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How Does a TPACK-related Program Support EFL Pre-service Teachers' Flipped Classrooms?

I Putu Indra Kusuma[a*]

[a] indra.kusuma@undiksha.ac.id, English Language Education, Faculty of Language and Art, Universitas Pendidikan Ganesha, Indonesia
[*] Corresponding author, indra.kusuma@undiksha.ac.id

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Abstract

A worldwide discussion about Technological Pedagogical Content Knowledge (henceforth, TPACK)-related program or a program that provides technology, pedagogy, and content courses related to EFL flipped classrooms is scarce. Thus, the present study aimed at exploring (1) how a TPACK-related program supported the EFL pre-service teachers' understanding of flipped classrooms and their implementation, and (2) how a TPACK-related program supported the pre-service English teachers' technology integration in their flipped classrooms. This study employed a basic qualitative approach and recruited three EFL pre-service teachers who implemented flipped classrooms as participants. The data were collected by administering semi-structured interviews using an interview guide. Other documents were also collected to ensure the trustworthiness of the data. Then, the data were analyzed using the data analysis spiral strategy. The results revealed that the TPACK-related program helped the EFL pre-service teachers improve their understanding of flipped classrooms, develop considerations when implementing flipped classrooms, and successfully implement technology

	in their flipped classrooms. This study also provides three implications for improving the TPACK-related program worldwide, especially when teaching content about flipped classrooms approach.

Introduction

Flipped classrooms are the recent instructional innovation (Amiryousefi, 2019) among technology-based teaching approaches and promising mobile pedagogies among student-centered approaches. Flipped classrooms commonly denote instructional practices where the students review the course materials before coming to class (Adnan, 2017; Yeo, 2018), while the in-class time is spent engaging students in active learning via small group activities, mini-workshops (Mehring, 2016), group discussions, peer instructions, and mastery quizzes (Roehling, 2018). With its unique implementation through technology integration, the flipped classrooms approach has continued to garner teachers' attention at all levels of education (McLaughlin et al., 2016). Thus, this approach is fast becoming a vital issue and a current appealing topic to discuss in English language teaching (henceforth, ELT) worldwide, including Indonesia.

Moreover, educators are increasingly interested in implementing flipped classrooms in the Indonesian context (e.g., Kusuma, 2020; Kusuma et al., 2021; Lestari, 2021; Mubarok et al., 2019; Nugroho et al., 2020). For example, Kusuma (2020) successfully implemented this approach to 27 Indonesian students who took a speaking course by incorporating various technology tools. Kusuma required the students to watch YouTube videos or read online resources uploaded to Schoology before coming to school. The classroom activities then centered on discussing the topics, developing dialogs or monologues, practicing speaking, and recording students' speaking performances for posting to FlipGrid. Kusuma also argued that interesting materials, how teachers explain materials, interesting collaborative activities, and the incorporation of technology played important roles in successful flipped classrooms.

However, current studies on flipped classrooms generally discussed the effectiveness of this approach in ELT (e.g., Adnan, 2017; Amiryousefi, 2019; Hung, 2017; Kusuma, 2020) but failed to unravel the factors that support the successful implementation of this approach.

Implementing a flipped classroom might be challenging since it requires teachers to be extremely knowledgeable about pedagogy, content, technology, and the interplay of these three domains. Such knowledge represents Technological Pedagogical Content Knowledge (henceforth, TPACK) (Koehler & Mishra, 2009). Research suggests that TPACK is responsible for teachers' efficacy and competency in using technology in teaching (Koh & Divaharan, 2011; Yerdelen-Damar et al., 2017). Thus, many English Teacher Education Programs (TEPs) have now been offering TPACK-related programs to provide English teachers with the knowledge to support their ELT practices with technology. For instance, some previous studies (Hu & Fyfe, 2010; Koh & Divaharan, 2011; Kusuma, 2021; Turgut, 2017a) have indicated that TPACK-related programs have been implemented in many countries through the giving of educational technology courses, training, or workshops. Moreover, the TPACK-related program is different from technology-related courses because it offers technology courses and content-specific, teaching methods courses, and practicums or internships (Hofer & Grandgenett, 2012) to create an interplay among those domains which later becomes TPACK.

