in cycle II, and 74 in cycle III. Evaluation of student provisions in discussion learning is carried out by paying attention to the level of student participation and contribution during discussions.

The improvement in these aspects shows that the application of the Two Stay Two Stray Cooperative learning model is effective in increasing student engagement and learning outcomes. Two Stay Two Stray, by allowing students to interact with various groups, can help develop their discussion skills. Through discussions between groups, students can hone their speaking, listening and conveying ideas skills effectively. Apart from that, this method can also increase student motivation and participation, because they have the opportunity to share perspectives and experiences with their colleagues.

By implementing Two Stay Two Stray, it is hoped that discussion skills and learning outcomes can become an effective tool for achieving holistic learning goals, which not only measure mastery of subject matter but also develop students' social and cognitive skills. This research aims to determine the improvement in discussion skills and student learning outcomes through the implementation of the Two Stay Two Stray type cooperative model in class X IPS 4 SMA Negeri 5 Ternate City.

2. METHODS



This research is included in the type of classroom action research (PTK). PTK is research carried out by observing teaching and learning activities in the form of actions, which are deliberately created and occur in a class together (Arikunto 2006). The PTK stage consists of 4 stages, namely, (1) planning, (2) action, (3) observation, (4) reflection. The subjects of this research were 30 students in class X IPS 4 SMA Negeri 5 Ternate City, consisting of 17 male students and 13 female students. The data collection technique is by distributing test questions to students, observation sheets for students' discussion activities, and observation sheets for teacher and student activities. The data was analyzed descriptively and presented in the form of tables and graphs.

3. RESULTS AND DISCUSSION

Based on the results of research conducted at SMA Negeri 5 Ternate City in class X IPS 4, two cycles in the learning process in class can be explained. In cycle I, the stages of research implementation follow the steps of Classroom Action Research (PTK). In the planning stage of the cycle I, the researchers prepared learning tools, including a Learning Implementation Plan (RPP), learning media, Student Worksheets (LKPD), teaching materials, test questions, teacher/student observation sheets, and discussion activity observation sheets. The planning process involves discussions with tutors to help determine target students and form study groups. The next step is the action stage in cycle I, where the researchers act as a model teacher who implements TSTS learning in the classroom. At this stage, the researchers were assisted by a tutor and a fellow student who acted as an observer. Observers have a special task, namely observing learning activities carried out by researchers and recording them on an observation sheet. Cycle I ended with the observation stage, where the researchers collected data through direct observation of learning activities in the classroom. This observation data is then used as a basis for analysis and reflection to understand the impact of the actions that have been implemented. The findings of students' discussion abilities can be seen in Table 1 below.

Table 1. Observation results of students' discussion abilities in Session 1

Aspect of Observations Description Discussion	Notes/Description			
	Group I	Group II	Group III	Group IV
Courage/spirit	Lack of enthusiasm for participating in the discussion process	Enough enthusiasm, in the discussion process.	Very enthusiastic in the discussion process	Very enthusiastic in discussion
Eloquence	Speaking fluency is still lacking	Not yet fluent in delivering material during the discussion process	Still looks stiff in speaking	The speaking fluency is very good in conveying the material
Mastery of the problem	Mastery of the problem is still not focused	Not yet perfect in responding to the problems under discussion	Not yet focused on solving the problem	Mastery of the problem is quite good
Expressing opinions	There is very little expression of opinion. Because they are still stiff in discussions	Not yet able to express his opinion to the peers.	Always express his opinion, ask other groups about things they don't understand.	The expression of his opinion is still not good.

The table above is the result of observations at the observation stage in cycle I of classroom action research at SMA Negeri 5 Ternate City, class X IPS 4. The table describes observations of several indicators during discussion activities in class which were divided into four groups. Analysis of the table above can also provide a detailed picture of the performance of each group during discussion activities.



These results can be a basis for evaluating and improving at the next stage and also provide more in-depth knowledge about the dynamics of learning in the class.

Student Learning Results in Cycle I

After the learning process is adjusted to the Learning Implementation Plan (RPP) in cycle I, the teacher gives a test to assess students' abilities after completing a discussion on the hydrology cycle material with the theme of characteristics and dynamics of marine waters, using a cooperative model of the two stay two-story type. The test was taken by 30 students, with a minimum completeness criterion of 75. The results of the student learning tests are summarized in Table 2 below:

Table 2. Student learning outcomes in Cycle 1

No	Mark	Category	Frequency	Percentage
1	0-74	Not Completed	19	63%
2	75-100	Complete	11	37%
Amount			30	100%

Based on the results of the learning test in cycle I, 19 students had not achieved individual learning completeness, with a classical percentage of 63%, which means students had an absorption capacity of ≤ 75 in accordance with the school's Minimum Completeness Criteria (KKM) for geography subjects. Meanwhile, 11 students obtained an absorption capacity of ≥ 75 , with a classical learning completion percentage of 37%. Thus, it can be concluded that classical learning completeness in cycle I has not been achieved, and further analysis needs to be carried out to see a description of the completeness of students' classical learning outcomes. The results obtained are a starting point for developing improvement strategies in the next cycle to increase student learning outcomes. After going through the reflection stage of cycle I, the research continued to cycle II. In cycle II, researchers can make improvements or adjustments based on the results of analysis and reflection from cycle I. This process is repeated until the research reaches the desired objectives. Thus, cycle II also involves the planning stages actions and observations are similar to cycle I, but with adjustments based on learning from the previous cycle.

Results of Discussion Skills Cycle II

Table 3. Observation results for cycle 1 group 1.

Aspect of Observations Description Discussion	Notes/Description			
	Group I	Group II	Group III	Group IV
Courage/spirit	Very enthusiastic in participating in the discussion process	Enough enthusiasm, in the discussion process.	Very enthusiastic in the discussion process	Very enthusiastic in discussion
Eloquence	Very good at conveying the results of discussions	Already starting to be active in speaking	Fluent in speaking and delivering discussion material	The speaking fluency is very good in conveying the material
Mastery of the problem	Can master the problems in the discussion topic	Good enough according to the problem to be discussed	The mastery of the masala is very good, according to the topic of the problem.	Mastery of the problem is very good
Expressing opinions	Very good at conveying his opinions	Very good according to the	The presentation of the opinion	Always express your opinions,



	to other groups	topic of discussion	was very good	ask other groups about things they don't understand.
--	-----------------	---------------------	---------------	--

From the table above, it can be seen that in group 1 as a whole, students have been able to express their ideas regarding aspects of discussion skills, and this ability has improved more than in the previous meeting. For group 2, students were quite enthusiastic in carrying out the discussion process, and there was an improvement from the previous meeting where students had not fully mastered aspects of discussion skills. Meanwhile, the aspect of observing discussion information in group 3 was very good. Students showed enthusiasm and courage in following the discussion process to the end. Fluency in conveying discussion material, mastery of problems on the topic of problems resolved well, and conveying opinions very well, easily understood by other group friends. And in group 4, it was seen that students were enthusiastic in discussing, their speaking fluency was very good in conveying the material, their mastery of the problem was very good, and they always expressed their opinions and asked questions about things that other groups did not understand.

Student Learning Results in Cycle II

After the teaching and learning process takes place, a test is carried out to assess students' abilities after completing material on planning and conservation of marine waters, as well as the potential distribution and use of land waters. The results obtained using the two stay two stray cooperative model and involving 30 students with a minimum completion criteria of 75 can be seen in Table 4 below.



Table 4. Student Learning Results in Cycle II

No	Mark	Category	Frequency	Percentage
1	0-74	Not Completed	5	17%
2	75-100	Complete	25	83%
Amount			30	100%

Based on the results of the second cycle learning test, there were 5 students who had not achieved individual learning completeness with a classical learning completeness percentage of 17%, or had not achieved a KKN score of <75. Meanwhile, there were 25 students who obtained an absorption capacity of ≥ 75 with a classical learning completion percentage of 83%. Therefore, it can be concluded that classical learning completeness in cycle II has been achieved to see a description of the completeness of students' classical learning outcomes.

The results of students' discussions in cycles 1 and II showed a comparison where the discussion skills in cycle 1 still had many obstacles, including lack of enthusiasm in discussions, lack of fluency in speaking, unclear mastery of problems, difficulty in conveying opinions, and lack of clarity in the information conveyed by each group. Meanwhile, in the second cycle, the discussion skills of each group can be categorized as good, which can be seen in Table 3. Each indicator of discussion skills must be considered by the teacher. In learning activities using the discussion method, the teacher should provide a lot of motivation so that students are enthusiastic about participating in the discussion. There are many ways that teachers can use to encourage other students by giving sentences of appreciation or playing games/ice breaking. According to Mismawati. 2021, Ice Breaking can increase student motivation and learning outcomes. In line with Sunarto's 2017 statement, Ice Breaking provides a feeling of joy that can foster students' positive attitudes while participating in class learning. Apart from that, implementing the TSTS type cooperative learning model can involve student activity so that students are able to ask questions or answer questions about all the problems they face (Melikhatun, 2017). For problems found in cycle 1, teachers should create a supportive classroom environment where students feel safe to speak and participate. Providing constructive feedback and giving appreciation for each student's efforts can also increase motivation and enthusiasm in discussion activities.

The findings of student learning outcomes in cycle 1 by implementing the TSTS type cooperative learning model, it can be seen that 63% of students have not completed it (got a score of 0-74), while 37% of students have completed it (got a score of 75-100). With the learning outcomes obtained, there is a connection with students' discussion skills in cycle 1. This finding means that indicators of discussion skills include; the level of courage, fluency in speaking, mastery of problems, and expressing opinions in discussions can significantly influence student learning outcomes. Learning outcomes in cycle II by applying the TSTS learning model show good learning outcomes. Students who have a high level of courage, speak fluently, are able to master problems well, and are effective in expressing opinions tend to achieve better learning outcomes. This is because the continuity and quality of interaction in discussions can make a positive contribution to understanding concepts, improving critical thinking skills, and deepening understanding of learning material. Implementing TSTS can also improve student learning outcomes. According to Miisnawati's research results, 2021; Melikhatum, 2017 and Bayu, 2016 found that the TSTS Type Cooperative Learning Model can improve student learning outcomes. The learning outcomes found in cycles 1 and II of class X-4 students at SMA Negeri 5 Ternate City are described in the picture below.

