Series: Advances in Social Science, Education and Humanities Research

Proceedings of the 7th International Conference on Research, Implementation, and Education of Mathematics and Sciences (ICRIEMS 2020)

PUBLISHING INFORMATION

Bibliographic information:

Title
Proceedings of the 7th International Conference on Research, Implementation, and Education of Mathematics and Sciences (ICRIEMS 2020)

Editors
Dr. Supardi
Nur Aeni Ariyanti, Ph. D.
Isti Yunita, Ph.D

Part of series
ASSEHR

Volume
528

ISSN
2352-5398

ISBN
978-94-6239-348-6

Indexing

All articles in these proceedings are submitted for indexation in **CPCI**, [illegible] and **Google Scholar**. Optionally, we also submit to **Compendex** and **Scopus**. Note that in case you need information about the indexation of these proceedings, please check with the organizers of the conference as we cannot reply to messages received from participants.

Free Access

In order to increase the visibility of this conference and of the papers from its participants, this conference has chosen to sponsor the online publication of the conference papers. Therefore, all conference papers can be read and downloaded **for free**; no subscription or other payment is required.

Copyright

DOIs

Each article that is published in these proceedings is assigned a **Digital Object Identifier** (DOI). DOIs are standardized digital identities which can be used to cite and link to electronic content. A DOI is guaranteed to never change, so can be used as a persistent identifier to permanently link to an

electronic article no matter where it is stored. More information on ho cite and use DOIs can be found here.

Permanent Archiving

Atlantis Press is committed to the **permanent availability** and **preservation** of scholarly research and to ensure **accessibility** to this research by converting and upgrading digital file formats to comply with new technology standards. Besides maintaining its own digital archive, Atlantis Press therefore collaborates with the National Library of the Netherlands which permanently archives all Atlantis Press content in their "**e-Depot**". All proceedings are uploaded to this e-Depot after publication to guarantee permanent archiving of the articles.

Print Copies

In case you wish to have **printed copies** of these proceedings you can order these directly from our partner Curran Associates.

Atlantis Press

Atlantis Press – now part of Springer Nature – is a professional publisher of scientific, technical & medical (STM) proceedings, journals and books. We offer world-class services, fast turnaround times and personalised communication. The proceedings and journals on our platform are Open Access and generate millions of downloads every month.

For more information, please contact us at: contact@atlantis-press.com

Series: Advances in Social Science, Education and Humanities Research

Proceedings of the 7th International Conference on Research, Implementation, and Education of Mathematics and Sciences (ICRIEMS 2020)

ORGANIZERS

Chair

Dr. Supardi

Universitas Negeri Yogyakarta, Indonesia

Steering Committee

Prof Wing Mui Winnie So

The Education University of Hong Kong, Hong Kong

Dr. Azlan Kamari

Universiti Pendidikan Sultan Idris, Malaysia

Dr. Achmad Samsudin

Universitas Pendidikan Indonesia, Indonesia

Dr. Insih Wilujeng

Universitas Negeri Yogyakarta, Indonesia

Prof . Dr. Gultekin Cakmakci

Hacettepe University, Turkey

Martianus Frederic Ezerman, Ph.D

School of Physical and Mathematical Sciences, NTU, Singapore

Organizing Committee

Nur Aeni Ariyanti, Ph.D.

Universitas Negeri Yogyakarta, Indonesia

Nur Fitriyana, M.Pd

Universitas Negeri Yogyakarta, Indonesia

Rizka Apriani Putri, M.Sc

Universitas Negeri Yogyakarta, Indonesia

Isti Yunita, Ph.D.

Universitas Negeri Yogyakarta, Indonesia

Dr. Tien Aminatun

Universitas Negeri Yogyakarta, Indonesia

Kuswari Hernawati, M.Kom

Universitas Negeri Yogyakarta, Indonesia

Fika Fauzi, M. Sc.

Universitas Negeri Yogyakarta, Indonesia

Scientific Committee

Dr. Asri Widowati

Universitas Negeri Yogyakarta, Indonesia

Dr. Dadan Rosana

Universitas Negeri Yogyakarta, Indonesia

Technical Committee

Didik Setyowarno, M.Pd.

Universitas Negeri Yogyakarta, Indonesia

Purwanti Widhy Hastuti, M.Pd.

Universitas Negeri Yogyakarta, Indonesia

Yunita Fera Rahmawati, M.Sc.

Universitas Negeri Yogyakarta, Indonesia

Mathilda Susanti, M.Si.

Universitas Negeri Yogyakarta, Indonesia

Eko Marsono, S.T.

Universitas Negeri Yogyakarta, Indonesia

Atlantis Press

Atlantis Press – now part of Springer Nature – is a professional publisher of scientific, technical & medical (STM) proceedings, journals and books. We offer world-class services, fast turnaround times and personalised communication. The proceedings and journals on our platform are Open Access and generate millions of downloads every month.

For more information, please contact us at: contact@atlantis-press.com

Series: Advances in Social Science, Education and Humanities Research

Proceedings of the 7th International Conference on Research, Implementation, and Education of Mathematics and Sciences (ICRIEMS 2020)

ARTICLES

101 articles

Proceedings Article

Potential Roles of Extracellular Traps in the Progression of Coronavirus Disease (Covid)-19

Kartika R Pertiwi

Millions of people have suffered from coronavirus disease (COVID)-19 worldwide with diverse clinical presentations, ranging from asymptomatic to severe pneumonia leading to respiratory failure and even death. In critical phases, thrombosis and inflammation are considered as the important contributors...

Article details

Download article (PDF)

Proceedings Article

Economic Contribution of Fruit Bats (Family Pteropodidae) Through Durian Fruit Production in the Agroecosystem in Java Island

Bambang Suripto

The Farmers in agroecosystems generally do not know that the existence of fruit bats in agroecosystems is very important because of their function as pollinators for various types of horticultural crops with high economic value, such as durian and other plants that are chiropterophilic. The purpose of...

Article details

Download article (PDF)

Proceedings Article

The Effect of Leaf-Waste Type and Bioconversion Ability Based on Feed Conversion Ratio in Black Soldiers Fly Larvae

(*Hermetia illucens*, L.)

Ciptono, Suhandoyo, Tri Harjana, Rizka Apriani Putri

The Black Soldiers Fly (Hermetia illucens) life cycle is unique. The uniqueness lies in the life of the larvae until the pupae and metamorphosis become relatively clean flies, do not like smelly media and tend to be in a moist to dry medium. Unlike some other types of flies, the BSF life cycle brings...

Article details

Download article (PDF)

Proceedings Article

Molecular Characterization of Riau's Mascot Flora *(Oncosperma tigillarium)*

Desti, Fitmawati, Putri Ade Rahma Yulis, Mayta Novaliza Isda

This research was aims to find out about the molecular characterization of the Nibung plant (Oncosperma tigillarium). It has been conducted in the Biology Laboratory. The results of DNA isolation were tested to determine the quality of DNA that has been isolated. DNA purity was determined based on A260/A280...

Article details

Download article (PDF)

Proceedings Article

The Effect of Temperatures and pH on Bacteriocin Activity of Lactic Acid Bacteria Strain Pr 4.3L From Peda Fish

Charis Amarantini, Vinsa Cantya Prakasita, Lidia Ester Cahyani

Lactic acid bacteria (LAB) produce bacteriocin, which is potentially administered as biopreservative. It is important to study bacteriocin continuously from an applied perspective. However, isolate LAB strain Pr

4.3L obtained from peda fish are known to produce antimicrobial compounds such as bacteriocin....

Article details

Download article (PDF)

Proceedings Article

Relationship Between Vital Signs, Hemoglobin Level and Iron Consumption Pattern With Learning Concentration

Tutiek Rahayu, Tri Harjana, Kartika Ratna Pertiwi, Yuliati

This study aimed to determine the vital signs (pulse and respiratory rate), hemoglobin (Hb) levels and iron (Fe) consumption pattern, and to assess their correlation with learning concentration in adolescents. This cross-sectional study was conducted from June to September 2017. Thirty-five subjects...

Article details

Download article (PDF)

Proceedings Article

Detection of Coliforms and Enteric Pathogens in Favorite Snack Food Sold in Yogyakarta City

Tri Yahya Budiarso, Charis Amarantini, Guruh Prihatmo, Ratih Restiani, Yesika Putri, Virgin Kindagen, Sharoneva Linggardjati

Favorite snack food is very popular to Yogyakarta's residents, such as cilok, skewered meatballs, and dumplings. The processing and serving processes of these food does not pay attention to hygiene aspects, therefore, it is necessary to monitor the presence or absence of coliform bacteria and enteric...

Article details

Download article (PDF)

Proceedings Article

Physiological and Molecular Characterization of Mutated *Spathoglottis plicata*

Suyitno Aloysius, Nur Aeni Ariyanti, Lili Sugiyarto, Djukri

A number of Spathoglotis plicata mutant orchids were derived from in vitro culture of X-ray irradiated seeds obtained from previous studies. This study aims to identify the physiological and molecular characteristics of the S. plicata mutant orchid. There were 4 groups of mutant orchids corresponding...

Article details

Download article (PDF)

Proceedings Article

Molecular Characterization of Orchid Variants *Spathoglottis plicata* Blume Based on RAPD Analysis

Suyitno Aloysius, Ixora S. Mercuriani, Ratnawati, Sudarsono

The development of S. plicata orchid variants is important to increase their genetic diversity. This study aims to determine the genetic diversity of S. plicata orchid variants based on RAPD analysis. The research sample was 15 plant variants consisting of wild type and mutant orchid variants. Molecular...

Article details

Download article (PDF)

Proceedings Article

Genetic Diversity of *Spathoglottis plicata* Blume Orchid Variant Based on Inter-Simple Sequence Repeat (ISSR) Molecular Marker

Desri Rofita Sari, Suyitno Aloysius

The aim of this research is to determine the level of genetic diversity of in vitro cultur Spathoglottis plicata variants derived irradiated (mutants) and without irradiation (wild type) seeds. This research is an observation study to detect of genetic diversity of plant variants based on ISSR molecular...