In addition, there is a growing interest in investigating EFL teachers' TPACK and investigating the implementation of TPACK-related programs in the Indonesian context (e.g., Djiwandono, 2019; Drajati et al., 2018; Kusuma, 2021). For instance, Kusuma's (2021) study shed light on how 25 TEPs and 79 EFL lecturers in Indonesia invested their time and energy in implementing technology to assist TPACK-related programs. In addition, Kusuma discovered that both TEPs and lecturers made significant efforts to give TPACK to pre-service EFL teachers. This study therefore showed that Indonesian EFL pre-service teachers might possess appropriate knowledge regarding the integration of technology into their classroom instruction. As a result, implementing flipped classrooms may even be feasible.

Nevertheless, implementing a flipped classroom can prove challenging for teachers (Roehling, 2018), especially for novice instructors (Hung, 2018). Successful implementation of this approach requires effective pedagogical techniques and a keen understanding of technological tools to effectively design a flipped classroom that maximizes the benefits of both the technology and the in-class time. However, how a TPACK-related program supports EFL pre-service teachers in implementing a flipped classroom remains inconceivable,

especially for pre-service English teachers who may lack teaching experience. Previous studies mainly focused on EFL in-service and pre-service teachers' TPACK levels (e.g., Djiwandono, 2019; Drajati et al., 2018; Turgut, 2017) and their technology integration in teaching (Baz et al., 2019; Koh & Divaharan, 2011; Merç, 2015). Unfortunately, these studies did not explore how the TPACK-related program supported technology integration, especially in flipped classrooms. Without such information, it will be arduous to understand how a TPACK-related program plays its role in supporting EFL pre-service teachers' implementation of flipped classrooms. Thus, such information is pivotal for future improvements to the TPACK-related program and the flipped classrooms implementation as the interest in implementing this approach has been proliferating in the past few years (Hung, 2017).

This study therefore purposed to explore (1) how a TPACK-related program supported Indonesian EFL pre-service teachers' understanding of flipped classrooms and their implementation, and (2) how a TPACK-related program supported Indonesian EFL pre-service teachers' technology integration in their flipped classrooms. The following questions guided the inquiry in this study.

1. How did the TPACK-related program support Indonesian EFL pre-service teachers' understanding of flipped classrooms?
2. How did the TPACK-related program support Indonesian EFL pre-service teachers' technology integration in flipped classrooms?

Literature Review

Flipped Classrooms

As one of the mobile pedagogy representatives, flipped classrooms are teaching practices where the students are expected to review the material before coming to class (Adnan, 2017; Yeo, 2018). Then, the in-class time or face-to-face (F2F) time is used for more engaging activities that require students' active involvement. Such activities include but are not limited to small group activities, mini-workshops (Mehring, 2016), group discussions, peer instructions, and mastery quizzes (Roehling, 2018). In addition, some studies have shown that various technology tools can be implemented to support the flipped

classroom approach, such as offline videos (Hung, 2017), online videos resources (Amiryousefi, 2019; Hung, 2018), podcasts, screencasts, annotated notes (O'Flaherty & Phillips, 2015), wikis (McLaughlin et al., 2016), Flipgrid (Kusuma, 2020), Kahoot, and Learning Management System platforms (Adnan, 2017). Accordingly, technology tools make flipped classrooms more possible, as technology will possibly shift a teacher-centered approach to a student-centered approach.