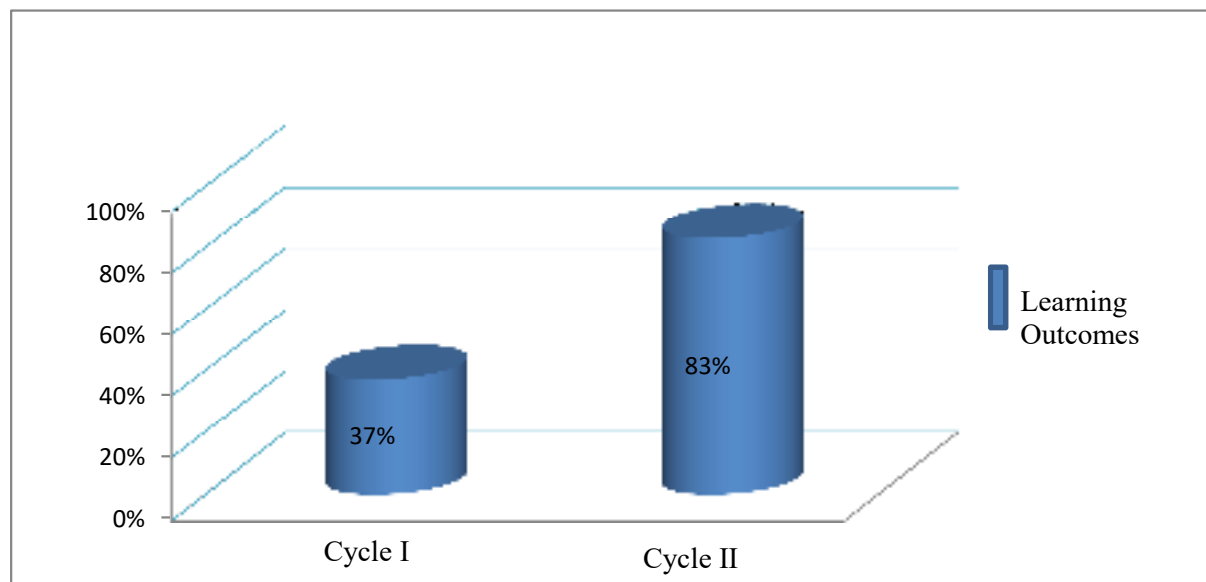


Figure 1. Diagram of the percentage of student learning outcomes for cycles I and II

Although basically the Two Stay Two Stay type cooperative model is not the only model that can be used in Geography subjects, when researchers conducted research in class Hydrosphere Dynamics (Sukmadinata, 2019). However, this also needs to be supported by the students' willingness to study Geography more actively. As stated by Nana Sudjana (2015), student learning outcomes are essentially changes in levels of behavior as a result of learning in a broader sense. Dimiyati and Mudjiono (2013) also stated that student motivation has an important role in the learning process.

4. CONCLUSION

Based on the results of the analysis and discussion above, it can be concluded that the implementation of the two stay two stray type cooperative learning model in class . In cycle I, it was seen that discussion skills had not yet fully improved, because several group members still experienced difficulties in discussing. However, in cycle II, there was a significant improvement, where group members in each group were able to discuss well. Furthermore, the learning results of students in cycle I, as many as 11 students completed, with a percentage of 37%, while 19 students did not complete with a percentage of 63%. However, in cycle II, there was an increase with 25 students completing (percentage 83%). This shows that the two-stay two stray type cooperative learning model is effective in improving students' understanding and learning outcomes. Thus, it can be concluded that the application of this cooperative learning model can be an effective alternative for improving students' discussion skills and learning outcomes, especially in Geography subjects with Hydrosphere Dynamics material at the high school level.

REFERENCES

- Anita Lie. (2010). *Kooperatif Learning (Mempraktikkan Cooperative Learning di Ruang-ruang Kelas)*. Jakarta: Grasison.
- Amiruddin. (2018). *Profesi Pendidikan dan Tenaga Kependidikan*. Medan; Lembaga Peduli Pengembangan Pendidikan Indonesia (LPPI).
- Arikunto. (2006). *Penelitian Tindakan Kelas*. Jakarta: Bumi Aksara



- Bayu, D. S., & Nugroho. (2016). Penerapan Model pembelajaran Kooperatif Tipe Two Stay Two Stray (TSTS) Untuk Meningkatkan hasil Belajar Siswa Pada Mata Pelajaran Teknologi Mekanik Kelas X di SMK Negeri 3 Surabaya. *Jurnal JPTM*, 5(2), 56-61
- Dimiyati & Mudjiono. (2013). *Belajar dan Pembelajaran*. Jakarta: Rineka Cipta.
- Hamalik, O. (2013). *Kurikulum dan Pembelajaran*. Jakarta: PT Bumi Aksara.
- Lubis, S. (2021). Belajar dan Mengajar sebagai Suatu Proses Pendidikan dan Berkemajuan. *Jurnal Literasiologi*, 5(2), 95-105
- Miismawati., M. Faizal., Fatmawaty. (2021). Meningkatkan Motivasi Belajar Melalui Teknik Pembelajaran Ice Breaking. *Jurnal Pinisi*, 1(2), 513-518
- Melikhatun. (2017). Implementasi metode *two stay two stray* (TSTS) untuk meningkatkan keaktifan belajar siswa dalam pembelajaran sejarah kelas X-3. <https://journal.student.uny.ac.id/ojs/index.php/risalah/article/view/9522>.
- Pramuswasti, I. (2010). Penerapan Model Pembelajaran Koperatif Tehnik Two Stay Two Stray. *Indonesia*
- Sudjana, N. (2015). Dasar-Dasar Proses belajar Mengajar. *Bandung*: PT Sinar Baru Algensido
- Sukmadinata, N. (2019). Metode Penelitian Pendidikan. Bandung: PT Rosdakarya
- Sumani, M. (2016). Konsep dan Model Pendidikan Karakter. Bandung: Remaja Rosda Karya
- Sunarto. (2017). Ice Breaking dalam Pembelajaran Aktif. Surakarta: Cakrawala Media.



TEACHER'S QUESTIONS IN ENGLISH CLASSROOM INTERACTION

Faninsky Aryanti La Ajina Hasibuan^{1*}, Desi Rahma Yuni Br.Sinulingga², Mursyid Mubarak³
^{1,2,3}Universitas Sumatera Utara, Indonesia
*faninsky77@gmail.com

ABSTRACT

The goal of this study was to describe teachers' questions in English classroom Interaction and the function of questions that the teachers asked. A descriptive qualitative design was used in this study. The data and source of data was one English teacher who teaches at grade 11 at SMA Negeri 15 Medan. The data were collected by using videotaping and interviews. The data were analyzed by using descriptive qualitative. The result showed that (1) The teacher asked remembering (81.5), understanding (17%) and applying (1.5%) to students. The teacher asked questions to stimulate and maintain students' interest, encourage students to think and focus on the content of the lesson, enable teachers to clarify what students have said, elicit particular structures or vocabulary items, check students' understanding and encourage students' participation in a lesson.

Keywords: Bloom's, classroom, interaction, questions, taxonomy, teachers

1. INTRODUCTION

In revolution industry 4.0, critical thinking is in the first second soft skills that people must enhance. Critical thinking is the ace and active interpretation and evaluation of communications, observations and argumentation (Fisher & Scriven, 1997, p.21). In enhancing soft skills in critical thinking, it should be started at an early stage, and school is involved in enhancing students' critical thinking.

The 21st century skills are in line with the concept of the 2013 curriculum. Learning activity in curriculum 2013 is using scientific approach (5M) which encompasses observing (mengamati), questioning (menanya), associating (menalar), experimenting (mencoba) and creating networking (membentuk jaringan). Based on revised Bloom's taxonomy by Krathwohl and Anderson, students need to be able to achieve not only LOTS (Lower Order Thinking Skills) namely C1 (remembering) and C2 (understanding), MOTS (Middle Order Thinking Skills) namely C3 (applying) and C4 (analyzing), but they must also able to achieve HOTS (Higher Order Thinking Skills) namely C5 (evaluating) and C6 (creating).

Ennis (1996) states that academic research shows that critical thinking is developed through teacher-facilitated questions. Ennis points up that to build complex conceptualizations and foster critical thinking, asking questions to students is a way to achieve that. Therefore, this research will deal with one aspect of classroom interaction, which is teacher's questions. Classroom interaction is the action that is performed by the teacher and the students in the process of teaching and learning in the classroom. According to Richmond et al. (2009, p.31), classroom interaction concluded that students develop a greater effect for subjects taught via class discussion. When students feel appreciated by the teacher, they will be motivated in communicating, conveying and expressing their thoughts. It is in the same line with the statement of Loewenberg and Forzani (2009, p. 497) who said that teachers are key to students' learning. In enhancing comprehension about certain topics, students need to enhance critical thinking skills. Teacher's questions are very effective in enhancing students' critical thinking skills. Students interpret, evaluate, observe, communicate, inform and argue when the teacher asks a lot of questions.

The teachers' questions, in fact, would have consequences on students' critical thinking. Barjesteh and Moghadam (2014) states that the teachers' questions are a means of attracting the students' attention to promote verbal response and assess students' progress. Researches and experts showed that the questioning dominates the teaching learning process in educational settings. In the classroom, teachers are expected to stimulate students to think critically by engaging them to discuss a certain issue related to the topic being taught. The reason for doing that is to get students to speak English to take part in the teaching and learning process.

In English learning, students are expected to produce in the target language. Those can be achieved by asking a lot of questions related to the lessons being taught. Students' answers to one question can bring more



questions that teachers may ask. There will be an interaction in a classroom when students respond to the teacher's questions actively and enthusiastically, and vice versa. This derives that students can actively take part in the classroom when teachers ask questions to students, and they need to answer the questions in the target language at the same time. Additionally, students' language ability can be improved through teacher-student interactions. Considering the need of teacher's questions, questioning plays a role in comprehension in learning for students. In a classroom setting, teacher questions that are used to expose negation, challenge assumptions, and lead to new knowledge are considered as an important teaching approach. Hence, teachers should be able to design questions to increase students' knowledge and advance their critical thinking. Also, teachers need to design questions that can stimulate each level of students' critical thinking. For example, lower order questions require students to recall previously taught information, while higher order questions require students to manipulate information for some purpose (Perrot, 1986).

Ahmadi and Kurniawan (2020) investigated a teacher's question in the intensive listening course at an institute of Islamic studies in Ponorogo. Meida et al. (2020) analyzed teacher's question on Thematic Learning of Curriculum 2013 at Primary Schools. Fadilah and Zainil (2010) investigated teacher's question types and students' speaking performance in EFL classroom.

After concluding the previous studies above, the writer finally considered the research on analyzing teachers' questions that focuses on teaching explanation text in grade 11, where the researchers above have never done this research.

Based on the preliminary observation in grade 11 at SMA Negeri 15 Medan on September, 3rd 2023, the researcher found that the English teacher that the researcher observed dominantly asked Lower Order Thinking Skills (LOTS) to students. The total number of questions asked by the teacher was 12 questions. The preliminary data that the writer got in SMA Negeri 15 Medan did not meet the expectations above, that is why the researcher wants to do deeper research on what is the dominant level that the teacher asks students and what are the functions of the questions that the teacher asks to students.

The researcher has formulated the gap and this study needs to be done to know more about the question level asked by the teacher. Therefore, this study answers these research questions

1. What are the levels of questions asked by the teachers in English classroom interaction at SMA Negeri 15 Medan?
2. What are the functions of questions that the teachers ask?

The research contributes to finding methods in enhancing students' critical thinking in further research.

2. LITERATURE REVIEW

Bloom's Taxonomy

In 2001, Bloom's Taxonomy was revised by Bloom's former student, Lorin Anderson, and one of Bloom's original research partners, David Krathwohl. They hope that the updates will increase the relevance for students and teachers of the 21st century. Critical thinking questions can be used in the classroom to develop thinking at all levels in the cognitive domain. The result will be improved attention to details, better understanding and better problem-solving skills.