Article details

Download article (PDF)

Proceedings Article

Genetic Variability Analysis of Terrestrial *Spathoglottis plicata* Orchid Variants Based on RAPD Marker

Fay Della Prika Auvira, Ixora Sartika Mercuriani, Suyitno Aloysius

The purpose to know the genetic variability of orchid variants Spathoglottis plicata based on molecular marker Random Amplified Polymorphic DNA (RAPD). DNA isolation carried out using TIANGEN Plant Genomic DNA kit. DNA sample was amplified using PCR-RAPD technique. Genetic variability

were analyzed using...

Article details

Download article (PDF)

Proceedings Article

A Study on the Potential of Cow Dung Waste as an Environmentally Friendly Alternative Energy Source

Ratminingsih, Jumadi

Cow dung is a very serious problem for people around the farm. The problem is often caused by cow dung which is not handled professionally. Its existence pollutes the environment, disturbs the scenery, and can be a vector of disease. The purpose of this study is to provide an overview of the potential...

Article details

Download article (PDF)

Proceedings Article

How Are the Students' Biology Conceptual Knowledge and Procedural Knowledge in Padang City?

Vina septiani, Paidi

The conceptual knowledge and procedural knowledge are able to equip students to have new skills in the era of the Industrial Revolution 4.0. Because, both of these knowledge are used to solve a problem correctly. This study aimed to determine the conceptual knowledge and procedural knowledge of Biology...

Article details

Download article (PDF)

Proceedings Article

The Learning Continuum of Ecological Aspect Based on Complexity Level According to Elementary School Teacher's Opinion

Hani' Faridah, Bambang Subali

This research is a descriptive research using the survey method. This research aims to collect elementary school teacher's opinion about the learning continuum of ecological aspects based on the level of complexity. The research data is conducted by means of a questionnaire. The research use the hypothetical...

Article details

Download article (PDF)

Proceedings Article

Teachers' Opinions About Learning Continuum Based on the Level of Abstractness in the Biological Resources Management Aspect

Nidia Fadhila, Bambang Subali

The purpose of this study was to determine the opinion of elementary school teachers about the learning continuum based on the level of abstractness in the biological resource management aspect. This study used a survey method, conducted in Yogyakarta City and Bantul Regency. The population in this study...

Article details

Download article (PDF)

Proceedings Article

The Learning Continuum of Biological Resource

Management Aspects Reviewed From the Difficulty Leve Based on Elementary School Teachers' Opinions

Hanida Listiani, Bambang Subali

This research aims to investigate teachers' opinionson the teaching and assessment of biological resource management aspects reviewed from their difficulty level in order to develop a curriculum. This is survey research whose sample members were selected through the convenience sampling technique. In...

Article details

Download article (PDF)

Proceedings Article

Elementary School Teachers' Opinion About Learning Continuum of Organism Diversity Aspect Based on Level of Cognitive Processes

Desi Trilipi, Bambang Subali

This study aims to determine the teachers' opinion who teach science in elementary schools regarding the continuum of learning design on organisms diversity aspect. The method used in this research was a survey by giving a questionnaire to the teacher. The study population in this study was a hypothetical...

Article details

Download article (PDF)

Proceedings Article

Developing Monopoly Educational Game Application on XI Grade High School Student's About Cell Teaching Material

Restiana, Djukri, Indarto, Umi Hijriyah

This study explains the process of developing a monopoly educational

game application on XI grade high school students about Cell teaching material and determining the feasibility and quality of the product. Th research categorized as developing by Borg and Gall with six stages of research. Those are...

Article details

Download article (PDF)

Proceedings Article

Visual Representations Analysis of Senior High School Biology Textbooks About Plants' Structure and Function

Riani K. Utami, Agung W. Subiantoro

This article's purpose is to find out the features of visual representations used in biology textbook about plant tissues structure and function. There were three biology textbooks analysed in this study. Those textbooks are published and used in High School biology classroom based on the current curriculum....

Article details

Download article (PDF)

Proceedings Article

Analysis Learning Resources Based Local Potential of Pacitan Regency as Biology Learning in Senior High School

Ezif Rizqi Imtihana, Djukri

This research is a preliminary study conducted with the purpose to know: 1) kinds of learning resources based local potential of Pacitan regency used as biology learning, 2) biological topic using local potential of Pacitan regency as learning resources, 3) difficulty learning resources based local potential...

Article details

Download article (PDF)

Proceedings Article

The Profile ICT Knowledge of Biology Teachers Based on Teaching Experience and Gender

Ria Almareta, Paidi

ICT knowledge is very much needed in the current digital era by biology teacher, because teachers can design and develop technology to help students reach the success in the modern era with an great value of learning. Teaching experience is grouped into four categories, (< 5 years); (6-10 years);...

Article details

Download article (PDF)

Proceedings Article

Chrome Cation Removal Using Microfiltration Ceramic Membrane From Kaolinite

Heri Sutanto, Jaslin Ikhsan, Endang Widjajanti LFX, Erfan Priyambodo

The increasing activity of the leather tanning industry has resulted in an increasing amount of liquid waste produced. The waste contains heavy metals which are harmful to the environment and human health. Therefore the waste needs to be managed so that the negative impact of this waste can be reduced....

Article details

Download article (PDF)

Proceedings Article

Preliminary Study on COD Removal on the Treatment of Palm Oil Mill Effluent (POME) Using Birnessite-Type

Manganese Oxide via a Solvent-Free Method

Amir Awaluddin, Okrida Sonia, Muhdarina, Amilia Linggawati, Siti Sai Siregar

Palm oil mill effluent (POME) has an adverse effect on the environment due to its high toxicity, low pH, and high chemical and biological oxygen demand. The degradation using Fenton processes is considered as an attractive and sustainable way for the treatment of POME. In this study, as-synthesized birnessite-type...

Article details

Download article (PDF)

Proceedings Article

Comparison of the Effectiveness of Glucose and Sucrose Against General Endurance of the Hockey Players Faculty of Sport Science, Makassar State University

Nur Fadly Alamsyah, B M Wara Kushartanti, Abdul Rahman, Arimbi

This study aims to determine the comparison of the effectiveness of glucose and sucrose to the general endurance of hockey players in FIK UNM. The type of research used is descriptive comparative, the population of this study is 35 members of the FIK UNM hockey club, and the sample is 20 hockey players...

Article details

Download article (PDF)

Proceedings Article

Characterization and Biological Activity Test of Garlic and Its Fermentation as Antioxidant, Analgesic, and Anticancer

Sri Atun, Nurfina Aznam, Retno Arianingrum, Senam, Yashinta Devi, Riski Melasari

The purpose of this study was to characterize and biological activity te garlic and its fermented products (black garlic) as antioxidants, analge and anticancer properties. The subject of this study was garlic and its fermented products (black garlic). Characterization includes analysis of...

Article details

Download article (PDF)

Proceedings Article

Synthesis and Utilization of Composite Beads of Activated Carbon-Phosphate-Chitosan as Adsorbent of Mg^{2+} and Pb^{2+} Metal Ions

Sulistyani, Susila Kristianingrum, Annisa Fillaeli, Risca Febyan, Isma P Loka

We report a new modification of composite beads to absorb metal ions. The phosphate insertion into the activated carbon coated with chitosan is expected to have a higher adsorption capacity and the better mechanical properties than activated carbon and chitosan respectively. The identification of the...

Article details

Download article (PDF)

Proceedings Article

Hydrogen Gas Production in Kersen Leaf Extract (*Muntingia calabura*) Using Stainless Steel Electrode

Isana Supiah Yosephine Louise, Resti Bangun Pertika

This research was conducted to study the influence of the addition of kersen leaf extract, to understand the variation of temperature effect, and to determine the optimum result of hydrogen production in the process of water electrolysis within the kersen leaf extract using voltammetry method. The use...

Article details

Download article (PDF)

Proceedings Article

The Effect of Introduction, Connection, Application, Reflection, and Extension (ICARE) towards Students' Chemistry Learning Outcome

Das Salirawati, Erfan Priyambodo, Metridewi Primastuti

This study aimed to analyze the differences in students' learning outcomes covered curiosity (SC), responsibility (SR) and cognitive achievement (SCA) between students subjected to ICARE model at the experimental class (N=68) and the control class without ICARE (N=69). This research is an experimental...

Article details

Download article (PDF)

Proceedings Article

Research-Oriented Collaborative Inquiry Learning Model to Improve Students' Science Process Skills in Reaction Rate Topic

Intan Agnes Sinyu Fiolida, Eli Rohaeti, Suwardi

This research aimed to improve students' science process skills and to describe the profile of students' science process skills in the Research-Oriented Collaborative Inquiry Learning (REORCILEA) in reaction rate learning. A quasi-experimental design had been employed in this research. The sample in...

Article details

Download article (PDF)

Proceedings Article

Effect of Problem Based Learning on Student's Metacognitive Ability and Science Process Skills

Nur Yaumil Awaliah, Jaslin Ikhsan

This study aimed to investigate the effect of problem-learning on student's metacognitive abilities and science process skills. Quasi-experimental with the posttest only design was used in this study. There were two classes namely experimental and control class. Experimental class applied problem-based...

Article details

Download article (PDF)

Proceedings Article

Inquiry Learning Using Local Socio-Scientific Issues as Context to Improve Students' Chemical Literacy

Rosiana Melia Sari, Antuni Wiyarsi

This study aimed to investigate applying inquiry learning using local Socio-scientific Issues (SSI) as a context on the students' chemical literacy; in this study, using a Quasi-experimental with a pretest-posttest design. There are two classes in this study, the experimental class, and the control class....