Innovative Ways to implement Flipped Classrooms

As the flipped classroom continues to attract researchers' attention, a growing body of studies devoted to discovering innovative ways of implementing flipped classrooms has emerged (see Adnan, 2017; Amiryousefi, 2019; Bergmann & Sams, 2012; Hung, 2017, 2018; Lockwood, 2014). Bergmann and Sams (2012) started an innovative way by recording themselves explaining chemistry materials for their students to watch before coming to class. Since then, videos have become essential materials in every subject matter, including ELT. For instance, Hung (2017) researched 43 EFL Taiwanese university students by giving them popular sitcom videos, Friends, as the course materials in a flipped classroom. Hung found that the experimental group performed better than the control group by utilizing this material. Hung (2018) conducted another study by employing more interactive ways, such as combining flipped classrooms with game-based learning, and then he used online materials that he took from TED-Ed. Later on, he found that the experimental group performed better than the control group. Another interactive way of implementation was identified in Adnan's (2017) study. Adnan utilized various applications (Telegram and LMS) and online resources (TED, North Star, and First Certificate in English) as the experimental group treatments. Adnan then found that the students in the experimental group outperformed their counterparts in the control group. However, as Lockwood (2014) explained in her book, materials are not limited to videos. From her experience, Lockwood used course materials from books instead of using videos.

Flipped Classrooms in the Indonesian Context

Since researchers around the globe have successfully implemented flipped classrooms (e.g., Adnan, 2017; Amiryousefi, 2019; Hung, 2017; Kusuma, 2020), there is a growing interest in implementing this approach in the Indonesian context. For example, Kusuma (2020) successfully implemented this approach to 27 Indonesian students who took a speaking course and compared their speaking and self-regulated learning scores with their 26 counterparts in the control group. By incorporating various technology tools, the students in the experiment group watched YouTube videos or read online resources uploaded to Schoology before coming to school. Then it was continued in the classroom by discussing the topics, developing dialogs or monologues, practicing speaking, and recording students' speaking performances for posting to FlipGrid.

Kusuma's (2020) successful implementation has influenced other Indonesian researchers to implement Flipped Classrooms in ELT. For instance, Nugroho et al. (2020) combined flipped classrooms with a mind mapping technique to teach reading courses to 31 EFL students and compared these students' critical thinking ability with the other 31 EFL students in the control group. Nugroho et al. found that those taught using Flipped Classrooms and mind mapping exerted better performance than those taught using the conventional method. Another successful implementation was documented by Kusuma et al. (2021), who implemented the combination of Flipped Classrooms and e-portfolios in teaching speaking skills to 29 EFL students, and compared these students' speaking performance with their 34 counterparts in the control group. Kusuma et al., besides discovering that this combination exerted better speaking performance, also found that the students in the experiment group had better learning engagement. These studies have indicated that Flipped Classrooms exerted better students' performance and could be incorporated with other teaching methods. Furthermore, regarding the students' attitude toward Flipped Classrooms, Lestari (2021) surveyed 75 EFL students and reported that these students had positive attitudes toward the flipped classroom and obtained several benefits after doing this approach. Unfortunately, the previous studies did not explore how they could successfully implement Flipped Classrooms in detail. Whether educational programs, such as workshops, seminars, and courses during TEPs have played important roles remain unclear. But, those studies generally argued that successful Flipped classrooms were influenced by

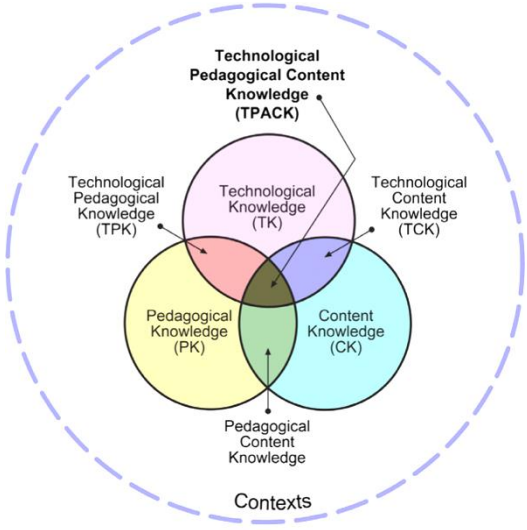
interesting activities, technology mastery for teaching, and technology supports (Kusuma, 2020; Lestari, 2021).