Futher information about the level of the revised Bloom's Taxonomy by Anderson and Krathwohl (2001) can be seen in figure 1.

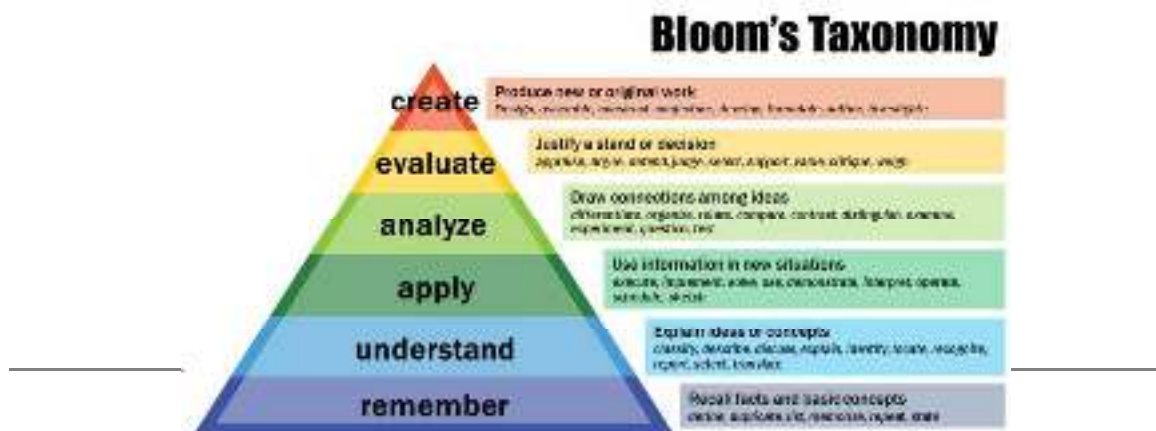




Figure 1. Level of Questions Based on Revised Bloom's Taxonomy

Function of Questions

Research demonstrates that questioning is one of the foremost techniques used by teachers in a classroom (Lewis, 1990). Richards and Lockhart (1994) state that there are several functions of questions.

a. Stimulate and Maintain Students' Interest

Dewey (1913) believes that to awaken and stimulate the direct needs of the individual, educational activities should be done. Some task features called cooperative variables can affect attention and arousal (Berlyne, 1970). In order to stimulate students' interest in new topics, they can use their personal interests by teaching in the context of the interests. For example, teachers stimulate students to consider the need of describing things or places in descriptive text before teaching it. Teachers begin the teaching by asking questions "if you ask someone about a place and you are about to go there, what information can you ask to him/her?", "if they cannot mention a single information about the place, can you go there?"

b. Encourages Students to Think and Focus on The Content of The Lesson

There are many factors why students do not feel motivated to learn English, one of them is that the teacher implements passive teaching. Teacher is lecturing without accepting any feedback from students. Students feel drained by receiving knowledge from teachers only without thinking and stay focused on the content of the lesson. Here, asking questions to students can help to cope with that problem to make students be active to think and stay focused on the lesson.

c. Enable Teachers to Clarify What Students has Said

Students sometimes answer teachers' questions indirectly or students cannot explain it correctly and clearly. In this situation teachers clarify what the students meant to say by asking and dig more information about the answer, for example:

- T : Who can mention 5 continents?
S : Asia, Africa, Australia, Europe and United States
T : United States? United States is a country. What continent is United States in?
S : America, Ma'am
T : Correct

d. Elicit Particular Structures or Vocabulary Items

For students to be better in English skills, they must know the fundamentals of language itself, structures and vocabulary. The teacher asks about particular structures and vocabulary items to students. If a student answers the teacher's questions, the rest of the students know particular structures or vocabulary items.

- T : How can you say *ayah saya sedang menjemput saya*? What is *menjemput* in English?
S : Pick up, ma'am. My dad picks me up
T : Your dad is on the way to pick you up, he's doing it, so you need to add an additional formula. So how is it supposed to be?
S : My dad is picking me up, Ma'am
T : Good job



e. Check Students' Understanding

To check students' understanding, teachers can measure to what extent the students understand. For example, the teacher had explained the explanation text.

- T : How many generic structures are in explanation text?
S : 2 ma'am
T : What are they?
S : General statement and sequenced explanation
T : If the explanation is a fact, what tense you use to explain it?
S : Simple present tense
T : How do you say "tape diproduksi dari ubi yang difermentasi? What language feature do you use?
S : Passive voice ma'am, tape is produced from fermented cassava

f. Encouraging Students' Participation in a Lesson

It is essential to encourage students' participation. One way to achieve that is by implementing a classroom discussion. Teachers can ask HOTS and LOTS questions to students which can guide a lot more questions asked by the teacher.

3. METHODS

The research employed qualitative techniques on what the level of questions are used in English Classroom and the functions of questions. The data are information or facts used in discussing or deciding the answer to a research question (Arikunto, 2010, p. 129). The data of this study were videotaping from teachers' utterances which consist of teachers' questions and the interview consists of the function of teacher's questions. The setting of the research was SMA Negeri 15 Medan, which is located in Medan Sunggal Regency. The research was conducted at grade 11 of SMA Negeri 15 Medan. The participant of this study was an English teacher at SMA Negeri 15 Medan

4. RESULTS & DISCUSSION

RESULTS

Level of Questions

The total number of questions asked by the teacher was 65 questions during a 36 minute meeting via Google Meeting. The topic of the material taught by the teacher was about personal letters. The topic that the teacher taught was the topic that had been taught in previous meetings before. The teacher explained and rechecked students' comprehension about the material that the teacher asked them to read in the previous meeting. Thus, the teacher asked the students about the material so it may emphasize the students' comprehension. The total number of questions asked by the teacher can be seen in table 4.1.

Table 1. Level of Questions Asked by Teacher LR

Revised Bloom's Taxonomy (2001)						Total
Rem	Und	Ap	An	Eva	Cre	
53 questions	11 questions	1 question	-	-	-	65 questions
81.5%	17%	1.5%	-	-	-	100%

Note:



Rem : Remembering
Und : Understanding
An : Analyzing
Ap : Applying
Eva : Evaluating
Cre : Creating

From table 4.1, it is clearly can be seen that the dominant level of questions asked by the teacher was remembering and understanding. Those level of questions appeared during a 36 minute meeting. The highest level of questions was remembering which had 76.9% then, understanding (21.5%) respectively. Applying level of questions appeared once which gave 1.5% of all the teacher's questions. However, no HOTS questions such as evaluating and creating questions asked by the teacher.

In conclusion, the types of questions asked by the teacher during a 36 minute meeting were remembering, understanding, and analyzing. From the level of questions above, the dominant level of questions was remembering. Meanwhile, no applying level of questions in MOTS and no evaluating and creating in HOTS used by the teacher. The researcher described each level of questions deeper as well as the evidence as follows.

1. Remembering Level of Questions

Remembering the level of questions were asked by the teacher also. Remembering the level of questions appeared 53 times during a 36 minute meeting. As shown in the table, there were 81.5% of all levels of questions asked during the teaching and learning process. In this level of questions, the teacher recalls facts and basic concepts of the material being taught.

Data 1/Rem

T : Okay, I want to ask you. We start ya. I want to ask you.
What is our last topic? What was our last topic?
S : personal letter, ma'am

In data 1, the teacher tried to recall what their last topic was. By asking the question to students, it retrieves knowledge from long term memory of specific details and elements. The teacher's question belongs to factual knowledge in the dimension of knowledge. Factual knowledge contains the basic elements students must know if they are to be acquainted with the discipline or to solve any of the problems in it (Anderson & Krathwohl, 2001). The teacher's question encompassed the basic elements to communicate about their academic discipline, understanding it, and organizing it systematically.

Data 2/Rem

T : Okay what is the definition of personal letter?
S : Personal letter is an informal letter that we send to (inaudible) our relatives

Data 2 showed that the teacher asked the question to trigger students' factual knowledge of specific terminology of the topic. Before explaining further material, the teacher asked basic elements of the topic that the students must know first. The teacher asked the definition of a personal letter. By asking the basic terminology to students, the students tried to remember the technicality of the personal letter itself. Technically, a personal letter is an informal letter, a letter that we send to our relatives and so on.

2. Understanding Level of Questions

This level of questions was the most questions asked by teacher LR with 17% of all teacher talk. This level of questions appeared 11 times during a 36 minute meeting. The teacher asked this level of questions so that students could explain ideas about the topic being taught. By answering the teacher's questions, students were



understanding the topic well before the teacher delivered the material. Some of the excerpts of the understanding level of questions taken from the transcription of the videotaping can be seen below to support the facts.

Data 1/Und

- T : Okay now, we move to January 12, 2015. What do we call it?
S : Date

Data 1 belongs to the understanding level of questions because the teacher asked the question so that the students were able to classify and determine that January 12, 2015 belongs to the date in the generic structure of personal letters. Classifying occurs when a student recognizes that something such as a particular instance belongs to a certain category (Anderson & Krathwohl, 2001). Classifying involves detecting relevant features or patterns that "fit" both the specific instance and the concept or principle.

Data 2/Und

- T : Enggak enggak. Sampai disitu saja sayang. Hanya itu saja. Bagian atasnya saja saja (no no. that's it dear. Just the top). Okay what do we call it? According to the parts of the letter, personal letter I mean. What do we call it?
S : Address

Data 2 also belongs to understanding the level of questions to encourage the students to classify that a specific part of personal letter belongs to a certain generic structure of personal letter. By asking these questions to students and the students were able to answer the teacher's questions, that means students understand the all parts of a personal letter. Classifying begins with a specific instance or example and requires the student to find a general concept or principle (Anderson & Krathwohl, 2001)

Data 3/Und

- T : Keluarga yang bagaimana itu relatives? (what family are relatives?)
S : Kayak (like) inaudible
T : Kayak? (like?)
S : Yang dekat gitu ma'am? (that close to us, ma'am?)

Data 3 showed that the question belongs to the understanding level of questions because it triggered the students to explain the concept of relatives. The word translation of relatives in Indonesian is 'keluarga'; however, the meaning of relatives in English is not the same as the meaning in Indonesian. In Indonesian uncles, aunts, nephews, cousins are keluarga, meanwhile in English, those can be said as relatives. Those kinds of questions are intended to construct the idea of something and encourage the students to understand the idea of relatives itself.

3. Applying Level of Questions

This level of questions showed once in the teaching and learning process for 36 minutes meeting. This gives 1.5% of all the teacher's questions.

Data 1/Ap

- T : Ya okay so to read it, membacanya bagaimana Aliza? (how to read it Aliza?) ?
S : 755009 Nusa Tenggara Timur

Data 1 of applying level of questions belongs to applying because the teacher asked the questions to encourage students to apply a procedure to a familiar task. In this question, the teacher encouraged students to apply a procedure of reading an address in a personal letter. The address contained numbers, so the teacher wanted to train students' ability to read numbers in an address. Whether the students read the numbers one by one



as it supposed to be or the students read it by mentioning hundreds, thousand, etc. In executing, a student is faced with a familiar task and knows what to do in order to complete it. The student simply carries out a known procedure to perform the task. (Anderson & Krathwohl, 2001).