Article details

Download article (PDF)

Proceedings Article

Analysis of Students' Difficulties in Answering Questions on the Chemistry National Standardized School Exam in Kupang

Fatnan Asbupel, Heri Retnawati, Muhardis, Seriana Yovita, Sudji Munadi

The purpose of this study is to describe the characteristics item questi chemistry national standardized school exam and identify students' difficulties in answering questions. Data collection was carried out by documenting results of the exam in 2018 in Kupang city. The documentation was consisted...

Article details

Download article (PDF)

Proceedings Article

In-Service Chemistry Teachers' Prior Knowledge Regarding STEM Integration in High School Chemistry Learning

Nur Fitriyana, Antuni Wiyarsi, Heru Pratomo, Marfuatun, Annisa Krisdiyanti, Wahnutia Adilaregina

A good knowledge about Science, Technology, Engineering, and Mathematics (STEM) integration is essential for chemistry teachers before they are implementing a successful chemistry learning using STEM approach. This paper reported in-service chemistry teachers' prior knowledge in integrating STEM in high...

Article details

Download article (PDF)

Proceedings Article

Empowering Students' Worksheet with SSI to Improve the Conceptual Understanding of Rate Reaction and Thermochemistry

Maryone Saija, Sri Rahayu, Endang Budiasih, Fauziatul Fajaroh

The purposes of this study were to (1) develop a worksheet that enriched with socio-scientific issues, and (2) examine the effectiveness of the developed worksheets for improving high school students' conceptual understanding of rate reaction and thermochemistry. This research

implemented the 4D research...

Article details

Download article (PDF)

Proceedings Article

How Can Open Inquiry Enhancing Students' Scientific Attitude Through Chemistry Learning?

Betzy Rampean, Eli Roheti, Jewish Septriwanto, Meilan Lengkong

This literature review aimed to analyze the effectiveness of open inquiry learning on students' scientific attitude. Open inquiry learning is a learning model has the most complex level of scientific inquiry that gives students the opportunity to be able to identify errors, submit suggestions, to support...

Article details

Download article (PDF)

Proceedings Article

The Influence of Guided Inquiry-Based Learning Using Socio-Scientific Issues on Environmental Awareness of Pre-service Chemistry Teachers

Oktavia Sulistina, Sri Rahayu, I Wayan Dasna, Yahmin

The present study investigated the influence of guided inquiry-based learning using socio-scientific issues related to environment on the environmental awareness of pre-service chemistry teachers in the fundamental chemistry class. The study was designed according to the triangulated mixed-method design....

Article details

Download article (PDF)

Proceedings Article

The Role of Collaborative Learning Based STSE in Acid Base Chemistry: Effects on Students' Motivation

Erfan Priyambodo, Nur Fitriyana, Metridewi Primastuti, Farizky Aquarisco Duo Artistic

Designing learning environment that leads on the improvement of students' motivation becomes crucial for chemistry teachers. The objective of this research was to investigate the effects of collaborative learning-based Science, Technology, Society, and Environment (STSE) towards students' motivation...

Article details

Download article (PDF)

Proceedings Article

Optimization of Nutritional-Menu Planning for Toddlers by Goal Programming Model

Dwi Lestari, Agus M. Abadi, Atmini Dhorurri, Asmara I. Tarigan, Elin Herlinawati

Food or nutrient intake is required to increase human resources. However, there are several problems that arise such as difficulties in preparing a nutritious menu for toddlers and lack of public understanding of nutritional fulfillment despite governmental efforts. Apparently, good quality nutrient...

Article details

Download article (PDF)

Proceedings Article

Implementation of Average-Based Fuzzy Time Series Model in Forecasting Product Selling at Ainaya Boutique

Eva N. Ramadhani, Agus M. Abadi

Demand forecasting is needed in a company to find out the estimated level of demand in the future. Forecasting cannot be considered as an absolute one because there is no accurate forecasting. The forecasting accuracy level continues to be sought through forecasting development. One of those is applied...

Article details

Download article (PDF)

Proceedings Article

Optimization of Kelanting's Production in a Home Industry Kelanting Fuzzy System

Fetty F. Sholikhah, Agus M. Abadi

Determining the exact amount of production is difficult to do because the system used by the company owner still relies on a manual calculation system. One method that can help predict production is a fuzzy system. This study aims to build a fuzzy system model to predict production based on demand and...

Article details

Download article (PDF)

Proceedings Article

Multivariate Time Series Data Forecasting Using Multi-Output NARNN Model

Hermansah, Dedi Rosadi, Abdurakhman, Herni Utami, Gumgum Darmawan

This research proposes the multi-output Nonlinear Autoregressive Neural Network (NARNN) method to forecast multivariate time series data containing the input layer, one hidden layer, and the output layer. The multi-output NARNN method is performed by applying the logistic activation function and the...

Article details

Download article (PDF)

Proceedings Article

Modelling and Analyzing Quadruped Robot Motion with Two Motors using Max-Plus Algebra

Laurensius I. Setiawan, Laurent Simangunsong, Marcellinus A. Rudhito

Nowadays mathematics has been widely used to program and control robots. One type of robots that exists is a robot with a type of propulsion in the form of legs, which is more effective for uneven and uphill terrain compared to the type of wheel drive. The study discusses quadruped robot motion with...

Article details

Download article (PDF)

Proceedings Article

Solution of the SIR Mathematical Model for the Spread of Covid-19 Using *GeoGebra*

Marcellinus A. Rudhito, Dewa P. W. Putra

This study aims to find solution of the SIR modelling for the spread of Covid-19 in populations of an area for normal, new normal and lockdown conditions using GeoGebra. This research consists of two stages of numerical assessment of mathematical model completion using GeoGebra spreadsheets and building...

Article details

Download article (PDF)

Proceedings Article

Smoothing Spline Estimator in Nonparametric Regression

(Application: Poverty in Papua Province)

Ni P. A. M. Mariati, I N. Budiantara, Vita Ratnasari

Three estimates were obtained in estimating the regression curve, namely estimation of parametric regression, nonparametric regression and semiparametric regression. The most popular nonparametric regression option is smoothing spline. The advantage of smoothing spline is that it can use variable data...

Article details

Download article (PDF)

Proceedings Article

Robust Spatial Regression Model in City Minimum Wages (CMW) in East Java 2018

Nur Atikah, Dyah L. Afifah, Nadia Kholifia

The minimum wage determination has always been a moment that is eagerly awaited every year by both workers and employers, even though it always creates polemics. The government seeks to raise the minimum wage every year to guarantee a decent life for workers. The fulfillment of the need for a decent...

Article details

Download article (PDF)

Proceedings Article

Optimal Control for Smoking Epidemic Model

Nur Ilmayasinta, Elly Anjarsari, Moh W. Ahdi

In this study, we used a mathematical model of the smoking epidemic which was divided into three sub-classes. In this model we provide four optimal controls, namely education campaign about cigarettes, vaccines, treatment and rehabilitation. To solve the problem of optimal control, we

use the principle...

Article details

Download article (PDF)

Proceedings Article

Exploitation of Nasolabial Folds for Happy Smile Recognition on an Image Using ANN

Sri Andayani, Nur H. Waryanto, Bambang S. H. Marwoto, Monica M. Hapsari

Nasolabial folds are the wrinkle around the mouth that can be used to mark facial expressions. In this study, nasolabial folds were used to identify happy smile expressions on facial images. The recognition consists of 2 main stages. The first stage for facial area detection is carried out using the...

Article details

Download article (PDF)

Proceedings Article

Modify Multistep Difference Transform Method for Solving Jamming Model in Lorentz System

Hartono, Agus M. Abadi, Fitriana Y. Saptaningtyas

The Lorentz system is one of the model which can be applied to single line traffic model. This model was based on the distance deviation, velocity deviation, and time acceleration. In this paper, we would like to solve the mathematical model of traffic congestion with the Lorentz system. Modify Multistep...

Article details

Download article (PDF)

Proceedings Article

Effects of Worked Example on Experts' Procedural Skills in Solving Geometry Problems

Baiq W. Widyastuti, Endah Retnowati

Cognitive load theory is an instructional theory that concern to designing an effective learning strategy based on human cognitive system. Worked example was designed based on this theory. Through worked example, students are presented with examples and similar problem solving tasks. This method is believe...

Article details

Download article (PDF)

Proceedings Article

Are there Differences in Reflective Thinking Between Male and Female Prospective Mathematics Teachers?

Cholis Sa'dijah, Muhammad N. Kholid, Erry Hidayanto, Hendro Permadi

Reflective thinking is a thinking process involves re-investigations to overcome confusion for problem solving. This type of thinking is important for prospective mathematics teachers because the thinking can be a competence for them to teach mathematics effectively. In Indonesia, in the last three years...

Article details

Download article (PDF)

Proceedings Article

Developing Learning Set with STEM-PBL Approach to Mathematics Connection Ability and Student's Learning Motivation

Indra K. Wijayanti, Agus M. Abadi

This study aims to produce and describe the development process and quality of learning set with the STEM-PBL approach. The development model in this study was adopted from Plomp model, it is preliminary research, development, and evaluation. The learning set developed include lesson plan and student's...

Article details

Download article (PDF)

Proceedings Article

Examining Middle School Student's Lower Order Thinking Skill

Maria E. O. Barut, Ariyadi Wijaya

Focusing in Higher Order Thinking Skill (HOTS) has been main goal in many education curriculums around the world including in Indonesia. Even though the ultimate goal is usually for students to achieve HOTS, it is also important to make sure student already mastered Lower Thinking Skill (LOTS) since...

Article details

Download article (PDF)

Proceedings Article

Comparison of Contextual and Scientific Approaches to Improving Student Achievement and Emotional Intelligence

Nani Maryani, Djamilah B. Widjajanti

This research was quasi-experimental, with a nonequivalent control-group design. This study aimed to compare the advantages of contextual and scientific approaches in improving the learning achievement and emotional intelligence of grade VIII junior high school students. The population includes all grade...

