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Improving the preservice teachers' TPACK level through hybrid learning

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Abstract – This study aims to explore whether there is a significant improvement in preservice teachers' Technological Pedagogical Content Knowledge (TPACK) after implementing hybrid presentation and teaching simulation as one of the tasks in the Teaching Methods and Conventional Media course. This study also reports students' responses to the implementation of the hybrid presentation and teaching simulation. In this quantitative study, preservice teachers' knowledge was measured using a TPACK scale prior to and subsequent to the hybrid class implementation period. Twenty-one students studying in the fourth semester of an English education department in a private university in Indonesia participated in this study. A paired-samples t-test result suggested a significant improvement in students' scores from the pre- to the post- TPACK self-assessment ($t = -8.210$, $p < .05$). The findings of this study suggest that hybrid presentation can be an effective strategy to help foster preservice teachers' TPACK skill while developing speaking and other skills.

Keywords: hybrid learning; preservice teachers; TPACK; oral presentation; technological knowledge

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1. Introduction

In facing the ongoing and unpredictable pandemic challenges, schools have been compelled to use their creativity to support distance learning and maintain student engagement. Parallel to this, over the past two years, technology in the classroom has undergone constant change with school having to be conducted by using remote learning and hybrid learning (Singh, Steele, & Singh, 2021). Teachers, as well as students, must adapt if they want to keep up with the use of technology in the classroom (Gavenila et al, 2021). Given the fact that students are today's children who grow up with technology as an essential part of their lives, it is easier for them to adapt to the use of technology in the classroom. However, for teachers, their technological knowledge, skills, and competencies fall short from their technology-native students. Evident in the research conducted by Permata and Hadiani (2021) and Padmadewi et al (2020), the majority of teachers were mentioned to be not proficient in using technology and media effectively, which makes them unqualified to teach using technology. Furthermore, teaching with technology requires not only technological knowledge but also an understanding of how technology, pedagogy, and content interact to support student learning, which is also known as TPACK. (Ersanli, 2016).

TPACK which stands for Technological Pedagogical Content Knowledge is a framework that integrates digital technologies into teaching and learning in the classroom. Niess (2011) describes TPACK strategic thinking as knowing when, where, and how to use domain-specific knowledge and strategies to direct students' learning with suitable information and communication technologies. TPACK framework focused on seven distinct components gained from the three core components and the overlapping part of the core components (Mishra & Koehler, 2008). Each component encompasses different importance.

Technological Knowledge (TK) describes the understanding of a variety of technologies, from low-tech ones which includes books and white boards to digital ones such as internet and computer (Schmidt, et al., 2009). Content knowledge (CK) refers to the knowledge of the actual subject to be learned or taught (Mishra & Koehler, 2008). Pedagogical Knowledge (PK) includes the knowledge of classroom management, assessment, lesson planning, and student learning which are basically known as the techniques and procedures of teaching. Pedagogical Content Knowledge (PCK) is the combination of teachers' pedagogy and content knowledge, which influences their instruction in ways that best promote students' learning for understanding (Driel & Berry, 2010). Technological Content Knowledge (PCK) refers to the understanding on how technology and content interact, influence, and constrain one another. In practice, this can be seen as teachers' choices of technologies which are best suited for addressing subject-matter learning or vice versa. Technological Pedagogical Knowledge (TPK) is the understanding of how various technologies can be used in teaching and the possibility that doing so could alter how teachers deliver their lessons (Schmidt et al, 2009; Bustam, 2022). Finally, the Technological Pedagogical Content Knowledge (TPACK) is where all three-core knowledge converges. Understanding this knowledge involves more than just knowing technology, content, or pedagogy on their own; rather, it involves knowing how these knowledge forms interact with one another as an emergent form (Mishra & Koehler, 2008).