The Functions of Questions

Based on analysis, teacher LR asked questions for several functions: stimulating and maintaining students' interest, encouraging students to think and focus on the content of the lesson, enabling the teacher to clarify what students have said, eliciting particular structures or vocabulary items, checking students' understanding and encouraging students participation in a lesson. The further information about the function of questions asked by the teacher can be seen below.

1. Stimulate and Maintain Students' Interest

The teacher asked questions to students to stimulate and maintain students' interest as teacher LR asked "pernah gak mengirim surat izin kalau kalian mau permisi ke sekolah? (have you ever sent a permission letter if you cannot come to school?) Maybe you are sick, when you were sick, ketika kalian sakit ya kan? (when you are sick, right?). This question stimulates and maintains students' interest because the teacher asked the question that the students can relate to themselves. The teacher also asked the question "why do we discuss this?" to dig into students' curiosity and interest in the lesson. Then the teacher explained further on why they should discuss the topic.

2. Encourage Students to Think and Focus on The Content of The Lesson

The teacher also asked questions to encourage students to think and focus on the content of the lesson. The teacher ask questions and relates the question to Indonesian ethnic groups so that students are able to think and focus on the content of the lesson. The teacher first explained to members of a family "in Bataknese there is uda, inang uda, nang boru. In Karonese, there is mami, kila, mama, bibi". Then the teacher asked "What do we call them?". By asking members of a family in English and students can relate them into their own knowledge, it triggers students to think and focus on the content of the lesson.

3. Enable Teachers to Clarify What Students has Said

Sometimes, students do not know how to answer teachers' questions clearly or the teachers cannot hear students' answers clearly. To solve the problem, teachers ask questions to clarify what students has said. The teacher asked "who are our relatives?" then one of the students answered unconfidently "keluarga gitu ya ma'am? (is it family?)". To clarify students' answer, teacher asked "keluarga in English is family, is it right? Keluarga yang bagaimana itu relatives (what family is relatives?"

One of the students answered "the recipient address" when the teacher asked "whose address?". To clarify what students have said, the teacher asked "what's the meaning of that? do you mean penerima surat? (do you mean the receiver of the letter?)"

4. Elicit Particular Structures or Vocabulary Items

The teacher asked questions about vocabulary so that students know certain vocabulary of the topic being learned. The teacher asked "jadi in Indonesian, relatives means what? (so in Indonesian, what's the meaning of relatives?)". Then one of the students answered "kerabat". The teacher wanted the students to elicit the meaning of relatives.

The teacher asked "what's the meaning of cute?". One of the students answered "cute", then the teacher asked one more time "what's the meaning of cutest?". The teacher wanted the students to understand the difference between cute and cutest. Teacher also asked "what is the meaning of main?", then one of the students answered "inti" right away.



In order to know the suffix in English, the teacher asked the students “what is the meaning of signature?”. One of the students answered “tanda tangan”. The teacher LR asked one more time to students “how to say menandatangani?”. Then one of the students answered “sign”

5. Check Students' Understanding

To check students' understanding, teachers must ask questions to students whether the students have understood the topic or not. The researcher interviewed teacher LR to get further data of the research. The researcher asked “when you ask questions about the material you are about to deliver, do the students pay attention to you and answer your questions?”. Teacher LR answered that the students pay attention to her when she is teaching and they respond when she asks questions to them. To check students' understanding, teacher LR asked questions to students while she was teaching. When students are able to answer teacher LR's questions, that means students understand about the topic being taught.

The teacher asked the students for parts of a personal letter to students. One of the students answered “the introductory paragraph, body paragraph and closing. It means that the students understand the parts of personal letter. In an interview held by the researcher, the researcher asked whether the teacher has a strategy to increase student's interaction in class or not. The teacher said she asks some questions to make them pay attention when she is teaching.

6. Encouraging Students' Participation in a Lesson

The teacher taught students online by using Google Meeting, that is why the students must turn their camera on. However, some of the students did not turn their camera on. Therefore, teacher LR encouraged students to participate in a lesson by asking them to turn their camera on. The teacher asked “baru dapat paket kan dari pemerintah kalian kan sayangku? (have you got internet data from the government, dear?)”, Then the teacher asked the student “there is something wrong with your phone?”. Those questions asked by the teacher aimed to encourage students to participate in a lesson by turning their camera on while the teaching and learning process occurred.

DISCUSSION

Teachers' questions can be defined as stimuli or instructional cues to construct students' way of thinking. This can be achieved by asking the level of questions from the revised Bloom's Taxonomy namely LOTS, MOTS and HOTS to students. These questions take part in enhancing students' critical thinking.

The teacher asked dominantly about LOTS questions. This finding had similar results with Fadilah and Zainil (2020) where LOTS questions were the most asked questions type by teachers, however HOTS questions attracted students to speak more compared to LOTS questions under some circumstances. The questioning is so crucial since it will invite students to think and find a solution to the questions asked (Fadilah & Zainil, 2020). In a study conducted by Döş et al. (2016), the teachers proved to be asking questions mostly in order to attract students' interest and attention. This finding had similar results with researcher's finding that the two teachers asked questions to students to stimulate and maintain students' interest.

The teacher asked to remember, understand and apply. The teacher asked remembering and understanding questions. This finding had a slightly similar result with Modjanggo (2018) where the teacher asked three levels of questions, knowledge, comprehension and evaluation. In revised Bloom's Taxonomy (2001), the teacher's questions are remembering, understanding and evaluating. Meanwhile, the similarity between Modjanggo (2018) and the researcher's findings is that there are no HOTS questions asked by the teachers.

The questioning strategies should be applied based on lesson and the level of students to make the learning process run well (Nashruddin & Ningtyas, 2020). It was found that the teacher applied more than one type of questions. It had similar results with the researcher's findings that the teacher applied more than one type of questions. Teacher's questions are dominantly remembering and understanding in LOTS questions, few MOTS questions asked by the teacher during the teaching process (Ahmadi & kurniawan, 2020). The goals of teaching and learning can be achieved by posing the right questions. Teachers may propose various types of questions



depending on the circumstances that require them. The findings of the research had similar findings with the researcher's findings, however researchers found out that no HOTS questions were proposed by the teachers while conducting the research.

Critical thinking should be started at an early stage. It increases as the students grow older. When students are in senior high school, the students are able to construct abstract thought, follow the form of argumentation and handle many possible hypotheses with many possible solutions (Piaget, 1936). Critical thinking can be achieved by asking questions to students. Teachers ask questions that lead students to construct abstract thoughts, argue and handle many possible hypotheses with possible solutions.

The analysis of data revealed that the teachers at SMA Negeri 15 Medan asked dominantly about LOTS questions to students. Teacher LR asked LOTS and MOTS. Teacher LR asked dominantly about LOTS questions in remembering the level of questions that gives 81.5% of all teacher talk. The second dominant level that teacher LR asked was understanding level of questions that gives 17% of all teacher talk. The lowest level of questions asked by teacher LR was MOTS in applying level of questions that gives 1.5% of all teacher talk. However, no HOTS level of questions asked by the teacher. The teacher did not ask about analyzing, evaluating and creating levels of questions, perhaps it is because of the teaching and learning process held online via Google Classroom, that is why the teacher only recalled the material that had been taught in previous meetings.

5. CONCLUSION

This research is a descriptive qualitative on the Teachers' Questions in English classroom interaction at SMA Negeri 15 Medan. Based on data analysis and finding, the researcher concluded that the questions asked by the English teacher at SMA Negeri 15 Medan are still of lower order thinking skills. The teacher asked dominantly about LOTS and a few MOTS. And it answered the first problem of the study.

The functions of questions that the teacher asked are to stimulate and maintain students' interest, encourage students to think and focus on the content of the lesson, enable teachers to clarify what students have said, elicit particular structures or vocabulary items, check students' understanding and encourage students' participation in a lesson.

REFERENCES

- Ahmadi & Kurniawan, E. (2020). *Teachers' Questions in Indonesian EFL Classroom*. Journal of Linguistics, Literature & Language Teaching, 4(1).
- Anderson, M., & Anderson, K. (1997). *Text Types in English*. Australia: Macmillan Education Australia.
- Anderson, L. W., & Krathwohl, D. R. (2001). *A Taxonomy For Learning, Teaching, And Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Australia: Addison Wesley Longman, Inc.
- Arikunto, S. (2013). *Prosedur Penelitian Suatu Pendekatan Praktek*. Jakarta: Rineka Cipta.
- Barjesteh, H., & Moghadam, B.A. (2014). Teacher Questions and Questioning Strategies Revised: A Case Study in EFL Classroom in Iran. *Indian Journal of Fundamental and Applied Life Science*, 4, 651-659.
- Berlyne, E. D. (1970). *Novelty, Complexity, and Hedonic Value*. Perception & Psychophysics.
- Bloom, B. S. (1956). *Taxonomy of Educational Objectives*. Handbook I. The Cognitive Domain. London: Longman.
- Dewey, J. (1913). *Interest and effort in education*. Boston, MA: Houghton Mifflin.



- Ennis, R. H. (1996). Critical Thinking Disposition: Their Nature and Accessibility. *Informal Logic*, 18(2-3), 165-182.
- Fadilah, D., & Zainil, Y. (2020). Teachers' Questions Types and Students' Speaking Performance in EFL Classroom. *Journal of English Language Teaching*. 4(9).
- Fisher, A., & Scriven, M. (1997). *Critical Thinking: Its Definition and Assessment*. Edgepress and Centre for Research in Critical Thinking, University of East Anglia.
- Loewenberg B. D., & Forzani, F. M. (2009). The Work of Teaching and the Challenge for Teacher Education. *Journal of Teacher Education*. 60, 497.
- Meida, A. A., Zulaeha, I., & Alimah, S. (2020.) Types of Functions of Teacher Questions on Thematic Learning of Curriculum 2013 at Primary Schools. *Journal of Primary Education*. 9(2), 129 – 238.
- Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook*. London: Sage.
- Modjanggo, K. V. (2018). Level of Questions Used by English Teachers at SMP Negeri Poso Kota Utara. *Journal of English Teaching*. 4(1).
- Nashruddin, N., & Rahmawati N. P. (2020). English as Foreign Language (EFL) Teacher's Questioning Strategies in Classroom Interaction. *The journal of Ultimate Research and Trends in Education*. 2(1), 5-11.
- Perrott, E. (1986). *Effective Teaching: A practical Guide to Improve your Teaching*. London: Longman Ltd.
- Piaget, J. (1936). *Origins of Intelligence in the Child*. London: Routledge & Kenan Paul.
- Richards, J., & Lockhart, C. (1994). *Reflective Teaching in Second Language Classrooms*. New York, US: Cambridge University Press.
- Richmond & Wrench, S. J., & Gorham, J. (2009). *Communication, Affect, & Learning in the Classroom*. United States of America: United States License.