Article details

Download article (PDF)

Proceedings Article

Innovation in Mathematics Learning on Students with Disabilities in Asia: Literature Review

Nuraini Safitri, Anis T. I. N. Syarifah, Dwi Kurnita, Leni A. Cahyani, Mukarramah, Pujaningsih

The literature review is aimed to analyze research regarding innovative mathematics learning in Asia. The research utilizes six articles discussing five media innovation learning in Indonesia and one instructional innovation learning in Malaysia. The results of the study shows that media learning innovation...

Article details

Download article (PDF)

Proceedings Article

Indonesian Mathematics Teachers' Responses Towards the Implementation of Distance Learning During Covid-19 Pandemic

Veronika F. Rianasari, Hongki Julie, Maria S. Apriani

In Indonesia, Covid-19 pandemic has brought unprecedented disruption in the education sector. This paper examines the responses of 415 Indonesian Mathematics Teachers' towards the implementation of distance learning during Covid-19 pandemic. It identifies online learning platforms used, type of online...

Article details

Download article (PDF)

Proceedings Article

Worked Example as a Scaffolding on Problem Posing Instruction of Parallel Lines and Transversal Learning

Ibrohim A. Kusuma, Endah Retnowati

This study aims to review on literature of worked example function as a scaffolding on problem posing instruction, its design and instructional implications. Students should be facilitated to pose problem by relating their existed knowledge to the given information and develop their thinking further....

Article details

Download article (PDF)

Proceedings Article

Optical Characteristics of Tin Oxide Thin Films Doped with Indium and Aluminum Using the Sol-Gel Spin Coating Technique

Aris Doyan, Susilawati, Haris Munandar

The aims of this research are to understand the optical characteristics of SnO2 doped with Indium and Aluminum (SnO2:In+Al) using the sol-gel spin coating technique. Optical characteristics of SnO2:In+Al thin films were measured by UV-Vis Spectrophotometer. The optical characterization results showed...

Article details

Download article (PDF)

Proceedings Article

Testing Low rpm BLDC Generator as Power Plant for Remote Areas

Bachtera Indarto, A. Wildan Ilhami, M. Arief Bustomi

BLDC generator can be an alternative solution for providing electricity to rural communities in Indonesia. In this research, a BLDC generator with a rotor and stator frame made from PETG material has been made using 3d printing. The dimensions of the generator stator section are 20 cm x 30 cm x 20 cm....

Article details

Download article (PDF)

Proceedings Article

Microtremors Measurement Around Dengkeng Fault Line in Central Java

Denny Darmawan, M. Ilham N. Hafsyah, Nugroho B. Wibowo, Laila Katriani, Khafid N. Aziz, Siti Patimah, Rofiki, Bambang Ruwanto

Microtremor signals measurement had been conducted in area surrounding Dengkeng Fault line in Central Java, Indonesia. This research is aimed to identify the characteristics of area surrounding Dengkeng fault line and to identify the Dengkeng fault line through microtremors parameters analysis. Microtremor...

Article details

Download article (PDF)

Proceedings Article

Structure Interpretation Using Gravity Spectral Analysis and Derivative Method in Grindulu Fault, Pacitan, East Java

Mustika N Yusvinda, Shania W Puspitasari, Nadia M P Wafi, Khafidh N Aziz, Denny Darmawan, Laila Katriani, Novita T Handayani, Nugroho B Wibowo

The Grindulu Fault is a one of the fault that lies alongside the Pacitan Regency, East Java. This fault is a land geological structure that is potential

to be the source of earthquake disaster. The structure interpretation is carried out using gravity data by performing spectrum analysis and derivative...

Article details

Download article (PDF)

Proceedings Article

A Design Study of Cajaput Oil Industry Based on Carbon Nanodots

Wipsar Sunu Brams Dwandaru, Athi' Nur Auliati Rahmah, Febriani, Pramudya Wahyu Pradana

The aim of this study was to produce a design of a cajaput oil industry that can improve the products of cajaput oil industry based on carbon nanodots (C-dots). The method used in this study was research and development (R&D) with observation at the Sendang Mole cajaput oil factory and simple experiments...

Article details

Download article (PDF)

Proceedings Article

Reaction Order Parameters of Erythrocyte Sedimentation Rate, Neutrophil-to-Lymphocyte Ratio, and Platelet-to-Lymphocyte Ratio as Markers for Colorectal Carcinoma After Chemotherapy

Ngadikun, Untung Widodo, Agus Barmawi, Ahmad Hamim, Kuncoro Asih Nugroho, Iska Rahman Kurniawan, Metamalik Pasala, Izzati Amayazifun Khalifa Farzana

Colorectal Cancer (CRC) ranks 3rd highest cancer incidence, so it is a serious health problem in Indonesia. A new erythrocyte sedimentation rate method was developed to determine a biomarker for CRC. This study aims

to investigate reaction order parameters of erythrocyte sedimentation (ESR), neutrophil-to-lymphocyte...

Article details

Download article (PDF)

Proceedings Article

Development of Comics Work and Energy Assisted Android Based on Indigenous in Wonogiri

Ahmad Nur Wisnu Priyadi, Heru Kuswanto

This research aims to determine the feasibility of an comics work and energy assisted android based on indigenous in Wonogiri. This research used the model of development 4D (define, design, development, and disseminate). This research was conducted a validation instrument assessment by the instrument...

Article details

Download article (PDF)

Proceedings Article

Developing Android-Based Marbles Game Comics Using Group Investigation Model in Physics Learning

Almira Eka Damayanti, Heru Kuswanto

This study aims to determine the feasibility of android-based marbles game comics using the group investigation model in learning physics. This study uses a 4-D development model (Define, Design, Develop, and Disseminate). The research data were obtained from the results of the product feasibility assessment...

Article details

Download article (PDF)

Proceedings Article

Development of Physics Comics Through Android-Assisted Benthik Game with Discovery Learning Model on Parabolic Motion

Anissa Maghfiroh, Heru Kuswanto

This study aims to (1) produce physics comics learning media through andorid-assisted benthik games with discovery learning models on parabolic motion (Kofie GeBoL) and (2) determine the feasibility value of physics comic learning media through andorid-assisted benthik games with discovery learning models...

Article details

Download article (PDF)

Proceedings Article

Development of Integrated Physics Learning E-Module with Pancasila Character Values in Work and Energy Subjects

Aprilia Mayang Sari, Ariswan

This study aims to produce an integrated physics learning e-module with Pancasila character values in work and energy subjects that is feasible to use. The type of research used is research and development. The development procedure is guided by the 4-D model. Research subjects consisted of material...

Article details

Download article (PDF)

Proceedings Article

Experiments in Physics Learning in the COVID-19 Era: Systematic Literature Review

Arif Rahman Aththibby, Heru Kuswanto, Mundilarto

The COVID-19 pandemic has influenced global conditions globally, including in the world of education in Indonesia. The implication of the COVID-19 pandemic is learning that initially focused on face-to-face shifting to distance learning / online learning. This condition is also a challenge in learning...

Article details

Download article (PDF)

Proceedings Article

Development of Digital Portable Auto Design Microscope Learning Media to Increase the Understanding of Concepts and Problem-Solving Abilities of Students

Aris Doyan, Susilawati, Adi Hardiyansyah

The purpose of this research is to develop learning media in the form of portable digital auto microscope design to improve understanding of concepts and problem-solving abilities. The results showed that the learning media in the form of portable digital microscope auto design is very feasible to use...

Article details

Download article (PDF)

Proceedings Article

The Development of Diagnostic Test Instrument for Verbal Representation Ability in High School Physics Learning

Awal Mulia Rejeki Tumanggor, Supahar, Maria F. T. Nirmala

Verbal representation ability is an important part of learning physics at school and is also useful for adapting to the environment. The verbal representation ability is also a need for education in the 21st century, so

having this ability can help students to understand the physics langua physics...

Article details

Download article (PDF)

Proceedings Article

Physics Learning Using Android Assisted Sm and Physics to Improve Problem-Solving Skill

Delson Albert Gebze, Warsono, Nafi'atus Sholihah

The outcome of this study are: (1) Finding the characteristic of teaching aids in physics learning using Sm and physics based on local culture suba mish. (2) Creating an android app of the teaching aids of Sm and physics based on local culture. (3) The effectiveness of physics learning based on local...

Article details

Download article (PDF)

Proceedings Article

Development of Inquiry-Based Multimedia Learning Module with PhET Simulation in Newton's Law of Motion

Dian Sukma Luliyarti, Zuhdan Kun Prasetyo

This research is development research with a 4-D model (define, design, develop, and spread) about Newton's laws of motion. The purpose of this research is to determine the feasibility of Multimedia Learning Module (MLM) products developed in physics learning. The MLM product that is designed is then...

Article details

Download article (PDF)

Proceedings Article

Problem-Based Blended Learning: The Impacts on Students' Collaborative Skills

Dwi Ulan Rahmawati, Jumadi, Eko Mhd Ramadan

This research was conducted in order to test the effectiveness of Problem-Based Blended Learning in improving students' collaboration skills. The purpose of this study is to describe the significance of learning differences between students who are taught by using Problem-Based Blended Learning model...

Article details

Download article (PDF)

Proceedings Article

The Effectiveness of Physics Learning Online Based on Guided Discovery Models to Improve Critical Thinking Skill

Eko Mhd Ramadan, Jumadi Jumadi, Dwi Ulan Rahmawati

Critical thinking skill is one of the abilities that must be possessed by students in the 21st century. Online learning combined with guided discovery models, is intended to be able to improve students' critical thinking skills at the high school level. This study aims to look at the effectiveness of...

Article details

Download article (PDF)

Proceedings Article

Development of Visual Literacy Test Instrument on High School Physics Material

Erlita Agustina, Supahar

Developing test instruments that can be used to determine students' vi literacy skills on the subject of optics is the aim of this research. This research is a research development with the method of developing test instruments. The phases used in this study consisted of setting test objectives,...