In this age of information explosion, technological pedagogical content knowledge (TPACK) has been regarded as the key to effective teaching. It is crucial for all teachers,

especially in the post-COVID-19 era, to use technology to support such pedagogical advancements (Wang, 2022). Being said that, the TPACK level of teachers however were not quite satisfying. Garba et al (2015), in their research, interviewed a number of in-service teachers and discovered that the teachers have not yet acquired technological pedagogical knowledge due to the limited access to digital technology. In another research, Wang (2022) mentioned that the EFL teachers were less confident in their TPACK teaching, especially when it is related to higher-order thinking skills. Crompton (2014) added that preservice teachers' lack of self-assurance in their technological proficiency is one of the reasons for their limited use of technology.

Experience and practical knowledge are essential for teachers to develop a deeper and more effective TPACK, which implies that teachers must gain first-hand experience before utilizing technology in teaching activities (Rahimi & Pourshahbaz, 2018). Simply said, teachers need to learn about online learning through online learning (Slaouti & Motteram, 2006). Fortunately for the current preservice teachers, due to the pandemic situation pre-service teachers have the chance to study in a hybrid setting.

In this context, hybrid setting or hybrid learning refers to any instruction where content is delivered both online and face-to-face (Rahmani & Daugherty, 2007). The purpose of combining online and face-to-face instruction is to fully utilize each platform's advantages to offer a learning opportunity that can better support student learning than either platform by itself. The purpose of having combined instruction is to apply the "right" learning technologies to match the "right" learning to the "right" person at the "right" time in order to maximize the achievement of learning objectives (Meydanlioglu & Arikan, 2014).

One duty of teacher education is to give preservice teachers the chance to develop the abilities and approaches necessary to overcome obstacles in a fast-changing world and increase their professional resilience (Pasaribu & Wulandari, 2021; Fuzianti et al, 2022). Through the experience of hybrid learning, preservice teachers are expected to make the most of technology to create interesting and useful lessons based on the information presented in class. Preservice teachers can better understand how to incorporate technology into their lessons by using it in their planning and preparation. It is anticipated that this activity will raise the TPACK level of preservice teachers. This study questions whether there is a significant improvement in preservice teachers' TPACK after implementing hybrid presentation and teaching simulation as one of the tasks in the Teaching Methods and Conventional Media course.

2. Method

2.1 Research Design and Participants

This study seeks to answer one research question: Is there any significant improvement in preservice teachers' TPACK after implementing hybrid presentation and teaching simulation as one of the tasks in the Teaching Methods and Conventional Media (TMCM) course? In this quantitative study, preservice teachers' knowledge was measured using a TPACK scale prior to and subsequent to the hybrid class implementation period. Twenty-one students studying in the fourth semester of an English education department in a private university in Indonesia participated in this study. A paired-samples t-test was employed to measure whether there is a significant improvement in students' scores from the pre- to the post- TPACK assessment. In other words, the objective of the quantitative study was to show that the hybrid presentation and teaching simulation were effective at raising students' TPACK levels.

2.2 Research Setting

During the pandemic, the university applied for full online learning for 3 semesters starting from 2020 until 2021. The university has been facing the ongoing and unpredictable pandemic challenges since then. Therefore, in academic year 2021/2022, the university decided to implement hybrid learning which combines face-to-face classroom meetings and virtual zoom meetings. It is expected that by applying the hybrid approach, it can support distance learning while maintaining student engagement. Some technical devices were installed to support the implementation of this policy including Polycom camera which can capture classroom activities and broadcast it through virtual video conferencing app. Students can join the lectures either in the classroom or at home. The lecturers also received training in hybrid teaching techniques.

The Teaching Methods and Conventional Media (TMCM) course was a 4-credit course in which the students, who are the preservice teachers, were assigned to study some teaching methods such as Direct Method, Project Based Learning Method, Suggestopedia, etc. After studying certain teaching methods, they are assigned to perform a presentation and teaching simulation of those teaching methods. In this hybrid mode, they were challenged to grasp not only pedagogical knowledge but also technological knowledge. Consequently, it is crucial to determine how their TPACK level has changed.