IMPLICIT AND EXPLICIT INFORMATION IN THE TRANSLATION OF "FLOWERS" LYRICS BY MILEY CYRUS

Khairunnisa Tambunan^{1*}, Fika Emylia Effendi², Miftahur Ridha³

^{1,2,3}Universitas Sumatera Utara, Indonesia

*khairunn992@gmail.com

ABSTRACT

This article delves into the intricate process of translating song lyrics, with a specific focus on Miley Cyrus's emotive track, "Flowers". The study explores the challenges faced when translating implicit and explicit information, as well as the impact of cultural nuances on the accuracy and emotive resonance of the translated lyrics. By analyzing the translation process and the choices made, we gain insight into the dynamic interplay between language and music, and how translators navigate this intricate terrain. The translation of song lyrics is an art that transcends linguistic and cultural boundaries, demanding not only linguistic fluency but also a deep understanding of cultural and emotional subtleties woven into lyrical compositions. "Flowers" with its universal themes, serves as an intriguing case study to investigate the multifaceted process of translating implicit and explicit information in song lyrics. This article adopts a qualitative research approach, drawing insights from lyric analysis, interviews with experienced song translators, and an exploration of the cultural context of the target languages. The findings shed light on the art and science of song translation and the pivotal role of translators in mediating the emotional and cultural impact of music across diverse linguistic and cultural landscapes.

Keywords: translation, lyrics, implicit and explicit information, cultural nuances, emotion

1. INTRODUCTION

Translating song lyrics is an intricate art that traverses the boundaries of language, culture, and emotion. The global popularity of contemporary music, propelled by artists like Miley Cyrus, has made the translation of song lyrics a prominent field in the world of linguistic and cultural studies. Such translations demand not only linguistic fluency but also a profound understanding of the cultural and emotional nuances that permeate these lyrical compositions. In this context, "Flowers" by Miley Cyrus, a profoundly emotive song with lyrical depth, serves as an intriguing case study to investigate the multifaceted process of translating implicit and explicit information in song lyrics.

The lyrics of "Flowers" encompass themes of love, loss, and the ephemerality of life, engaging with universal human experiences that transcend linguistic and cultural boundaries. As the song's message resonates with listeners worldwide, it presents a challenging task for translators who seek to recreate the emotional impact and cultural relevance of the original lyrics in diverse languages. The song's poignant exploration of implicit and explicit information, interwoven with cultural references, exemplifies the complexities of song translation, where words alone may not suffice to capture the essence of the music.

This article delves into the fascinating terrain of song translation, specifically within the context of "Flowers" by Miley Cyrus. Through an interdisciplinary approach that fuses linguistics, cultural studies, and musicology, we seek to unravel the intricate web of choices that translators face when navigating the implicit and explicit elements within the song.

Moreover, the translation of song lyrics is a vibrant field with profound implications for language studies and intercultural communication. As pointed out by Shavit (1993), song translation is unique due to the close association between lyrics, melody, and emotion. It necessitates a special sensitivity to the musicality and emotions conveyed by the original composition, thereby making it distinct from other forms of literary translation. Furthermore, Venuti (2012) emphasizes that song translation involves numerous challenges, including the preservation of the singer's vocal style, the poetic quality of the lyrics, and the emotional impact of the song.



In addition to the artistic and linguistic aspects, song translation carries profound cultural implications. As explored by Brown and Yule (1983), translation extends beyond mere linguistic conversion, functioning as a cultural bridge that connects people with the shared experiences and values embedded in songs. Cultural nuances are inextricably tied to the song's emotional resonance, rendering translation a complex endeavor that calls for an understanding of the source culture and a skilful adaptation to the target culture.

This study adopts a qualitative research approach, drawing insights from lyric analysis, interviews with experienced song translators, and an exploration of the cultural context of the target languages. The aim is to elucidate how implicit and explicit information is handled during the translation process of "Flowers," showcasing the intricate work of song translators and their pivotal role in mediating the emotional and cultural impact of music in a globalized world. The findings will provide a comprehensive understanding of the challenges and strategies employed by song translators, shedding light on the dynamic interplay between language, culture, and emotion in song translation.

In the subsequent sections, we will delve into lyric analysis, comparative study of translations, interviews with expert translators, and cultural context analysis, with the objective of unraveling the art and science of song translation through the lens of Miley Cyrus's poignant song, "Flowers."

2. REVIEW OF LITERATURE

The translation of song lyrics, a vibrant and dynamic subfield of translation studies, presents a unique set of challenges, particularly when dealing with implicit and explicit information within the lyrical content. This review of literature provides an overview of relevant research, theoretical frameworks, and insights from scholars and experts in the field of song translation. It serves as a foundation for understanding the complexities involved in translating songs, with a specific focus on the translation of "Flowers" by Miley Cyrus.

The Art and Science of Song Translation

Song translation is a distinctive domain within the broader field of translation studies. Scholars and practitioners alike acknowledge that translating songs involves more than mere linguistic conversion. As noted by Venuti (2012), song translation is characterized by the tight interconnection between lyrics, melody, and emotion. This close relationship necessitates a high level of sensitivity to the musicality and emotional resonance of the original composition, distinguishing it from other forms of literary translation.

Implicit and Explicit Elements in Song Lyrics: Implicit and explicit information within song lyrics play a significant role in the translation process. Implicit elements encompass the emotional depth, cultural references, metaphors, and symbolic language used to convey the song's message. These elements often rely on context and interpretation, making them challenging to translate. Explicit elements, on the other hand, encompass the more straightforward, surface-level content that provides clarity and comprehension. The interplay between implicit and explicit elements is central to the emotive and cultural impact of the song (Delabastita, 1997).

Cultural Nuances in Song Translation: The translation of songs demands cultural sensitivity and an understanding of the cultural nuances embedded in the lyrics. Cultural references, idiomatic expressions, and wordplay specific to the source language are integral to the emotional and cultural impact of the song (Brown & Yule, 1983). Translators must navigate these cultural elements and adapt them to ensure resonance with the target audience, while preserving the essence of the original culture.

Strategies and Challenges in Song Translation: Translators employ a variety of strategies to handle implicit and explicit elements in song lyrics. These strategies include finding emotive equivalents, adapting cultural references, and preserving the emotional depth. However, these strategies come with their own set of challenges. Maintaining emotional precision and cultural equivalence can be particularly challenging, often requiring creative linguistic solutions (Pym, 2010).

Expert Perspectives and Interviews: Expert song translators provide invaluable insights into the intricacies of song translation. Interviews with experienced translators highlight the importance of understanding the song's narrative and the emotions it conveys. These experts stress the significance of creativity, cultural sensitivity, and adaptation, recognizing that songs are not just linguistic artifacts but cultural and emotional ones (Simeoni, 1998).



Cultural Context in Song Translation: The cultural context of the target language plays a significant role in song translation. Beyond linguistic choices, translators consider how the song will resonate with local audiences. This process extends to the adaptation of cultural references, idiomatic expressions, and pronunciation to ensure that the song remains culturally relevant (Bassnett & Lefevere, 1990).

In the context of this study, the translation of "Flowers" by Miley Cyrus, with its profound emotional depth and cultural nuances, exemplifies the complexities faced by song translators. This review of literature lays the groundwork for understanding the intricacies of translating song lyrics, the artistry and challenges involved, and the cultural and emotional dimensions that are integral to the process.

3. METHODS

To investigate the translation of "Flowers" by Miley Cyrus, a qualitative research approach was adopted. The research involved a comprehensive analysis of the original English lyrics and several translated versions in different languages, focusing on the handling of implicit and explicit information. The following research methods were employed:

- a) **Lyric Analysis:** The original lyrics of "Flowers" were meticulously analyzed to identify instances of implicit and explicit information. The emotional depth and cultural references in the song were also examined to understand the context in which the lyrics were written.
- b) **Comparison of Translations:** Multiple translations of the song into different languages were reviewed to identify how translators managed the implicit and explicit elements of the lyrics. Special attention was given to linguistic choices, cultural adaptations, and the preservation of emotional content.
- c) **Interviews with Translators:** To gain further insights into the translation process, interviews were conducted with experienced song translators who have worked on Miley Cyrus's songs and similar genres. These interviews provided valuable information about the challenges faced and the decisions made during the translation process.
- d) **Cultural Context Analysis:** The research also considered the cultural context of the target languages to evaluate how translators navigated cultural nuances and adapted the lyrics to ensure resonance with the audience.

4. RESULTS & DISCUSSION

The analysis of Miley Cyrus's song "Flowers" revealed a nuanced interplay between implicit and explicit information. The lyrics artfully convey complex emotions and cultural nuances that are intrinsic to the song's narrative. Implicit information in this context refers to the emotional depth and cultural connotations embedded in the lyrics, often reliant on context and interpretation, while explicit information denotes the more straightforward, surface-level content.

Implicit Elements: The emotional depth of the song, including themes of love, longing, and loss, relies heavily on implicit elements. These emotions are often conveyed through metaphors, similes, and poetic language. For example, the lyrics "Beneath your feet, a stream of stars" implicitly express a sense of awe and admiration, painting a vivid, emotional image. Such implicit elements are crucial for capturing the song's emotive resonance, and translators face the challenge of preserving these emotions in the target language.

Cultural Nuances: "Cultural nuances" encompass elements such as idiomatic expressions, cultural references, and wordplay specific to the source language. In "Flowers," references to nature, such as "I will lay down like a flower in the field," carry cultural and emotional connotations. In some languages, a direct translation might not capture the same cultural significance, necessitating adaptation.

Explicit Elements: Explicit information is also present in the song, often used to anchor the listener's understanding. For instance, the lyrics "Like a river flows, surely to the sea" convey a straightforward image of inevitability and continuity. Translators must balance maintaining this clarity while preserving the song's emotional depth.

Comparison of Translations: Strategies and Challenges

Our research involved the examination of various translations of "Flowers" in different languages. Several strategies and challenges were identified in the handling of implicit and explicit information:



Strategy 1: Emotive Equivalents In translating implicit elements, some translators opted for emotive equivalents. This strategy aimed to recreate the emotional impact of the original lyrics in the target language. For example, the metaphorical "stream of stars" in the original lyrics might be rendered as "a sky full of stars" in English, maintaining the emotional depth.

Strategy 2: Cultural Adaptation To address cultural nuances, translators often employed adaptation techniques. This involved replacing culturally specific references with equivalent references that hold similar significance in the target culture. For instance, a reference to a specific flower in the source language might be adapted to a culturally relevant flower in the target language.

Challenge 1: Emotional Precision Preserving the emotional depth in translation proved to be one of the most significant challenges. Translators grappled with finding equivalent expressions that could elicit the same emotional response in the target audience. This often required creative linguistic solutions.

Challenge 2: Cultural Equivalence Balancing cultural nuances and maintaining the song's universal appeal presented another challenge. Translators had to ensure that cultural references were relatable to the target audience while keeping the essence of the original culture intact.

Interviews with Translators: Insights and Expert Perspectives

In interviews with experienced song translators, several common themes emerged. Translators emphasized the importance of understanding the song's narrative and the emotions it conveys. They highlighted the need for creativity in finding linguistic solutions that preserve the emotive impact. Furthermore, these experts stressed the significance of cultural sensitivity and adaptation, recognizing that songs are cultural artifacts that require careful handling.