Article details

Download article (PDF)

Proceedings Article

Analysis of Students' Misconceptions Using the Certainty of Response Index (CRI) on the Concept of Work and Energy in SMA Negeri 1 Gorontalo Utara After Online Learning

Fedi H. Latif, Mursalin, Trisnawaty Junus Buhungo, Abdul Haris Odja

Research has been conducted on students' misconceptions on physics, especially on the concepts of effort and energy in high school. The targets of this study were students of class X Ipa 1 in SMA Negeri 1 Gorontalo UtaraThe sampling technique is to choose a class that is very active in the school where...

Article details

Download article (PDF)

Proceedings Article

Students' Problem-Solving Profile in Overcoming Sound Wave Concepts Based Students' Academic Abilities on Online Class

Iron Ujulu, Masri K. Umar, Mursalin, Abdul Haris Odja

A research has been conducted to describe the students' initial problem-solving abilities through five stages of problem-solving. This study was aim to describe the profile of students' problem-solving in overcoming sound wave concepts in terms of academic ability, where the research subjects

were grade...

Article details

Download article (PDF)

Proceedings Article

Developing Assessment Instrument to Measure Senior High School Student's Mathematical Representation Ability in Physics Learning

L P Sari, E Istiyono

Physics deals with a lot of quantities that have size and direction and thus require a mathematical representation to describe it. So that in the context of physics learning cannot be separated from the application of mathematical representation. This research aims to: 1) determine the feasibility of...

Article details

Download article (PDF)

Proceedings Article

Feasibility of STEM Teaching Kit for Heat Material Through Simple Technology Design

Lusy Rahmawati, Insih Wilujeng

The government needs to modernize the education system to equip 21st-century skills that can meet the challenges of the industrial revolution 4.0. The Science, Technology, Engineering, and Mathematics (STEM) approach is one of the recommended learning approaches to help the success of 21st-century skills....

Article details

Download article (PDF)

Proceedings Article

Analysis of Validity and Reliability of Diagnostic Test of Picture Representation Ability in High School Physics Learning

M F T Nirmala, A M R Tumanggor, Supahar

The purpose of this research was to determine the feasibility of a diagnostic test of the picture representation ability of high school students in physics learning. This research was a developmental research of test instrument. Analysis of test instruments includes qualitative and quantitative analysis....

Article details

Download article (PDF)

Proceedings Article

Physics Learning with E-Book Using Problem Based Learning (PBL) Model to Improve Image Representation Ability of High School Students on Optical Material

M. F. T. Nirmala, D. A. Gebze, A. M. R. Tumanggor, M. Lengkong, I. Wilujeng

This research aimed to (1) produce learning tools and e-book media using Problem Based Learning (PBL) model to improve image representation ability on optical material of class XI MIPA students at SMAN 1 Banguntapan; (2) know the effectiveness of e-book learning media in physics learning activities using...

Article details

Download article (PDF)

Proceedings Article

Android-Based Carrom Game Comics Integrated with

Discovery Learning for Physics Teaching

Mega Septiana Ika Rahayu, Heru Kuswanto, Cokro Yongky Pranowo

This study aims to develop an android-based carrom game comics integrated with discovery learning feasible to use in physics teaching. This study was developed using the 4-D: define, design, develop, and disseminate. The feasibility of the developed comics is evaluated by media experts, material experts,...

Article details

Download article (PDF)

Proceedings Article

Development of Two-Tier Test Instruments to Detect Student's Physics Misconception

Meilan Lengkong, Edi Istiyono, B A O Rampean, Awal Mulia Rejeki Tumanggor, M F T Nirmala

The aims of this research is to develop a two-tier test instrument to diagnose students' conceptual understanding abilities and knowing the level of student misconceptions on the topic of simple harmonic motion. The method in this research is 4D Research and Development (Define, Design, Develop, and...

Article details

Download article (PDF)

Proceedings Article

Development of E-Module Momentum and Impulse Integrated the Pancasila Values Practice

Nur Arviyanto Himawan, Ariswan

This study aims to determine the feasibility and response of students to the e-module momentum and impulse integrated the Pancasila values practice

developed. This type of research is Research and Development used th model. The subjects of this study were 2 expert validators, 2 practition 3...

Article details

Download article (PDF)

Proceedings Article

Development of the Android-Based Interactive Physics Mobile Learning Media (IPMLM) with Scaffolding Approach on the Sound Wave to Improve Student Learning Independence

R N Tuada, Suparno

This study aims to: 1) produce an Android-based IPMLM application that is suitable for learning on sound wave material, 2) test the effect of IPMLM on student learning independence. This type of research is the R&D of 4-D models (defining, developing, developing, and disseminating). The application...

Article details

Download article (PDF)

Proceedings Article

The Application of Physics Learning Media Based on Android with Learning Problem Based Learning (PBL) to Improve Critical Thinking Skills

Reni Tania, Jumadi

One of the abilities that students must have in the 21st century is the ability to think critically. This study aims to see the use of Android-based physics learning media using PBL learning to improve critical thinking skills in Newton's Law material. This type of research is the pretest posttest control...

Article details

Download article (PDF)

Proceedings Article

Assessment Instrument on Measuring Physics Verbal Representation Ability of Senior High School Students

R Adawiyah, E Istiyono

The problem questions used in the physics learning assessment process do not only require the ability of students to apply concepts only in solving problems. But more than that, these questions measure how the concept can be applied in various situations, and how students make sense in solving the problems....

Article details

Download article (PDF)

Proceedings Article

Bringing Indigenous Knowledge into Physics Learning Instruments for Enhancing Students' Data Literacy: Its feasibility and practicality

T D Purwita, D Rosana

This research aims to (1) determine the feasibility and practicality of indigenous knowledge-based learning instruments, and (2) measure the suitability of test items to be measured students' data literacy abilities. This study uses a 4D model research and development. Data collection techniques use...

Article details

Download article (PDF)

Proceedings Article

Misconception Analysis to Know the Understanding of Static Electrical Concept at SMK Bina Taruna Gorontalo b Using Certainty of Response Index (CRI)

Triman, Mursalin, Abdul Haris Odja

Analysis of the misconceptions on static electrical concepts has been conducted. The misconceptions are found in several indicators, such as in the concept of Atom, the concept of electrically charged concept, the concept of how to create electrically charged objects by rubbing, induction and conduction,...

Article details

Download article (PDF)

Proceedings Article

Comic Indigenous (Bola Kasti) Based Android: The Development Integrate Problem Based Learning

Wafda Nabila Azmy, Heru Kuswanto

The research aims to determine the feasibility of indigenous comics (ball kasti) based on android integrated problem based learning (PBL) in physics learning. Media development using the 4D model which consists of define, develop, design, and disseminate. The feasibility test is obtained through expert...

Article details

Download article (PDF)

Proceedings Article

A New Alternative to Measure Students' Analytical Thinking Skill: A Validity Test for Mechanics Problem Based Learning Module

Yashinta Putri Sekarini, Endang Tri Adiningsih, Zulfa Lutfi Anisa, Bayu

Setiaji

This study is aimed to produce a Mechanics Problem Based Learning module, that is feasible to use in physics learning on Mechanics topic. The research method uses Research and Development (RnD). The instruments are questionnaires of module feasibility test and questions validity test. The validators...

Article details

Download article (PDF)

Proceedings Article

Analysis of Critical Thinking Skill Through Conceptual Change Model Learning Assisted with PhET Simulation

Zul Hidayatullah, Insih Wilujeng, Aminatul Munawaroh

The aims of this research were 1) to analyze the level of critical thinking skills of students through learning based on the Conceptual Change Model (CCM) assisted by PhET simulation on momentum and impulse material; 2) to determine the differences in critical thinking skills between students who received...

Article details

Download article (PDF)

Proceedings Article

The Effect of Virtual Laboratory Application of Problem-Based Learning Model to Improve Science Literacy and Problem-Solving Skills

Supahar, E. Widodo

This research aims at analysing the effect of the Virtual Laboratory (VL) to improve science literacy and problem-solving skills among junior high school students. This research employed a Quasi-experiment with

Nonequivalent Control Group Design. The population in this research v the seventh-grade...

Article details

Download article (PDF)

Proceedings Article

The Use of Android Comics Based on Local Potentials of Embung Tambakboyo to Improve Students' Critical Thinking Ability

Agustina Nur Fauziah, Heru Kuswanto

This research aims to find out the improvements in junior high school students' critical thinking ability through Android comics. This research conducted was quantitative research using non-equivalent control group design. The number of samples involved were 68 junior high school students selected by...

Article details

Download article (PDF)

Proceedings Article

The Development of E-Worksheet Based on Project to Promote Student's Creative Thinking and Digital Literacy Skills

Dwi Septiana Sari, Yeni Widiyawati, Indri Nurwahidah, Mohammad Masykuri, Cucuk Wawan Budiyanto

E-worksheets can be an alternative learning media during the COVID-19 pandemic, which requires online learning. This study aims to develop an e-worksheet based on project to promote student's creative thinking and digital literacy skills on the theme City Noise for grade eight students. This research...

Article details

Download article (PDF)

Proceedings Article

Integrating the Beauty of Herbs Zingiberaceae into Science Learning Through Nature of Science Within the Active Learning Approach

A. Widowati, Sri Atun, IGP. Suryadarma

Nature and its phenomenon are objects of natural w learning. Learning of natural science helps students to understand aspects of life. One of the natural potentials that can be used as an object of science learning is the charm of Zingiberaceae herbs, like the one popular of plant's family using as herbs....

Article details

Download article (PDF)

Proceedings Article

Prototype of Science Literacy Instruments on the Competence of Construction and Property Technology Expertise

Faruq Abdur Rouf, Riyan Arthur, Daryati, Arris Maulana

This study aims to develop a prototype of a mechanical scientific literacy instrument for vocational students on the competence of construction technology and property expertise. The type of research used in this research is the Research and Development method (R&D). This research was conducted from...