TPACK-related Program

TPACK is an expanded approach to Shulman's (1986) PCK and represents a strategy and paradigm for digital educators to create applicable instructions with technology in the digital era (Koehler & Mishra, 2009). Unlike Shulman's PCK that contains pedagogy knowledge (PK), content knowledge (CK), pedagogical content knowledge (PCK) only, TPACK consists of seven types of knowledge: technology knowledge (TK), PK, CK, PCK, technological pedagogical knowledge (TPK), technological content knowledge (TCK), and technological pedagogical content knowledge (TPACK). Thus, compared to Shulman's PCK, TPACK refers to the interplay of technology, pedagogy, and content (Mishra & Koehler, 2006) and denotes the knowledge of implementing technology to teach a subject matter.

Figure 1

TPACK Framework (Koehler & Mishra, 2009, p. 63)



As TPACK is associated with technology integration in teaching, this integration's success can only be attained if the teachers know how to implement the

interplay between pedagogy, content, and technology (Wong & Hsu, 2008). Thus, Zyad (2016) suggested that TEPs should equip pre-service teachers with a balanced knowledge of pedagogy, content, and technology. In addition, practicums or internships to gain real-world experiences are also necessary to complete the interplay (Hofer & Grandgenett, 2012). Accordingly, the TPACK-related program was born as TEPs integrated technology courses and other related coursework into their curriculum to provide the teachers with TPACK and relevant experiences to support the competency of teaching with technology. Consequently, pre-service teachers would sufficiently implement this knowledge and experiences into teaching practice (Batane & Ngwako, 2017).

Regarding the research on TPACK in the Indonesian context, some earlier studies concentrated on how teachers developed their TPACK. For example, few studies have explored that EFL teachers had good TPACK (e.g., Djiwandono, 2019; Drajati et al., 2018). These studies might indicate that TEPs have provided them with sufficient knowledge of teaching English using technology. To explore this notion, Kusuma (2021) did a study and recruited 79 EFL lecturers from 25 TEPs in Indonesia and found that they devoted their time and effort to delivering TPACK to Indonesian EFL pre-service teachers by providing knowledge about technology use, providing enough infrastructure, and exposing them to technology use in ELT. However, how TPACK influenced Indonesian EFL pre-service teachers' technology integration remains unclear.

In addition, very few studies were dedicated to investigating TPACK-related programs' roles to enhance pre-service teachers' self-efficacy to implement technology in their teaching practices, even in a global context. For instance, Hu and Fyfe's (2010) study revealed that technology courses facilitated the teachers to practice technology implementation in teaching by connecting their technology competence with content and pedagogy knowledge. However, different results were found with EFL pre-service teachers, where some studies reported that these teachers had a low interest in teaching with technology. Merç (2015) researched 86 EFL student teachers in Turkey on their technology integration in their teaching practices. Through collecting the data from questionnaires and semi-structured interviews, Merç later found that the schools had insufficient technology tools to support these EFL student teachers' teaching practices. Merç also discovered that they did not

implement technology into their teaching practices for several reasons, such as unfamiliarity with the technology and lack of knowledge of teaching English with technology. Baz et al. (2019) studied 22 EFL pre-service teachers in Turkey on implementing the Voicethread application, a cloud application that allows creating, commenting and sharing documents, presentations, images, audio files, and videos. They then trained these EFL pre-service teachers on using Voicethread for three weeks. By collecting the data from questionnaires and interviews, Baz et al. found that these EFL teachers did not intend to implement Voicethread in their teaching practices because of the lack of facilities and inability to control the technology tools.

As the above literature review has revealed, in-depth explorations of how the TPACK-related program help EFL pre-service teachers teach with technology, especially when implementing flipped classrooms, are necessary. Studies exploring this issue, especially on how TPACK-related programs help provide a profound understanding of flipped classrooms and their successful implementations, will contribute to the literature on TPACK, TPACK-related programs, and their relevance to flipped classrooms.