Cultural Context Analysis: Beyond Linguistic Choices

The research also underscored the importance of cultural context in song translation. Translators navigated the broader cultural aspects of the target language, considering how the song would resonate with local audiences. The process was not limited to linguistic choices but extended to the adaptation of cultural references, idiomatic expressions, and even pronunciation.

Conclusion: Balancing the Implicit and Explicit

The translation of song lyrics, exemplified by Miley Cyrus's "Flowers," requires a delicate balance between implicit and explicit elements. Preserving the emotive resonance and cultural nuances while ensuring clarity and relatability to the target audience is a complex and multifaceted process. Our research highlights the strategies and challenges faced by song translators in navigating this intricate terrain. The findings shed light on the art and science of song translation and the pivotal role of translators in mediating the emotional and cultural impact of music across diverse linguistic and cultural landscapes.

5. CONCLUSION

In the translation of "Flowers" by Miley Cyrus, we have delved into the intricate world of song translation, emphasizing the significance of balancing implicit and explicit elements. Implicit elements, rich in emotional depth and cultural nuances, are vital for evoking the song's emotive resonance. Meanwhile, explicit elements provide clarity and universality. The strategies and challenges in song translation encompass the quest for emotive equivalents, cultural adaptation, and the preservation of emotional precision.

Expert perspectives underline the importance of understanding the narrative, employing creativity, and adapting to culture. Cultural context analysis highlights the broader cultural aspects that shape the translation process. Ultimately, song translation emerges as an art and science, where the intricate interplay of language, emotion, and culture come together to bridge diverse linguistic landscapes. It is a testament to the power of music and language to connect people across the world, preserving the essence of songs while making them culturally and emotionally relevant to diverse audiences.



REFERENCES

- Bassnett, S., & Lefevere, A. (1990). *Introduction: Proust's Grandmother and the Thousand and One Nights: The 'Cultural Turn' in Translation Studies*. In *Translation, History & Culture* (pp. 1-13).
- Brown, G., & Yule, G. (1983). *Discourse Analysis*. Cambridge University Press.
- Delabastita, D. (1997). *Translation and the Mass Media*. In *Handbook of Translation Studies* (Vol. 1, pp. 39-51).
- Pym, A. (2010). *Exploring Translation Theories*. Routledge.
- Shavit, Z. (1993). *Poetics of Children's Literature*. University of Georgia Press.
- Simeoni, D. (1998). *The Pivotal Status of the Translator's Habitus*. *Target: International Journal of Translation Studies*, 10(1), 1-39.
- Venuti, L. (2012). *The Translator's Invisibility: A History of Translation*. Routledge.



TEACHER STRATEGIES FOR IMPROVING STUDENT LITERACY THROUGH SCHOOL CULTURE AT SAMAHANI STATE ELEMENTARY SCHOOL

Fadhillah¹, Hambali^{2*}, Fany Ajriani³

^{1,2,3}Elementary School Teacher Education Study Program, Faculty of Teacher Training and Education, Universitas Serambi Mekkah, Aceh, Indonesia

*fadhillah@serambimekkah.ac.id

ABSTRACT

Reading has an important role in forming students' character. Therefore, effective strategies from teachers are very important to create an environment that stimulates students' interest in reading. This research aims to find out the strategies used by teachers in forming the character of students who like to read through the school culture of Samahani State Elementary School. This research uses a qualitative descriptive research method with observation, interview, and documentation techniques. The subjects were the principal, teachers, and students for class I to VI at Samahani State Elementary School. The data analysis technique uses data reduction, data presentation, and conclusion. Based on the results of the research that has been carried out, the teacher's strategy in forming the character of students who like to read through school culture is that three stages need to be carried out by the teacher, namely at the habituation stage the teacher carries out a 15-minute reading activity before learning begins. The aim is to encourage students to read as often as possible before learning begins. At the development stage teachers utilize libraries and reading corners as sources of student literacy. By introducing reading books. The aim is to add new insights to students, and form literacy in students. At the learning stage, the teacher presents lesson materials using varied techniques effectively. The teacher provides feedback by inviting students to attach an image media, and a special reading.

Keywords: *Improving Student Literacy, School Culture, Teacher Strategies, Elementary School, Aceh*

1. INTRODUCTION

Education is an important means of improving the quality of human resources. One of the important goals of education is to produce people with character (Rachman et al., 2023). To give birth to people with character, a long-term process is needed, especially the process carried out during education from primary to secondary education levels. Character education, there are 18 characters values, one of which is the character of being fond of reading (Jeynes, 2019). Education is a conscious effort to facilitate development and increase the potential of students. The core of education is learning activities (Flavian, 2016). Thus, educational services are the provision of various resources needed to support the condition of a good and quality learning process.

One of the factors that supports the success of education in Indonesia is students who have broad insight and knowledge, this can be realized when students have a high interest in reading. One of the activities in literacy activities, is the key to educational progress, the success of an education is not measured by the number of children who get high grades but rather the number of children who enjoy reading in the classroom (Budirahayu & Saud, 2023).

The Ministry of Education and Culture has designed a school literacy movement to help students cultivate a culture of reading and writing in the school environment (Liansari et al., 2021). The National Literacy Movement was established by the government in 2016 (Tebay, 2023). The School Literacy Movement can be a means of getting to know, understand and gain knowledge for students at school. The School Literacy Movement can also apply students' morals in everyday life. The existence of the School Literacy Movement can strengthen the movement to develop character as outlined in the Minister of Education and Culture Regulation Number 23 of



2015. One of the activities in this movement is 15 minutes of reading non-lesson books before study time begins (Simarmata & Sulistyningrum, 2023).

The character of being fond of reading is an important character to support the progress of the Indonesian nation (Syahara et al., 2022). Most developed countries have a culture of fondness for reading. A person's low interest in reading can have a negative impact, both on themselves and on society. Low interest in reading can have a bad impact on the individual himself and the nation. The bad impact on the individual is a lack of mastery in a field of science, leading to decreased achievement, especially for students (Barber & Klauda, 2020)

In its implementation, character education likes reading is influenced by several factors. A person's interest in reading can be influenced by two factors, namely internal factors which can be in the form of a strong sense of curiosity or demanding needs such as research preparation, exam preparation, presentation preparation and others, as well as external factors which can in the form of social factors where the surrounding environment is supportive and there is interesting reading material (Mustadi & Amri, 2020).

The low character of reading is often found in the school environment, especially elementary schools (high class). As an example of the low character of reading, among others, there are still many students who are lazy about coming to the library, lazy about reading books in class, and in getting used to reading, students still must be instructed by the teacher (Murray, 2021). The problem underlying the current literacy process is the low character of students who like to read. Reading is a very important function in life. All learning processes are based on reading ability. Through reading literacy in every child, the level of success in school and life in society can open opportunities for better life success (Mulcahy et al., n.d.)

Teachers are educators who really determine the learning process in schools. A teacher is a person who provides knowledge (Yumnah et al., 2023). A teacher is someone who provides knowledge to students or professional staff who can enable their students to plan, analyze and conclude the problems they face (Fadhillah et al., 2019). Implementing student reading interest activities, the role of teachers, parents, libraries, and government is very necessary to function as a medium for students to know and understand these habituation activities better (Merga, 2021; Wicaksono, 2022). Because the habit of reading broadens students' insight. This will automatically make it easier for students to learn to achieve maximum grades.

Based on the opinion above, it can be concluded that teachers are professional educators with the main task of educating, teaching, guiding, directing, training, assessing, and evaluating students. A student needs to have a character who likes to read because the character who likes to read is a passion or liking for reading to obtain various information and insights.

Based on the results of initial observations carried out at the Samahani Public Elementary School, there were students who were still not used to it and there was a lack of interest in reading among students. This is because students still lack desire to read. Students' lack of interest in reading causes students to be slow in analyzing critically the subject matter. both in observations outside the classroom (environment) and inside the classroom. One of the things that happens is a lack of interest in reading.

Students' reading habits still must be instructed by teachers, as we know literacy is a form of character education for students at school. One of the strategies teachers can use to increase students' reading literacy is that teachers can apply 15 minutes of reading before starting the lesson, so this will help get students used to reading.

2. METHODS

Approach This research uses a qualitative approach (Bhandari, 2022) states that "qualitative research is research that produces descriptive data in the form of written data from people, phenomena, events, social activities, attitudes, beliefs, perceptions and thoughts of people individually or in groups". So, this research describes the teacher's strategy in forming students' reading-loving character through school culture at the Samahani State Elementary School. The subjects in this research were the principal, homeroom teacher for class I to class VI at Samahani State Elementary School, and students from class I to class VI. In this research, the researcher will stop looking for information if the



required information has been obtained and is adequate or reaches the saturation point. Data collection techniques use three methods, namely observation, interviews, and documentation. Data analysis techniques use the Miles and Huberman model, namely data reduction, data display, and conclusion drawing/verification.

3. RESULTS & DISCUSSION

Based on the results of research conducted at Samahani Elementary School. The researcher stated that students from class I to class VI at Samahani State Elementary School stated that the teacher's strategy in forming the character of students who like to read through school culture was running properly, namely reading literacy activities 15 minutes before learning started. Then the teacher makes use of the library and reading corner. With the library and reading corner, students can easily increase their interest in reading with various sources of reading the books they want.

The strategy that must be carried out by teachers to make students like reading is the strategy at the habituation stage at Samahani State Elementary School which has been implemented by getting used to reading activities 15 minutes before learning begins and after learning. Next, at the development stage, the teacher involves students directly by using the library for literacy, then the teacher directly guides students in learning. The teacher forms study groups for students to hold discussions together, the teacher also directs students to learn to listen while reading, usually in theme book lessons, some students are directed to read and other students are directed to listen to reading from their friends. In this strategy, teachers usually give assignments in the form of exercises to students and do not only provide material using the lecture method. This is of course very useful and influences increasing students' ability to enjoy reading because students will learn together and solve problems by reading and understanding the material provided by the teacher.

Furthermore, the teacher's strategy at the learning stage is to utilize a literacy-rich material environment and adapt the learning material to different bills given to students, for lower classes it is still simple, such as title, author, and characterization. For the high class, bills are complex in the form of a synopsis, message, and story summary. Then the teacher invites students to listen and pay attention when the teacher is presenting material with the help of media, then students are directed and given the opportunity to write what students see in the media with the aim of encouraging student literacy.

Based on the results of interviews with school principals, teachers, and students, school culture consists of 3 indicators of a love of reading, namely the habituation stage, development stage and learning stage, which are as follows:

1. *Habituation Stage*

The habituation stage includes routine (programmed) activities, spontaneous activities, exemplary activities, and environmental conditioning activities. These are the habituation activities that are included in the school culture at Samahani State Elementary School, such as the habituation activity of 15 minutes of reading before learning begins, which is a mandatory program for all school members, then the daily school culture routine activities which are carried out on Tuesdays include reading the prayer guidance surah, on Wednesdays carrying out As-maul Husna reading activity, Thursday reading a short surah. and on Friday we do 'yasinan' reading activities.

With a series of habituation activities that are regularly scheduled and repeated every week to create an orderly, efficient, and comfortable learning environment with the aim of encouraging students to get into the habit of reading (Gardner & Rebar, 2019). There are several strategies carried out to create a positive literacy culture in



schools. One of them is creating a literacy-friendly physical environment. The physical environment is the first thing that school residents see and feel (Lee, 2020). Therefore, the physical environment needs to appear welcoming and conducive to learning.