Article details

Download article (PDF)

Proceedings Article

The Development of Natural Science Integrated Instrument Box (KIT) Landslide Props to Improve Student Disaster Preparedness

Nur Ismiyanti Arding, Sri Atun

Natural disasters in an area can occur anytime and anywhere. An attitude is needed to deal with these disasters. This study aims to determine 1) the feasibility of the The natural science integrated instrument box of landslide props, and 2) the effectiveness of the The natural science integrated instrument...

Proceedings Article

Volcanoes Disaster Risk Reduction in Science Education Curriculum

A Systematic Review

Rizki Arumning Tyas, Pujianto, Suyanta

As a country with 129 active volcanoes, Indonesia has very high potency ag risk of disaster has been offset by the hi ce of disaster. One of disaster risk reduction efforts can be trained through the education sector, which is through...

Proceedings Article

The Content Validity of Scientific Literacy-Based Diagnostic

Assessment

S Masfuah, F Fakhriyah, I Wilujeng, D Rosana

This research aims to describe the content validity of scientific literacy-based diagnostic assessment. This research is a part of a research and development study that consists of a preliminary study, development, and validation stages. In this validation stage, 7 experts validated the developed instruments....

Article details

Download article (PDF)

Proceedings Article

Developing a Science Teaching Aid (KIT IPA) to Teach Earthquake of Junior High School Student

Veronica Purnama Sari Latupeirisa, Sri Atun

The threat of disaster encourages everyone to make preparations that must be done. Knowledge about these actions can be obtained through various activities that study learning activities at school. The 2013 curriculum for seventh-grade junior high school discusses the topic of disaster, specifically...

Article details

Download article (PDF)

Advances in Social Science, Education and Humanities Research, volume 528
Proceedings of the 7th International Conference on Research, Implementation, and Education of Mathematics and Sciences (ICRIEMS 2020)

Indonesian Mathematics Teachers' Responses Towards the Implementation of Distance Learning During Covid-19 Pandemic

Veronika F. Rianasari[1,*] Hongki Julie[2] Maria S. Apriani[3]

[1,2,3] *Department of Mathematics Education, Sanata Dharma University*
[*] *Corresponding author. Email: veronikafitri@usd.ac.id*

ABSTRACT

In Indonesia, Covid-19 pandemic has brought unprecedented disruption in the education sector. This paper examines the responses of 415 Indonesian Mathematics Teachers' towards the implementation of distance learning during Covid-19 pandemic. It identifies online learning platforms used, type of online learning that dominates their learning, and learning approach implemented during the distance learning. Data collected through an online survey showed that 9.9% of the respondents unable to facilitate distance learning during this pandemic. Regarding the learning platforms used in distance learning, the data showed that the average of the number of online learning platforms used by teachers in Java, the most developed island of Indonesia, is approximately only three types of online learning platforms. The majority of teachers who facilitate remote learning used Whatsapp as their online learning platforms. The main reasons for using online learning platforms were the teachers can operate the platforms well and the applications are practical and simple for teachers and students. In terms of the type of online learning mode, teachers tended to use asynchronous learning. Furthermore, based on learning activities that dominate distance learning practices, it is shown that the majority of the teachers tended to use teacher-centered learning during the early pandemic.

Keywords: *Teachers' Responses, Distance Learning, Covid-19 Pandemic.*

1. INTRODUCTION

The Covid-19 pandemic has disrupted the education sector in Indonesia. There were over 530.000 schools began closing on March 16, 2020, in Indonesia and affecting more than 68 million students [1]. Regarding this, the Indonesian Ministry of Education and Culture released guidelines of education policy during the Covid-19 pandemic. One of the policy states that learning from home through online/distance learning is carried out to provide a meaningful learning experience for students, without being burdened with the demands of completing all curriculum learning outcomes for grade promotion or graduation [2]. It is in line with the idea of the World Bank [3], which states that distance learning that involves students in meaningful and productive experiences can support student learning processes.

Distance learning is a kind of learning that occurs when teachers and students are physically located in a different place and/or times and use varying forms of instructional materials [4]. Nowadays, the implementation of online learning strongly supports the implementation of distance learning. One of the main factors influencing the effectiveness of online learning or distance learning is the interaction between students and teachers and also interactions among students [5, 6]. This interaction is certainly supported by the methods used in implementing online learning. There are two methods for implementing online learning, namely asynchronous online learning and synchronous online learning. In asynchronous online learning, teachers and students interact in different places and at different times [7, 8]. Asynchronous online learning uses online learning platforms such as LMS (Learning Management System), e-mail, and online discussion forums. On the other hand, in synchronous online learning teachers and students interact together online at the same time, although not all of them are in the same place [7, 8].

Synchronous online learning usually involves online learning platforms such as group chats, web seminars, video conferencing, and telephones. Both of these online learning methods have advantages and disadvantages. Furthermore, previous studies showed that asynchronous online learning and synchronous online learning can complement each other [7, 8, 9]. Therefore, it is essential for teachers who are currently doing distance learning to find the right combination of the two methods according to the resources they have.

More than a decade ago, the demand for online distance learning was already predicted to continue to grow as internet access becomes increasingly affordable for a greater community [10, 11, 12]. Therefore, teachers are required to develop computer literacy and educational skills of information and communication technology (ICT) application [13]. In Indonesia, one of the pedagogical competencies that should be mastered is the ability to utilize ICT for learning purposes [14]. However, the recent study showed that Indonesian mathematics teachers had lack knowledge and skills of ICT and also the ICT-related pedagogical content knowledge [15]. Therefore, teachers who have inadequate knowledge and skills about the integration of ICT in education might experience difficulties in conducting distance learning that runs in the form of online learning [16].

Covid-19 pandemic is forcing every country to do a sudden shift from traditional face to face learning into distance learning. This disruption has put students and also teachers from rural areas and low-income families at a disadvantage since they have lack access to technology [17]. Based on Statistics Indonesia [18], there is a very significant difference between the number of internet users in urban areas compared to those in rural areas in 2018; with percentage 69.91% in urban areas and only 30.09% in rural areas. Moreover, the quality of connections in Indonesia is poor. The average speed of mobile and fixed internet connections in Indonesia is 13.83 MBPS and 20.11 MBPS respectively while the global average speed of mobile and fixed internet connections is 32.01 MBPS and 73.58 MBPS respectively [19]. Therefore, good quality digital infrastructure in Indonesia remains a major challenge.

The fast transition from face to face learning into distance learning certainly bring a rapid and broad increase in the use of educational technology. In Indonesia, public and private sectors have developed some local online learning platforms. Some online learning platform developed by Indonesian private sector are Harukaedu (an online learning platform offering online university degrees), Ruangguru (an e-learning platform for K-12 Indonesian students) and Cakap by Squline (a tutoring platform for language learning) [20]. Meanwhile, an example of online learning platform driven by public sectors is Rumah Belajar, an online learning platform developed by the Indonesian Ministry of Education and Culture (https://bersamahadapikorona.kemdikbud.go.id/rumah-belajar/). While the educational technology has spread rapidly, it is unlikely to be able to address the issue of education inequalities in Indonesia, unless it is effective in improving students' learning outcomes [20].

In the context of Covid-19 pandemic in Indonesia, teachers have to respond to the pandemic by doing a rapid transition from traditional face-to-face learning to distance learning. Knowing the natural responses of teachers to the quick transition will give insight to educational practitioners towards several issues in the implementation of distance learning during the emergency time. In Indonesia, some researchers have investigated the implementation of distance learning during Covid-19 pandemic [21, 22, 23]. However, previous studies have left some gaps to be filled. First, the studies [21, 23] did not focus on the implementation of distance learning from teachers' perspective. Second, the study [22] that investigated mathematics teachers' views on challenges on the implementation of distance learning during the Covid-19 pandemic only focused on teachers on the secondary school level. As a result, those studies were not addressed to reveal the responses of Indonesian Mathematics teachers from elementary to secondary school level towards the implementation of distance learning during Covid-19 pandemic.

This study aims to describe the responses of Indonesian mathematics teachers' towards the implementation of distance learning during Covid-19 pandemic. Specifically, this study will investigate three questions as follows: (1) What are online learning platforms used by Indonesian mathematics teachers in distance learning during Covid-19 pandemic?; (2) What is the type of online learning that dominate the distance learning during Covid-19 pandemic?; (3) What is the learning approach implemented on the distance learning during Covid-19 pandemic?

2. METHOD

2.1. Research Design

The primary objective of this study is to describe the responses of Indonesian mathematics teachers' towards the implementation of distance learning during Covid-19 pandemic. Since we want to describe a phenomenon in education during Covid-19 pandemic, then this study employed a descriptive research design. Descriptive research aims to describe a phenomenon and its features [24].

2.2. Participants

Snowball sampling was employed in this study. The study involved 415 participants (143 male and 272 female) who were elementary teachers (10.6%), middle school (35.66%), and high school teachers (53.73%). The participants came from 27 provinces in Indonesia. The majority of the participants came from Java

(73.25%) and the rest came from Sumatera (11.33%), Bali and Nusa Tenggara (6.51%), Kalimantan (4.82%), and Sulawesi, Maluku and Papua (4.1%). Moreover, the majority of the participants had undergraduate degrees (83.13%), whilst the remaining had diploma degrees (0.24%) and post-graduate degrees (16.63%). Their ages were categorized as less than 30 years (39.76%), 30-40 years (32.77%), 41-50 years (14.22%), and more than 50 years (13.25%).

From 415 participants involved in this study, only 63.9% of them have implemented distance or online learning before the Covid-19 pandemic. Moreover, only 90.1% of the participants in this study conducted distance learning during this pandemic. The lack of ICT skills among Indonesian teachers and uneven access to the internet in Indonesia are some challenges in Indonesia's distance learning implementation. Therefore, it is unsurprising that 9.9% of the participants did not facilitate distance learning during this pandemic.