Research Methods

Research Design, Setting, and Context

This study employed a qualitative approach to understand and interpret human behavior in a particular social setting (Ary et al., 2019). Notably, this study's design was a basic qualitative study which is described as a study that focuses on participants' experiences through implementing qualitative methods (Merriam & Tisdell, 2016). This study explored the participants' experiences related to (1) how a TPACK-related program helped them understand flipped classrooms and the implementation and (2) how a TPACK-related program supported their technology integration in their flipped classroom implementation. The study took place in Indonesia as its English TEPs are growing and implementing technology into their curriculums. Moreover, most English TEPs in Indonesia are providing great efforts to enhance their EFL pre-service teachers' knowledge of teaching English using technology (Kusuma, 2021) through using English as the medium of instructions,

providing ELT and technology courses, seminars and workshops, and providing practice teaching sites to advance the pre-service teachers' teaching skills. Regarding the participants' teaching site, it was a high school in an urban area where the students were familiar with the use of technology in ELT. The participants taught English courses to these high school students twice a week. Moreover, the context of this study was how a TPACK-related program supported EFL pre-service teachers' flipped classrooms.

Participants

As the present study sought to explore how a TPACK-related program supported the EFL pre-service teachers' implementation of the flipped classroom, I recruited pre-service teachers who were still studying at a state university in Indonesia that offered a TPACK-related program and were implementing flipped classrooms. I employed a convenience sampling technique to recruit the available participants to provide the maximum insight and understanding of the explored phenomenon (Ary et al., 2019; Mertens, 2015). Before recruiting the participants, I sought IRB approval and approached the research sites. The head of an English Language Education Department at a state university in Indonesia informed me that three EFL pre-service teachers were implementing flipped classrooms for their capstone projects. I then approached these pre-service English teachers and explained the present study, including the benefits and risks of participating in this study, to get their consent to participate in this research. All participants then gave their consent and agreed to participate in this study.

The participants in this study were called by pseudonyms. The purpose was to preserve the confidential information of the participants. Those participants were John, Andrew, and Mark (see Table 1). They started the TPACK-related program in 2016, and they were studying in the same classes. They had two educational technology courses, ten pedagogy courses, and twelve introductory English courses during their program. Moreover, they also joined some educational technology and workshops provided by their TEP during their studies. They were all 21 years old and were in their final semesters when the study was conducted. They were implementing practice teaching using flipped classrooms as their capstone projects to earn their bachelor's degree in

English education. They were implementing flipped classrooms in speaking courses in a senior high school in Indonesia for two months, but each worked with students at different grade levels. Even though John, Mark, and Andrew implemented in different grades, they did the practice teaching simultaneously.

Table 1

The Participants' Demography

Names	Age	Sex	Grades taught
John	21 years old	Male	Tenth
Mark	21 years old	Male	Eleventh
Andrew	21 years old	Male	Twelfth

Data Collection and Instrumentation

I gathered primary data from several sources as data/source triangulation (Farmer et al., 2006; Farquhar et al., 2020). I did triangulation to ensure the validity and trustworthiness of the data (Farmer et al., 2006; Stake, 1995). I conducted semi-structured interviews with an interview guide that contained ten questions about the two cases explored in this study. Each participant was individually interviewed three times over two months, lasting for approximately one hour each. I asked eight questions during the first and second interviews and two additional questions during the last session. Additionally, I gathered teaching artifacts throughout this third session. The interviews were conducted in Indonesian to reduce the participants' anxiety and enhance the opportunity to elaborate on the information easily. The interview questions related to the TPACK-related program helped pre-service English teachers to understand flipped classrooms, the considerations in implementing technology in flipped classrooms, and the implementation of flipped classrooms. The interviews were digitally recorded using a mobile phone recording application and transcribed verbatim by the researchers. Transcriptions were shared with participants to ensure the data's accuracy and trustworthiness (Utami & Prestridge, 2018). Moreover, I collected supporting data, such as the researcher' memos, the participants' curriculum documents, and the participants' teaching artifacts. These secondary data served as a triangulation method to confirm the participants' testimonies.