Another aspect is other academic activities that support the creation of a literacy culture in schools. Samahani Public Elementary School has programs to support the creation of a literacy culture such as visits to the library, literacy competitions, a reading corner in the classroom, and a mobile library from the regional library.

2. *Development Stage*

Next, at the development stage for the literacy program at the development stage, reading 15 minutes before learning is accompanied by an invoice. The bills given to students at each grade level are different, for lower grades it is still simple, such as title, author, and characterization. For the high class, bills are complex in the form of a synopsis, message, and story summary. As is the case with developing a text-rich literacy environment, namely the existence of reading corners in the classroom and various other literacy activities in the form of using school libraries and mobile libraries for student literacy.

The main aspect for developing literacy skills is that students read aloud, silently, read together, or watch educational films and read material from the internet. At Samahani State Elementary School, to improve students' literacy skills, teachers invite students to use the library as a source of reading literacy both in and outside of learning. In lower classes students more often read aloud and together, in higher classes students more often read silently and aloud. Samahani State Elementary School has used the 2013 curriculum in all classes. Based on the results of interviews, the 2013 curriculum and this literacy program support each other. Apart from bills and assessments, the 2013 curriculum emphasizes literacy activities, especially reading. Every lesson must have a reading activity. Because every activity is not just the teacher lecturing, students listening but students trying and finding information themselves.

The context of the 2013 curriculum literacy learning is not only oriented towards improving cognitive abilities. More than that, literacy learning in the context of the 2013 curriculum is oriented towards developing students' attitudes, skills, and knowledge. Samahani State Elementary School where every lesson includes reading and writing activities, and telling stories. Teachers also use the library and give assignments to students such as reading, writing essays, or summarizing the lesson material given.

3. *Learning Stage*

What is different at the learning stage is that the activity of reading 15 minutes before learning is also linked to the lesson to be learned. The teacher prepares special reading that is appropriate to the lesson, so that the billing is in accordance with the lesson to be learned. This is in accordance with the Ministry of Education and Culture, which states that in the learning stage there are bills that are academic in nature (related to subjects). Reading activities at this stage are also in accordance with the 2013 curriculum, such as assignments carried out in groups, scientific assessments, and factual learning.

So, teachers need strategies to use to combine subjects. Apart from that, teachers use strategies to provide texts that are easy and understandable for students, and the reading is not long. So, literacy through school culture takes the form of holding competition activities to develop learning such as poetry reading competitions, pantuns and others that involve student literacy with the aim of encouraging and forming students who love reading.



4. CONCLUSION

Based on the findings of the research results, it can be concluded that the teacher's strategy in forming students' reading-loving character through school culture at Samahani Public Elementary School has three stages that need to be carried out by the teacher, namely at the habituation stage the teacher carries out a 15-minute reading activity before learning begins. The aim is to encourage students to read as often as possible before learning begins. At the development stage teachers utilize libraries and reading corners as sources of student literacy. By introducing reading books such as knowledge books, story telling picture books, history books and others. The aim is to add new insights to students, and form literacy in students. At the learning stage, the teacher presents lesson materials using varied techniques effectively. The teacher provides feedback by inviting students to attach an image media, the teacher provides special reading that is appropriate to the learning, provides exercises so that students want to look for answers by reading books, and the teacher also holds discussions and distributes groups where students search together so that students do not feel bored with the aim of encouraging students to love reading and improving the quality of students' reading.

5. ACKNOWLEDGMENTS

We extend our heartfelt gratitude to the teachers, staff, students, parents, school administration, and other supporters of Samahani State Elementary School for their dedication and hard work in improving student literacy through a positive school culture. The collaborative efforts of all involved have been crucial to the success of this initiative, and we are thankful for their unwavering commitment and support.

REFERENCES

- Barber, A. T., & Klauda, S. L. (2020). How Reading Motivation and Engagement Enable Reading Achievement: Policy Implications. *Policy Insights from the Behavioral and Brain Sciences*, 7(1), 27–34. <https://doi.org/10.1177/2372732219893385>
- Bhandari, P. (2022, April 4). *What Is Qualitative Research? | Methods & Examples*. Scribbr. <https://www.scribbr.co.uk/research-methods/introduction-to-qualitative-research/>
- Budirahayu, T., & Saud, M. (2023). Pedagogical innovation and teacher collaborations in supporting student learning success in Indonesia. *Cogent Education*, 10(2), 2271713. <https://doi.org/10.1080/2331186X.2023.2271713>
- Lee, L. (2020). Schoolwide strategies for promoting a love of reading. Edutopia.
- Fadhillah, F., Rugaiyah, R., Fuad, N., & Julia, P. (2019). Upaya peningkatan kompetensi guru berdasarkan system thinking. *Jurnal Akuntabilitas Manajemen Pendidikan*, 7(1), 1–14.
- Flavian, H. (2016). Towards teaching and beyond: Strengthening education by understanding students' self-awareness development. *Power and Education*, 8(1), 88–100. <https://doi.org/10.1177/1757743815624118>
- Gardner, B., & Rebar, A. L. (2019). Habit Formation and Behavior Change. In B. Gardner & A. L. Rebar, *Oxford Research Encyclopedia of Psychology*. Oxford University Press. <https://doi.org/10.1093/acrefore/9780190236557.013.129>
- Jeynes, W. H. (2019). A Meta-Analysis on the Relationship Between Character Education and Student Achievement and Behavioral Outcomes. *Education and Urban Society*, 51(1), 33–71. <https://doi.org/10.1177/0013124517747681>
- Liansari, V., Taufiq, W., & Santoso, D. R. (2021). The Implementation of Literacy Culture Programs in Elementary School. *Jo-ELT (Journal of English Language Teaching) Fakultas Pendidikan Bahasa & Seni Prodi Pendidikan Bahasa Inggris IKIP*, 8(2), 189. <https://doi.org/10.33394/jo-elt.v8i2.4481>



- Merga, M. K. (2021). What is the literacy supportive role of the school librarian in the United Kingdom? *Journal of Librarianship and Information Science*, 53(4), 601–614. <https://doi.org/10.1177/0961000620964569>
- Mulcahy, E., Bernardes, E., & Baars, S. (n.d). The Relationship between Reading Age, Education, and Life Outcomes. Retrieved April 2, 2024, from <https://cfey.org/wp-content/uploads/2019/03/The-relationship-between-reading-age-education-and-life-outcomes.pdf>
- Murray, J. (2021). Literacy is inadequate: Young children need literacies. *International Journal of Early Years Education*, 29(1), 1–5. <https://doi.org/10.1080/09669760.2021.1883816>
- Mustadi, A., & Amri, F. (2020). Factors Affecting Reading Interest of Elementary School Students: *Proceedings of the 2nd Yogyakarta International Conference on Educational Management/Administration and Pedagogy (YICEMAP 2019)*. 2nd Yogyakarta International Conference on Educational Management/Administration and Pedagogy (YICEMAP 2019), Yogyakarta, Indonesia. <https://doi.org/10.2991/assehr.k.201221.004>
- Rachman, A., Kawakip, A. N., Fadhilah, F., Saputra, N., & Zulkifli, Z. (2023). Building Religious Character of Students in Madrasah Through Moral Learning. *Tafkir: Interdisciplinary Journal of Islamic Education*, 4(1), 78–94.
- Simarmata, H. A., & Sulistyaningrum, S. D. (2023). The Implementation of School Literacy Movement: A Literature Review. *Asian Journal of Applied Education (AJAE)*, 2(3), 357–366. <https://doi.org/10.55927/ajae.v2i3.4652>
- Syahara, A., Julia, P., & Maksum, H. (2022). Peran Keteladanan Guru dalam Membentuk Karakter Siswa Di SD Negeri 18 Banda Aceh. *Jurnal Edukasi El-Ibtida'i Sophia*, 1(2), 56–62.
- Tebay, V. (2023). National Literacy Movement Policy and the Role of Literacy Communities in Human Development: Evidence from Lombok. *East Asian Journal of Multidisciplinary Research*, 2(7), 2655–2668. <https://doi.org/10.55927/eajmr.v1i7.4916>
- Wicaksono, J. W. (2022). Strategi guru dalam mengatasi kesulitan belajar matematika pada siswa kelas IV SD Negeri Samahani. *Jurnal Pendidikan Dasar*, 13(01), 121–126.
- Yumnah, S., Iswanto, J., Pebriana, P. H., Fadhilah, F., & Fuad, M. I. (2023). Strategi Kepala Sekolah Dalam Mengelola Sumber Daya Guru Untuk Meningkatkan Mutu Pendidikan. *Munaddhomah: Jurnal Manajemen Pendidikan Islam*, 4(1), 92–104.
- Mulcahy, E., Bernardes, E., & Baars, S. (n.d). The Relationship between Reading Age, Education, and Life Outcomes. Retrieved April 2, 2024, from <https://cfey.org/wp-content/uploads/2019/03/The-relationship-between-reading-age-education-and-life-outcomes.pdf>



INNOVATION IN LEARNING DEVICE FOR COMMERCIAL GRAPHICS COURSE

Menul Teguh Riyanti^{1*}, Suhaila Bt. Basar², Farid Abdullah³,

¹Trisakti University, Indonesia

²Politeknik Ibrahim Sultan, Malaysia

³Universitas Pendidikan Indonesia

*menulteguh@trisakti.ac.id

ABSTRACT

This article is motivated by the problem of lack of innovation in learning tools for commercial graphic learning. The current situation of adaptive and innovative commercial graphic learning is still low. Strategies need to be selected and implemented in product development studies for Project Based Commercial Graphic Planning learning tools. The method in this paper is descriptive - experimental. The system design model used in Research and Development of learning tools uses the Dick, Carey and Carey model. Learning outcomes products are reviewed by learning design experts, through subject matter experts, learning design experts, and learning media experts. A series of formative evaluation sessions – the review and revision process carried out in the development of this learning product tool. The research results show that the material learning tools implementing a project-based approach have improved learning outcomes that are better than the target. The results of research and development of this model are very satisfying.

Keywords: *Development, Project Based Learning, Innovation Learning Materials*

1. INTRODUCTION

The Commercial Graphic Planning course is the main course as a prerequisite for continuing the Social Graphic Planning course in the Visual Communication Design study program at the Faculty of Fine Arts and Design, Trisakti University. Factually, the transformation of knowledge in the Commercial Graphic Planning course is not well received. Students feel boring and less interested, and are not interested in asking questions, this happens because the lecturer is less interactive in delivering theoretical and practical learning material and the exercises given are less varied and the use of learning materials, so that they are equipped with analytical skills and completing assignments - in the form of projects not maximal. The reality is that in the Commercial Graphic Planning course it is very difficult to get good grades, the average grades obtained are C and D. The current learning process uses the lecture method, centered on the lecturer.