2.3 Data Collection

A scale was used to collect data in the pre- and post-implementation of the hybrid presentation and teaching simulation to answer the research question, which was whether or not there was an improvement in students' TPACK level following the implementation of the hybrid presentation. The scale of TPACK was developed with an adaptation from Schmidt et al (2009). These scales were initially designed to help preservice teachers measure their technological, pedagogical, content knowledge. However, the items were modified and adjusted to the context of hybrid learning and oral presentation skills. The TPACK scale consisted of 20 items with a 5-point Likert scale ranging from 1 = 'strongly disagree' to 5 = 'strongly agree'. The TPACK scale is presented in Table 1.

Table 1 The TPACK Assessment Survey

TPACK Domain	Statements
Technological Knowledge (TK)	I find it easy to learn how to use technology.
	I can use presentation programs well.
	I can use video conferencing applications (zoom, gmeet, etc.)
Pedagogical Knowledge (PK)	I know various learning strategies/methods.
	I am good at applying learning methods.
	I am good at managing and controlling the class.
Content Knowledge (CK)	I am proficient in English.
	I am good at doing presentations in English.
	I can use specific English terms in my presentations.
Technological Content Knowledge (TCK)	I make use of technology to better comprehend English learning materials and concepts.
	I am familiar with online resources for learning English.
	I use digital media to carry out the learning process (LCD Projector, Laptop).
Pedagogical Content Knowledge (PCK)	I can choose learning strategies/methods that are appropriate to the material.
	I can create English materials that the students in my class can understand.
	I can teach English material by using the appropriate methodology.

Technological Pedagogical Knowledge (TPK)	I can choose the appropriate technology according to the strategy/method of learning in the classroom.
	I can convey ideas in a hybrid way (online or offline).
	I can use information and communication technology to discuss with students in class.
Technological Pedagogical Content Knowledge (TPACK)	I have the ability to combine technology and teaching strategies in accordance with the subject matter to be covered.
	I use various strategies and various web-based applications in the implementation of learning.
	I am capable of creating the best technology-based approach for learning English.

2.4 Data Analysis

Descriptive statistics were used for analysis and interpretation of the quantitative data from the survey. The normality test in SPSS was then used to verify the data's normality. The findings of the normality test were used to perform a paired-samples t-test to see whether there had been a statistically significant improvement in the students' TPACK. The paired-samples t-test is used to compare participant scores before and after the implementation of the hybrid presentation and teaching simulation, frequently following an intervention or event, as described by Pallant (2016). The null hypothesis (H0) asserts that the implementation of a hybrid presentation and teaching simulation as one of the tasks in the Teaching Methods and Conventional Media course did not significantly increase preservice teachers' TPACK score. The alternate hypothesis (H1), on the other hand, contends that the implementation of a hybrid presentation and teaching simulation as one of the assignments in the Teaching Methods and Conventional Media course has resulted in a significant improvement in preservice teachers' TPACK score.

3. Results and Discussion

To address the research topic, participants were given a scale of technological pedagogical content knowledge (TPACK) to self-assess their TPACK proficiency both before and after the hybrid presentation and teaching simulation was put into use. Table 2 displays the descriptive statistics of the students' TPACK scores before and after the hybrid presentation and teaching simulation task was implemented over the course of one semester.

Table 2 Descriptive Statistics

	N	Mean	Std. Deviation
Initial score of TPACK	21	65.9048	11.244
Final score of TPACK	21	85.9429	2.498

According to the findings of the descriptive statistics, there was a significant improvement in the mean TPACK scores of the students. The students' TPACK mean scores increased from 65.9 (SD=11.244) to 85.9 (SD=2.498) after a semester of study using the hybrid learning strategy. These findings have to be put to an inferential test, though, in order to demonstrate the significance of the improvement. The data must first be tested for normality before carrying out this method.

Table 3 Tests of Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Initial score	.125	21	.200*	.934	21	.162
Final score	.152	21	.200*	.924	21	.106

*. This is a lower bound of the true significance.