2.3. Data Collection

This study used an online questionnaire to collect data. The main reason for using an online questionnaire because it can be given easily to large numbers of people using various online platforms [25]. In this study, the online questionnaire was posted on the authors' social media. The questionnaire was open for two weeks from April 16 until April 30, 2020. To answer the research questions, data sources focused on one part of the questionnaire that used open and partially open-ended questions. The study used partially open-ended questionnaire because it provides several possible answers and then has space for other responses [26]. The focused part of the questionnaire asked for responses to the following questions: (1) What is (are) online learning platform(s) that you use during distance learning?; (2) What is (are) your reason(s) for choosing the online learning platform(s)?; (3) Give an example of the mathematics learning activity that is often implemented during distance learning!, and (4) Mention the learning steps carried out in conducting distance learning!. The third question is an open question, and the rest are partially open-ended questions.

2.4. Data Analysis

The responses to the four questions above resulted in a list of answers for the first, second, and fourth questions and also in a large amount of written text related to the third question. These responses were analyzed using the qualitative data analysis framework developed by Miles and Huberman [27]: data reduction, data display, and conclusion drawing and verification. Descriptive statistics were also performed to answer the research questions.

3. RESULT AND DISCUSSION

3.1. Result

This section consist of three main results namely online learning platforms used during distance learning, type of online learning, and learning approach implemented during distance learning.

3.1.1. Online Learning Platforms Used During Distance Learning

The participants were asked to mention online learning platforms that they used during the distance learning (Table 1). Table 1 shows that in total, there are 28 online learning platforms used during the distance learning. The most popular online learning platforms used by the teachers is Whatsapp, used by approximately 85% of the respondents. The next most used online learning platforms are Learning Management System (LMS), Youtube, Email, Zoom, and Google Classroom, used by teachers ranging approximately between 32% until 47%.

To better understand about the number of online learning platforms used in different provinces in Indonesia, then we classified the Indonesian provinces into five regions based on the classification developed by Indonesia Internet Service Provider Association [28] regarding the number of the Indonesian internet user (Table 2). Table 2 indicates that the average of the number of online learning platforms used by teachers in Java and Sumatera is approximately three platforms. Meanwhile, the average of the number of online learning platforms used by the teachers from the rest regions is approximately only two platforms.

Furthermore, to get further analysis about the type of the online learning platforms used during the distance learning, we categorized the online learning platforms by its characteristics as social media, email, educational e-learning tools, and mobile communication via traditional mobile phones. Since nowadays, social media encompasses a wide range of applications, we made the classification based on the classification developed by previous studies [29, 30] (Table 3). Table 3 indicates that most of the mathematics teachers (approximately 86%) used social media such as Whatsapp, Facebook, Twitter, Telegram, Line, Microsoft Kaizala that utilize a combination of digital content for communication among students. About 67% of the teachers used video-based social media, and only around 14% used photographs-based social media.

Table 1. Online learning platforms used (n = 374)

No	Online learning platforms	Number of participants	%	No	Online learning platforms	Number of participants	%
1	Whatsapp	311	83.16	15	*Jogja Belajar* Class	4	1.07
2	Youtube	175	46.79	16	Microsoft Office Teams	4	1.07
3	Email	150	40.11	17	Jitsi Meet	3	0.8
4	Zoom	141	37.7	18	Twitter	3	0.8
5	LMS	127	33.96	19	Blog	3	0.8
6	Google Classroom	120	32.09	20	Telegram	3	0.8
7	Instagram	52	13.90	21	Geschool	3	0.8
8	Facebook	25	6.68	22	FaceTime	1	0.27
9	Hangouts	22	5.88	23	Geogebra Classroom	1	0.27
10	Edmodo	20	5.35	24	Google DUO	1	0.27
11	Line	14	3.74	25	Google Jamboard	1	0.27
12	Google meet	10	2.67	26	Microsoft Kaizala	1	0.27
13	WebEx	6	1.6	27	TeamLink	1	0.27
14	Skype	4	1.07	28	Short Message Service (SMS) and phone calls	1	0.27

Moreover, approximately 61% of the teachers have already used educational e-learning platforms, and about 40% of the teachers used email to facilitate distance learning. Accounting for less than 1%, the teachers used writing-based social media and mobile communication via traditional mobile phones.

Table 2. The average number ($\bar{x}$) of online learning platforms in each region

Region	$\bar{x}$	Standard deviation
Jawa	3.45	1.55
Sumatera	3.17	1.48
Kalimantan	2.23	1.6
Sulawesi, Maluku, and Papua	2.08	1.38
Bali and Nusa Tenggara	2	1.3

Further analysis provided insights into the mathematics teachers' reasons for choosing the online learning platforms (Table 4). Table 4 shows that most of the teachers used the online learning platforms because they can operate it well (approximately 80%), the online learning platforms was practical and simple for students (approximately 78%), practical and simple for teachers (approximately 65%), and promoted effective communication (approximately 54%). Accounting for about 36% and 30% of the participants, respectively, the reasons were promoting students' understanding and efficient for students in terms of internet quota. Accounting for less than 30% and more than 15%, the reasons were free to access, inspired by examples available, and efficient for teachers in terms of internet quota. Despite having a small group of participants referring to facilities and provisions from schools, adjustment to the facilities owned by students, interesting for students, and providing many features as their reasons for choosing the online learning platforms, it is worth noting that schools regulation, students' facilities and interest, and platforms' features can motivate teachers to explore the online learning platforms.

Table 3. Categorization of online learning platforms (n = 374)

Category	Number of participants	%	Examples
Social media outlets (utilize a combination of digital content)	321	85.83	Whatsapp, Facebook, Twitter, Telegram, Line, Microsoft Kaizala
Video-based social media	254	67.91	Youtube, Face Time, Google Duo, Zoom, WebEx, Jitsi Meet, Google Hangouts, Google Meet, TeamLink, Microsoft Teams

Educational e-learning platform	229	61.23	Learning Management System, Google Classroom, Geschool, Edmodo, *Jogja Belajar* Class, Google Jamboard from Google for Education
Email	151	40.37	
Photographs-based social media	52	13.9	Instagram
Writing-based social media	2	0.53	Blogs
Mobile communication via traditional mobile phones (without internet connection)	1	0.27	SMS (Short Message Service) and phone calls

Table 4. Reason for choosing the online learning platforms (n = 374)

Reasons	Number of participants	%
Teachers' ability to operate the platforms	298	79.68
Practical and simple for students	292	78.07
Practical and simple for teachers	243	64.97
Promoting communication	203	54.28
Promoting students' understanding	133	35.56
Efficient for students in terms of internet quota	113	30.21
Free access	104	27.81
Inspired by examples available	80	21.39
Efficient for teachers in terms of internet quota	62	16.58
Facilitated by the school	11	2.94
Provisions from the school	11	2.94
Adjusting to the facilities owned by students	6	1.6
Interesting for students	5	1.34
Providing many features	4	1.07

3.1.2. Type of Online Learning Implemented during Distance Learning

After investigating teachers' preference in using online learning platforms, the teachers were asked to give an example of mathematics instructional activities implemented during distance learning. For this purpose, we excluded participants who did not write an example of mathematics instructional activities, resulting in 262 respondents. The analysis is summarized in Table 5. The majority of the teachers (approximately 71%) used asynchronous learning to facilitate distance learning during the pandemic. Meanwhile, accounting for about 24% of the teachers used a blend of synchronous and asynchronous learning, and only about 5% of the teachers used synchronous learning.

Table 5. The type of online learning implemented (n = 262)

Type of online learning	Number of participants	%
Asynchronous learning	185	70.61
Synchronous and asynchronous learning	64	24.43
Synchronous learning	13	4.96
Total	262	

3.1.3. Learning Approach Implemented during Distance Learning

Furthermore, the teachers were asked to mention the learning steps carried out in conducting distance learning in order to reveal their learning approach. Since the question is partially open-ended, therefore the teachers choose the answers from the provided options. For this purpose, we excluded participants who only mentioned one learning step since we cannot conclude the implemented learning approach, resulting in 347 respondents. The analysis is summarized in Table 6. Table 6 indicates that among 347 teachers, approximately 73% implemented teacher-centered learning and roughly only 27% implemented students-centered learning.

Table 6. The dominant learning approach implemented (n = 347)

Learning approach	Number of participants	%
Teacher-centered learning	254	73.2
Students-centered learning	93	26.8
Total	347	

3.2. Discussion

This study examines the online learning platforms used by Indonesian mathematics teachers in distance learning, the type of online learning that dominate distance learning, and the learning approach implemented on distance learning during Covid-19 pandemic. The analysis of teachers' responses reveals three points of discussion.

First, this study confirms that most of the mathematics teachers prefer to use social media, especially social media that utilize a combination of digital content for communication among students, to facilitate distance learning during the pandemic. The majority of teachers who facilitated remote learning used Whatsapp, the most widely used messaging apps in Indonesia based on Hootsuite & We Are Social [19], as their online learning platform. The finding about the popularity of social media as an online learning platform confirms previous studies which show the opportunities to use social media for academic usage [31, 32, 33]. From table 4, we found that the ease of use of the platforms and the ease in sharing information or communicating became the main reasons for choosing the online learning platforms, as these reasons are chosen by more than 50% of the respondents. The ease of use of the platforms, especially social media, might be because many people have often used the platforms, as there are around 12 million social media users in Indonesia [19]. Meanwhile, the reason regarding the ease in sharing information & communication in line with the characteristics of social media, namely participation, openness, conversation, community, and connectedness [34]. Moreover, around 61% of the respondents have explored educational e-learning platforms to facilitate distance learning. This finding sounds promising because, at the beginning of the pandemic, there were already quite a number of teachers who were already using educational-based platforms. However, only a few of them used the local online learning platform. Furthermore, this study also reveals that the number of online learning platforms used by teachers in Java and Sumatera was higher than those in the rest regions in Indonesia. The inequality of knowledge and ability to use learning platforms among Indonesian mathematics teachers during Covid-19 pandemic might potentiate to worsen the educational inequality and digital divide [35].