Lecturers should transform and facilitate students in a learning process that is not boring by presenting effective, efficient and interesting learning. In the learning process for the Project-Based Commercial Graphic Planning course, the lecturer should only act as a facilitator, then convey theoretical learning material and provide practical activities so that students can achieve learning goals by prioritizing learning activities through interaction between students and lecturers. Kamaruddin et al. (2023) defines project-based learning is a learning model that involves a project in learning. Projects carried out by students can be individual or group projects and carried out collaboratively over a certain period of time, producing a product, the results of which will be displayed and presented. Because in this way the project-based learning model is expected to facilitate the achievement of student-oriented learning, so that student grades achieve optimal grades, namely A.

For this reason, this research was carried out using the research and development model of Gall et al. (2007) in conducting a preliminary study, in order to obtain information and collect authentic data regarding learning outcomes before obtaining models and project-based learning material products. Then, to develop learning device products, the researchers use Dick and Carey's (2009) learning development system design model.



This Commercial Graphic Planning learning model was also used by Kamaruddin et al. (2023) in project-based strategy and approach in applying themes, contexts, as well as planning, processing, and implementing learning process activities.

2. METHODS

Research and Development (R & D) approach was adapted to the required objectives (Kamaruddin et al., 2023). Information and data collection was carried out through observation, interviews and questionnaires. The information and data collected is used as an analysis of learning needs.

At the research and development stage, the researcher used the Dick and Carey 's Instructional Development Model (2009). The products produced are learning materials for Planning Project-Based Commercial Graphics, learning manuals for lecturers and students. The resulting learning material products are validated by experts consisting of learning material experts, learning design experts and learning media experts. Furthermore, after validation by experts, the product is tested through one to one, small group and field trials, to determine the effectiveness of the learning tool

3. RESULTS & DISCUSSION

The results of preliminary research show that students do not have sufficient competency in the project-based commercial graphic planning course. Based on preliminary studies and the results of needs analysis, it is necessary to develop learning tools for Planning Commercial Graphics that refer to theoretical competence through affective, cognitive and psychomotor aspects. The learning tools developed, initial learning development using project-based strategies consist of conceptual models, procedural models and physical models. The conceptual model is a conceptualization of theories and principles that are integrated to form a learning design model. The Procedural Model was developed using the Dick and Carey Instructional Development Model. The Physical Model produces project-based learning model products for the Planning Commercial Graphics course. The development of project-based learning tools for the Planning Commercial Graphics course has been carried out in accordance with the development procedures of Dick and Carey (2009) so that the resulting learning design tools are suitable for use in the learning process in the Visual Communication Design study program. Effectiveness of learning tools for Planning Project-Based Commercial Graphics, through Pre-test and Post-Test. The results obtained from the Pre-Test and Post-Test show a higher increase in the value of the Post-Test results compared to the Pre-test results. This means that it can be concluded that these learning tools can improve the learning outcomes of students in the Visual Communication Design study program.

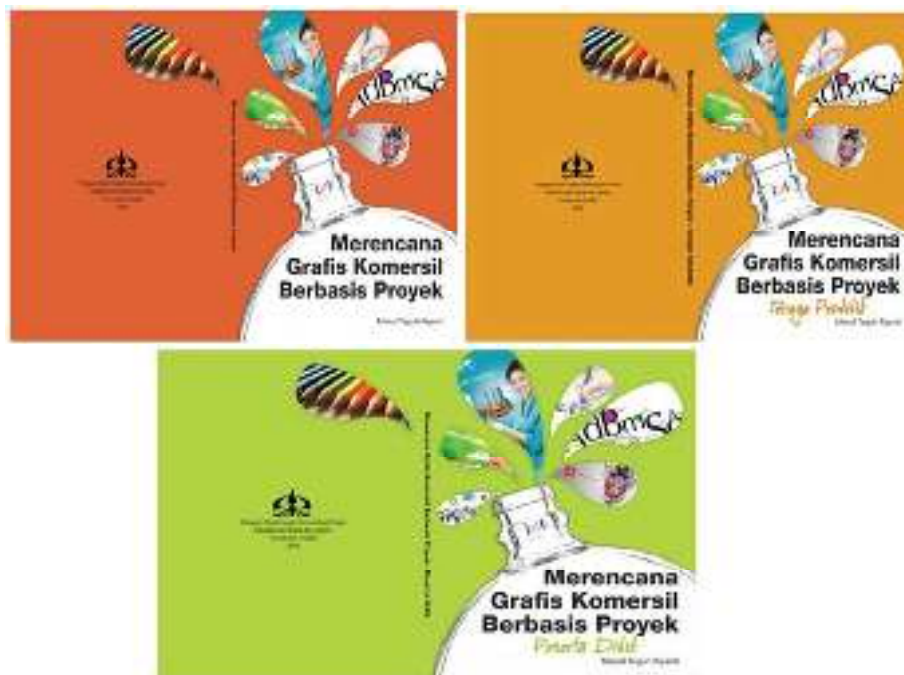


Figure 1. Learning Manual: Visual Communication Design Learning Material Products

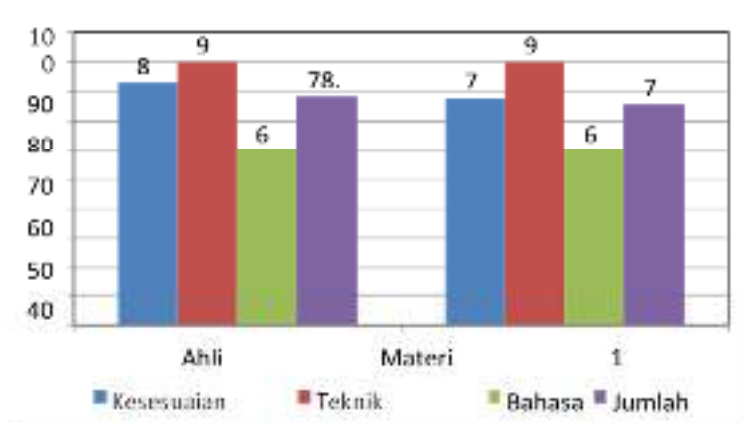


Figure 2 Learning Material Expert Eligibility Results

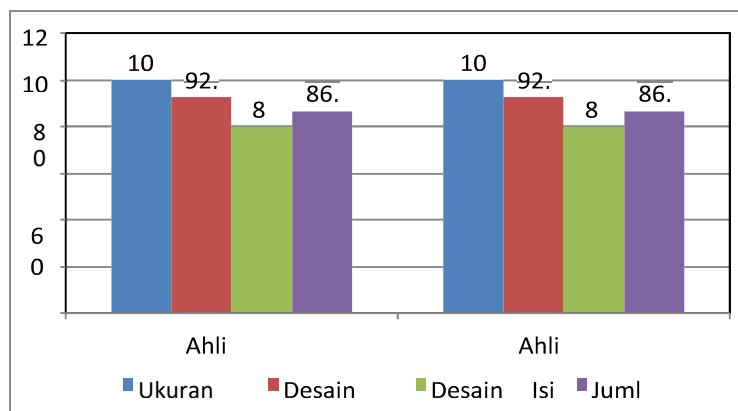


Figure 3. Learning Media Expert Validation and Evaluation Results (Part 1)

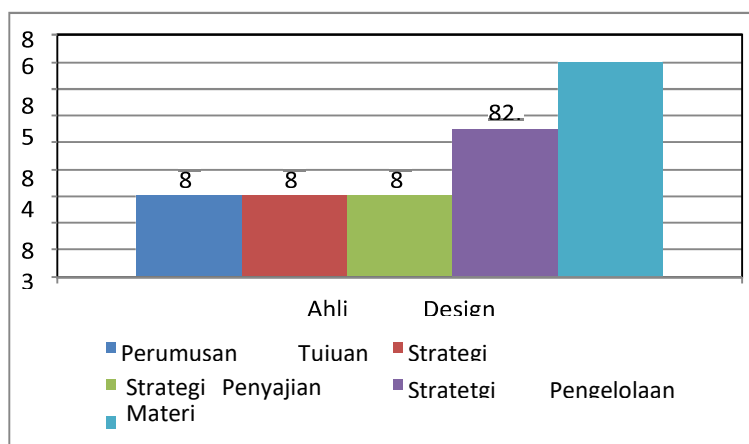


Figure 4. Learning Media Expert Validation and Evaluation Results (Part 2)

4. CONCLUSION

Based on the problem formulation and research objectives as well as the discussion of research results that have been presented in the previous chapters, it can be concluded from this research and development that:

The learning tools for the Planning Commercial Graphics course which were developed using a project-based approach consist of a) conceptual tools, b) procedural materials tools, and c) physical materials tools.

The development of learning tools can help organize problems, identify relevant problem factors, and then provide corrections that make it easier to map the problem. Conceptual learning tools can be a representative that truly shows the phenomenon being studied. Conceptual learning tools have characteristics; 1) is a verbal or visual construction that helps to distinguish important things related to the substance. 2) describes the substance logically and systematically, seen from the cause and effect relationship of related factors, 3) creates a basic reality of collective understanding, because the conceptual model is based on language that comes from understanding and theoretical references. Conceptual learning tools for the project-based Commercial Graphic



Planning course built on theories that help how to see a problem as a whole. Procedural carries out the next stage, research and development through formative evaluation by conducting expert review, revision, one-to-one learner, instructional revision, small group, instructional revision and Field Trial (Pre-Test and Post-Test).

Physical learning material devices resulting from research and development, produce products consisting of a general learning guidebook for project-based Commercial Graphic Planning courses, a learning guidebook for lecturers, a learning guidebook for students. Each of these products has its own function.

REFERENCES

- Dick, W. (2009). *The systematic design of instruction*. New Jersey Colombus: Ohio Pearson.
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction*. USA: Pearson.
- Hernawan, A. H., Permasih, H., & Dewi, L. (2012). Pengembangan bahan ajar. *Direktorat UPI, Bandung*, 4(11), 1-13.
- Kamaruddin, I., Suarni, E., Rambe, S., Sakti, B. P. S., Rachman, R. S., & Kurniadi, P. (2023). Penerapan model pembelajaran berbasis proyek dalam pendidikan: Tinjauan literatur. *Jurnal Review Pendidikan dan Pengajaran (JRPP)*, 6(4), 2742-2747.
- Lesh, R., & Harel, G. (2003). Problem solving, modeling, and local conceptual development. *Mathematical Thinking and Learning*, 5(2-3), 157-189.
- Morel, G. M., & Spector, J. M. (2022). *Foundations of educational technology: Integrative approaches and interdisciplinary perspectives*. Routledge.
- Reigeluth, C. M. (2013). *Instructional-design theories and models: A new paradigm of instructional theory, Volume II*. Routledge.
- Safanayong, Y., & Terpadu, D. K. V. (2006). Edisi kedua, Jakarta: Arte Intermedia.
- Smaldino, S. E., Lowther, D. L., Russell, J. D., & Mims, C. (2008). *Instructional technology and media for learning*.
- Suparman, M. A. (2012). *Desain instruksional modern*. Jakarta: Erlangga.



Published by:
Fakultas Keguruan dan Ilmu Pendidikan
Universitas Serambi Mekkah
Jl. Tgk Imum Lueng Bata, Batoh, Kec. Lueng Bata, Kota Banda Aceh, Aceh 23245
Email: fkip@serambimekkah.ac.id