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a. Lilliefors Significance Correction

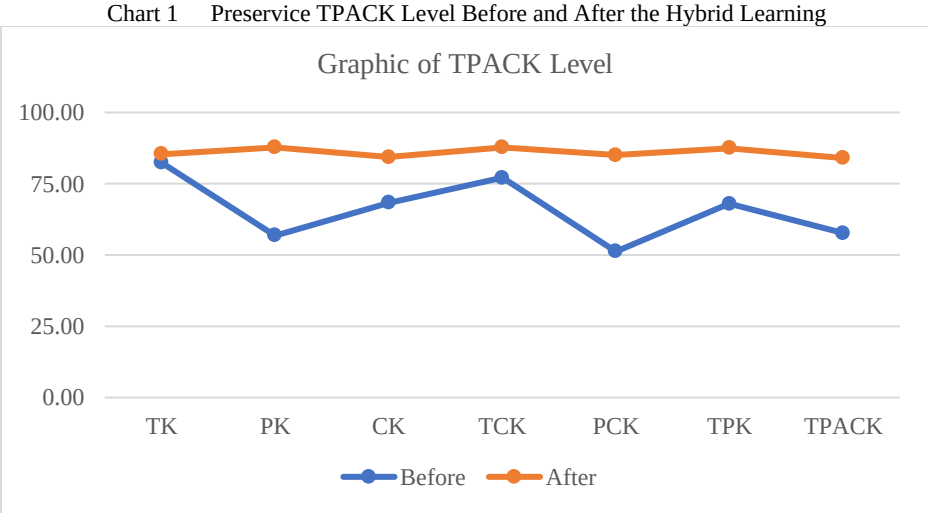
The results of the Kolmogorov-Smirnov test for normality are displayed in Table 3. The sig value in this table is higher than the research alpha (0.05), indicating that the data is normally distributed and that a paired t-test can be performed. Therefore, it was possible to use inferential statistics to determine whether the improvement in the students' TPACK scores was statistically significant. After that, a paired-samples t-test was performed, and the results are shown in Table 4.

Table 4 Paired Sample Test

		Paired Differences					t	df	Sig. (1-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Initial score of TPACK Final score of TPACK	- 20. 03810	11.1842 1	2.4405 9	-25. 12909	-14.94711	-8.210	20	.000

According to Table 4, the paired-samples t-test result revealed that students' TPACK scores significantly increased from the pre-test (M=65.9, SD=11.244) to the post-test (M=85.9, SD=2.498), with t (20) = -8.210 and p .05. (one-tailed). Therefore, it can be said that H1 is approved, meaning that after adopting the hybrid presentation and teaching simulation, preservice teachers' TPACK has significantly improved. See the graphic below.

Chart 1 Preservice TPACK Level Before and After the Hybrid Learning



The higher education environment has transformed as a result of the coronavirus disease of 2019 (COVID-19) pandemic. There is a need to investigate various educational approaches, including online, hybrid, and blended learning methods, as academic institutions around the world continue to deal with the global health issue. Universities must figure out the most effective approach to administer classroom activities to maintain engagement but still prevent the virus from spreading. Although hybrid learning is still a

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relatively new concept in many academic institutions, current research seems to show that it can greatly enhance the learning experience when "appropriately" adopted (Marsh, 2012).

Technology Knowledge (TK)

Understanding how to use various technologies is referred to as technology knowledge (TK), the first knowledge domain. From the statistics, it can be noted that the preservice teachers are having no trouble utilizing technology in hybrid learning contexts, especially the presentation tool and virtual video conferencing app.

Picture 1 Preservice teachers was conducting hybrid oral presentation in two modes (online and offline)

From the pictures above, it can be seen that preservice teachers are able to conduct hybrid presentations which combines face-to-face meetings and online presence through virtual video conferencing apps.

Pedagogical Knowledge (PK)

The second subdomain, pedagogical knowledge (PK), is concerned with the techniques and procedures of instruction. It would cover foundational information in areas like classroom management, assessment, lesson planning, and student learning. The results of the factor analysis on the three items representing PK indicate that preservice teachers are capable of recognizing and putting into practice different teaching strategies from this course in a hybrid learning environment.