Data Analysis

The data analysis in this study used the data analysis spiral strategy in which Creswell and Poth (2018) describe a strategy in which the researchers enter with text or audiovisual materials and exit with an account or a narrative. Furthermore, the data analysis spiral strategy consists of six phases such as (1) managing and organizing the data, (2) reading and memoing the emergent ideas, (3) describing and classifying codes into themes, (4) developing and assessing interpretations, (5) representing and visualizing the data, and (6) account of findings. In phase one, I translated all interviews from Indonesian to English and compiled all documents, such as the transcriptions and other documents related to participants' technology integration in flipped classrooms. In phase two, I continued reading and taking notes on emergent ideas when reading the transcripts and participants' teaching artifacts. I used a content analysis technique where it denotes the analysis of the contents (narratives) of the participants from the transcriptions of the interviews (Krippendorff, 2004) in phase three. In phase four, I compared our individual notes and codes as a researcher triangulation method to confirm our analysis, and I finally found three emergent themes. In phase five, I took relevant excerpts to support my participants' narratives. Then, in the final phase, I wrote this manuscript exploring the participants' experiences.

Results and Discussion

Results

This section summarized the overall findings from John, Andrew, and Mark to address each question. The three EFL pre-service teachers' experiences were then carefully examined. I found three themes, eight codes, and thirty-two excerpts from the analysis. The following table summarizes the analysis:

Table 2

Themes, categories, and Sample Excerpts

Themes	Codes	Sample Excerpts

The EFL pre-service teachers' knowledge of flipped classrooms	Having sufficient knowledge of flipped classrooms	"In my opinion, flipped classrooms are a new approach in which the students review the materials at home and do the assignment at school…."
	Having insufficient knowledge of flipped classrooms	"… but the lecturer did not discuss this approach in detail."
	Having additional information on flipped classrooms	"However, we could relate this topic with the explanation from other lecturers that happened to discuss the flipped classroom approach."
	Having sufficient knowledge to conduct flipped classrooms	"Overall, my pedagogy and technology knowledge seems to guide me to understand how to implement an instruction along with the appropriate technology tools, including those in flipped classrooms."
Considerations in Implementing Technology in Flipped Classrooms	Negative thinking	"In the beginning, I was afraid that the students could not participate well in flipped classrooms."
	Positive thinking	"When I thought about implementing flipped classrooms in that school, I was enthusiastic about implementing this approach."
Implementing Technology in Flipped Classrooms	Preparation	"…we read some articles about the current flipped classroom implementation with various technology tools…."
	Using various technology tools to implement flipped classrooms	"We used Schoology only to share YouTube links and materials to the students to review before coming to class."

In addition, the data have been narratively presented in-depth to demonstrate the commonality. This study also provides sample excerpts from John, Andrew, and Mark to support the narrative. In their excerpts, it was quite common that they mixed "I" and "we" to refer to their individuals or as a collective.

The TPACK-related Program Helped to Understand Flipped Classrooms

John, Mark, and Andrew started studying their four-years English TEP in the English and Language department in 2016. They had to take some introductory English courses to complete other advanced course requirements. In their second year, they started taking educational

technology courses, which comprised a technology course and an e-learning course. The technology course encompassed information on educational technology and technology tools that could be applied in ELT practices. Meanwhile, the e-learning course included designing instructions using technology applications to incorporate successful ELT activities with technology implementation. Furthermore, they also took some pedagogy courses during their first, second, and third years. Then, they took a Micro-teaching course and a practice teaching program in their fourth year. Such courses were the ones offered in their curriculum of the TPACK-related program.

John, Mark, and Andrew studied the flipped classroom approach in the e-learning course. They showed that they knew flipped classrooms well. For example, John explained:

> In my opinion, flipped classrooms are a new approach in which the students review the materials at home and do the assignment at school. So, flipped classrooms are about flipping the structure of traditional teaching. Thus, the students have more time to practice the contents (John, February 2019)

Unfortunately, the instructor did not discuss the procedure, advantages, disadvantages, and other relevant knowledge necessary to understand flipped classrooms. The course included only general information on flipped classrooms in ELT. For example, Mark confessed, "We learned flipped classrooms in the e-learning course, but the lecturer did not discuss this approach in detail. Consequently, at first, we did not know much about it and had a low interest in this approach."