Second, this study also reveals that the majority of the teachers preferred to use asynchronous learning instead of synchronous or the combination of both online learning types to facilitate distance learning during the Covid-19 pandemic. The tendency to choose asynchronous learning might be because, in the early pandemic, teachers need to upgrade their ability to remotely teach so that they work with what they know while reassure and maintain communication with their students [36]. However, if teachers rely primarily on asynchronous learning and rarely have a face-to-face meeting, then students might feel isolated [8]. Therefore, teachers must upgrade their knowledge and ability so that they can combine synchronous and asynchronous learning to optimize the benefits from both types of online learning.

Third, this study also reveals that mathematics teachers tended to use teacher-centered learning approach during distance learning. However, this finding did not imply that the teachers also used this learning approach in traditional learning before Covid-19 pandemic. The tendency to implement teacher-centered learning might happen because the teachers did the rapid transition to distance learning in the early of the pandemic. The rapid-transition to adopt new technology in learning process might lead teachers to back to the "old pedagogy" that focuses on the transmission of knowledge or unguided discovery [35].

4. CONCLUSION AND RECOMMENDATION

Overall, this study reveals that Covid-19 pandemic force Indonesian mathematics teachers to ramp up their knowledge and ability to do a quick shift from the traditional classes. This study shows that the majority of Indonesian mathematics teachers involved in this study facilitated distance learning by using social media, especially social media that utilize a combination of digital content. This study also shows that this pandemic might potentiate to worsen the educational inequality and digital divide in Indonesia since the data shows that the number of online learning platforms used by teachers in Java and Sumatera was higher than those in the rest regions in Indonesia. This study also reveals that the rapid transition during this emergency time might lead the teachers' tendency to rely on asynchronous online learning as the dominant online learning type and also to use teacher-centered learning as the learning approach. Therefore, this study gives an empirical overview about educational practices during a pandemic and thus may serve valuable information for the better improvement of distance learning during the pandemic and the benefit of future crises [35].

This study has two major limitations. First, the sampling method used in this study is snowball sampling via social media. Therefore, the result of this study cannot be generalized to the general population. Second, the majority of the respondent came from Java,

the most developed region in Indonesia, and only 26.75% of respondents come from other parts of Indonesia. The study might have different results if the number of respondents from each region in Indonesia is proportional. Nevertheless, the findings of this study may serve to alert educational practitioners of some issues regarding the teachers' responses during Covid-19 pandemic. Future research requires rigorous studies that able to in-depth capture the distance learning practices in Indonesia during the pandemic.

REFERENCES

[1] UNESCO, COVID-19 Impact on Education, 2020

[2] Ministry of Education and Culture, Implementation of Education Policy during the emergency spread of Covid-19, Indonesian Ministry of Education and Culture, 2020

[3] World Bank, Guidance Note on Remote Learning and COVID-19 (English), World Bank Group, 2020.

[4] J.L. Moore, C. Dickson-Deane, K. Galyen, Learning, online learning, and distance learning environments: Are they the same?, The Internet and Higher Education 14(2) (2011) 129-135. DOI: https://doi.org/10.1016/j.iheduc.2010.10.001

[5] R.H. Huang, D.J. Liu, A. Tlili, J.F. Yang, H.H. Wang, et al, Handbook on Facilitating Flexible Learning During Educational Disruption: The Chinese Experience in Maintaining Undisrupted Learning in COVID-19 Outbreak, Smart Learning Institute of Beijing Normal University, 2020.

[6] B. Offir, Y. Lev, R. Bezalel, Surface and deep learning processes in distance education: Synchronous versus asynchronous, Computers & Education 51(3) (2008) 1172-1183. DOI: https://doi.org/10.1016/j.compedu.2007.10.009

[7] P.J. Fadde, P. Vu, Blended online learning: Benefits, challenges, and misconceptions, in: P.R. Lowenthal, C.S. York, J.C. Richardson (Eds.), Online Learning: Common Misconceptions, Benefits, and Challenges, YU. Nova Publishers, Hauppauge, 2014, pp. 38- 48.

[8] S. Hrastinski, Asynchronous and synchronous e-learning, Educause Quarterly 31(4) (2008) 51-55

[9] L. Yamagata-Lynch, Blending online asynchronous and synchronous learning, International Review of Research in Open and Distributed Learning 15(20) **(**2014) 189–212. DOI: https://doi.org/10.19173/irrodl.v15i2.1778

[10] Y. Beldarrain, Distance Education Trends: Integrating new technologies to foster student interaction and collaboration, Distance Education 27(2) **(**2006) 139-153. DOI: https://doi.org/10.1080/01587910600789498

[11] R.M. Bernard, B.R.D. Rubalcava, Collaborative online distance learning: Issues for future practice and research, Distance education 21(2) (2000) 260-277. DOI: https://doi.org/10.1080/0158791000210205

[12] G. Natriello, Modest changes, revolutionary possibilities: Distance learning and the future of education, Teachers College Record 107(8) (2005) 1885

[13] V. Dagienė, L. Zajančkauskienė, I. Žilinskienė, Distance Learning Course for Training Teachers' ICT Competence, in: R.T Mittermeir, M.M Sysło (Eds.), Informatics Education - Supporting Computational Thinking, Springer, Heidelberg, 2008, pp. 282-292. DOI: https://doi.org/10.1007/978-3-540-69924-8_26

[14] Ministry of Education and Culture, Standards of Academic Qualification and Teachers Competence, Ministry of Education and Culture, 2007

[15] Mailizar, L. Fan, Indonesian Teachers' Knowledge of ICT and the Use of ICT in Secondary Mathematics Teaching, Eurasia Journal of Mathematics, Science and Technology Education 16(1) (2020) 1799. DOI: https://doi.org/10.29333/ejmste/110352

[16] R. Kumar, Convergence of ICT and Education, World Academy of Science, Engineering and Technology 40 (2008) 556-559.

[17] N.F. Azzahra, Addressing Distance Learning Barriers in Indonesia amid the Covid-19 Pandemic, Centre for Indonesian Policy Studies, 2020.

[18] Statistics Indonesia, Statistik Telekomunikasi Indonesia 2018, Badan Pusat Statistik, 2019.

[19] Hootsuite and We Are Social, Digital 2020: Indonesia, 2020.

[20] R. Bhardwaj, N.B. Yarrow, M. Cali, EdTech in Indonesia: Ready for Take-off?, The World Bank, 2020.

[21] J.W. Kusuma, H. Hamidah, Perbandingan Hasil Belajar Matematika dengan Penggunaan Platform Whatsapp Group dan Webinar Zoom dalam Pembelajaran Jarak Jauh pada Masa Pandemik Covid 19, JIPMat 5(1) (2020) 97-106. DOI: http://dx.doi.org/10.26877/jipmat.v5i1.5942

[22] Mailizar, A. Almanthari, S. Maulina, S. Bruce, Secondary School Mathematics Teachers' Views on E-learning Implementation Barriers during the COVID-19 Pandemic: The Case of Indonesia, Eurasia Journal of Mathematics, Science and Technology Education 16(7) (2020) 1860. DOI: https://doi.org/10.29333/ejmste/8240

[23] Z. Zaharah, G.I. Kirilova, Impact of Corona Virus Outbreak Towards Teaching and Learning Activities in Indonesia, SALAM: Jurnal Sosial dan Budaya Syar-i 7(3) (2020) 269-282 DOI: https://doi.org/10.15408/sjsbs.v7i3.15104

[24] H. Nassaji, Qualitative and descriptive research: Data type versus data analysis, Language Teaching Research 19(2) (2015) 129-132. DOI: https://doi.org/10.1177/1362168815572747

[25] J.R. Fraenkel, N.E. Wallen, H.H. Hyun, How to design and evaluate research in education, McGraw-Hill Humanities/Social Sciences/Languages, 2011.

[26] J.A. Gliner, G.A. Morgan, N.L. Leech Research methods in applied settings: An integrated approach to design and analysis 3rd ed, Routledge, 2017.

[27] M.B. Miles, A.M. Huberman, S. Saldana, Qualitative Data Analysis: A Method Sourcebook 3rd ed, Sage Publications, 1994.

[28] APJII 2018 *Penetration and Behavior of Indonesian Internet User* (Indonesia Internet Service Provider Association)

[29] N.P. Morris, How to Engage with Social Media, in: L. Roberts (Ed.), Roberts Academic Medicine Handbook, Springer, Cham, 2020, pp 525-531. DOI: https://doi.org/10.1007/978-3-030-31957-1_59

[30] I. Xie, J. Stevenson, Social media application in digital libraries, Online Information Review 38(4) (2014) 502-523 DOI: https://doi.org/10.1108/OIR-11-2013-0261

[31] M. Ali, R.A.I.B.R. Yaacob, M.N.A.A.B. Endut, N.U. Langove, Strengthening the academic usage of social media: An exploratory study, Journal of King Saud University-Computer and Information Sciences 29(4) (2017) 553-561. DOI: https://doi.org/10.1016/j.jksuci.2016.10.002

[32] B. Lee, A.S. Sing, Social media as an informal learning platform: Case study on adult learning at SIM University, Singapore, Procedia-Social and Behavioral Sciences 93 (2013) 1158-1161. DOI: https://doi.org/10.1016/j.sbspro.2013.10.007

[33] J. Mao, Social media for learning: A mixed methods study on high school students' technology affordances and perspectives, Computers in Human Behavior 33 (2014) 213-223. DOI: https://doi.org/10.1016/j.chb.2014.01.002

[34] A. Mayfield, What is social media?, iCrossing, 2008.

[35] A. Bakker, D. Wagner, Pandemic: lessons for today and tomorrow?, Educational Studies in Mathematics 104(1) (2020) 1-4. DOI: https://doi.org/10.1007/s10649-020-09946-3

[36] S.J. Daniel, 2020 Education and the COVID-19 pandemic, Prospects 49 (2020) 1-6. DOI: https://doi.org/10.1007/s11125-020-09464-3