Content Knowledge (CK)

The third knowledge domain, content knowledge (CK), relates to the knowledge teachers must possess regarding the subject matter they will be teaching as well as how the nature of that knowledge varies for distinct subject areas. The preservice teachers claim that they are able to pick up the language needed to provide an oral presentation, presenting the teaching strategies and also English lessons to others using suitable language, in this hybrid learning environment.

Technological Content Knowledge (TCK)

The fourth knowledge domain, technological content knowledge (TCK), is concerned with teachers' knowledge of how employing a particular technology might alter how students comprehend and apply ideas in a particular content area. The findings of this study demonstrate that participants are able to use technology to hone their English language skills, such as through watching English-language media or visiting websites that will help them learn the English language more thoroughly (before M=68,27, after M=84,27).

Pedagogical Content Knowledge (PCK)

Pedagogical content knowledge (PCK), the fifth knowledge domain, is the body of knowledge that relates to the teaching process. They learn a variety of teaching strategies

that they can use to teach English in the TMCM class. This study has shown that giving presentations and practicing lessons might boost participants' confidence in selecting the best English teaching strategy (Before M=77,07, after M=87,73).

Technological Pedagogical Knowledge (TPK)

Technological pedagogical knowledge (TPK) is the term used to describe teachers' awareness of how various technologies might be used in the classroom and how using technology may alter how a preservice teacher teaches. The mean score increases for the sixth knowledge domain, going from M=68.00 to M=87.47. It demonstrates that the participants are competent in making the best technological decisions to assist their teaching performance. Additionally, they can explain things to other people in both offline and online settings. Despite not being physically present in the class, they are still able to interact with the students and engage in meaningful discussion to gain a deeper understanding of the teaching strategies discussed because they were able to link across two environments by accessing virtual video conferencing app like Zoom.

Technological Pedagogical Content Knowledge (TPACK)

The seventh and final knowledge domain, technological pedagogical content knowledge (TPACK), refers to the knowledge that teachers need in order to incorporate technology into their instruction. By using the proper pedagogical techniques and technological tools while delivering content, teachers can help students develop an intuitive awareness of the intricate interactions between the three basic components of knowledge (CK, PK, and TK). As stated by the preservice teachers, they can prepare lesson plans which integrate the use of technology in English learning with the appropriate teaching methodology. They can also use a variety of strategies and web-based tools in order to implement English lesson. The mean score significantly increases for this final knowledge domain, going from M=57.60 to M=84.00 which shows the effectiveness of the program.

4. Conclusion

The current study discovered that implementing a hybrid presentation and teaching simulation in Teaching Methods and Conventional Media (TMCM) course considerably increases students' TPACK levels. In other words, the oral presentation that is implemented in hybrid mode could facilitate the preservice teachers to acquire new knowledge and skill in an innovative way. They can create lesson plans that combine the proper teaching techniques with the usage of technology in English learning. They can also administer English lessons using a range of techniques and online resources. Both blended learning and face-to-face learning have almost an equal effect on developing EFL prospective teachers' pedagogical performance. They can still gain benefits from this hybrid mode despite the forced change of the teaching and learning process to the online mode brought on by the Covid-19 pandemic. To add to this, hybrid learning has made it possible for students from all over Indonesia to access education from any location, especially with the advent of the independent learning curriculum at the higher education level.

The results of this study contribute to some pedagogical consequences and instructional advice. In the future, higher education institutions should not waste time debating whether to blend or not; instead, they should focus on how to blend the two environments. It provides preservice teachers with useful practice in managing hi-tech classroom activities for their future students. They will be equipped with the skills needed to succeed as twenty-first century language teachers. One of the study's limitations is that it did not investigate the preservice teachers' perceptions of their own efficacy with reference to the TPACK which can be addressed to the further research on the same field.

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