Fortunately, John, Mark, and Andrew could understand this approach from another lecturer who happened to implement flipped classrooms in another course. Furthermore, other lecturers have referred to or discussed flipped classrooms in some pedagogy courses. This additional explanation then encouraged them to eventually get enough knowledge of this approach. Even though the discussion addressed only the essential information and implementation of flipped classrooms, the technology tools used to facilitate the flipped classrooms' design and implementation were not explicitly identified.

Considerations in Implementing Technology in Flipped Classrooms

John, Mark, and Andrew discussed how flipped classrooms with various technology tools could be applied before planning their treatments for flipped classrooms. Two main factors, such as students' technology proficiency and technology tools to support students' learning, became the key points of their considerations. Interestingly, Mark and Andrew were equally pessimistic about those two factors. Their pessimism, however, did not decrease their desire to incorporate flipped classrooms. For instance, Andrew explained:

> In the beginning, I was afraid that the students could not participate well in flipped classrooms. It is because, you know, most of them are from rural areas. People from rural area do not use technology a lot. So, they may not know how to use it for education. Besides, I am afraid they (the students) do not have laptops, smartphones, or at least a computer connected to the internet to participate in this study. That's why I had thought of some solutions if some issues had arisen during the implementation. (Andrew, February 2019)

Moreover, on the other side, John thought that flipped classrooms would fit better in this school. Having enough experience teaching in this school, John felt that he would successfully implement flipped classrooms with technology. For example, John confessed:

> When I thought about implementing flipped classrooms in that school, I was enthusiastic about implementing this approach. I did my practice teaching in that school, and I knew the students could use technology tools to support their learning, especially smartphones. And then, If I am not mistaken, two teachers implemented teaching with technology before I did. I also asked the principals if the school was implementing technology in teaching or not. The principal said that the school had been implementing technology to support teaching and learning, but not all teachers were using technology. So, from these considerations, I thought my flipped classrooms would be successful in implementation. (John, February 2019)

Implementing Technology in Flipped Classrooms

As mentioned earlier, John, Mark, and Andrew did their theses by implementing flipped classrooms in the same senior high school but at different grades. As a result, they also discussed the plans together and incorporated the same technology tools with varied materials, activities, and assessments. Regarding the technology integration, they implemented various technology tools, such as Schoology, Flipgrid,

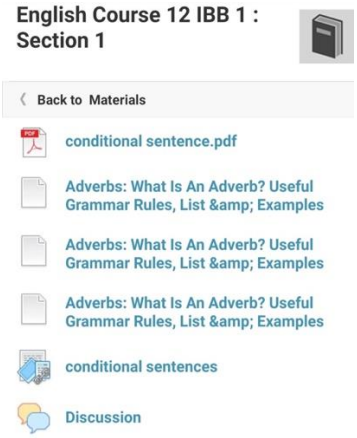
Youtube, and websites containing English teaching materials in their flipped classrooms. The reason for integrating these technology tools was because they tried to develop a modern flipped classroom approach using various online technology platforms to support technology-enhanced language learning. For instance, John said:

> As our advisor suggested, we discussed our research together in terms of technology tools. We then read some articles about the current flipped classroom implementation with various technology tools, and we wanted our teaching practices to be like the ones mentioned in the articles. Then, we, after having the discussion several times, decided to use Schoology, YouTube, websites, and Flipgrid. (John, February 2019)

These EFL pre-service teachers later explained that they utilized Schoology (see figure 2) because some of their lecturers had used this platform before, so they were familiar with the usage and how to design activities using Schoology.

Figure 2

An Example of the Course Arrangement Using Schoology



Furthermore, John, Andrew, and Mark had never used Flipgrid before. They searched on Google for potential technology tools for flipped classrooms, and they were referred to Flipgrid. As a result, they learned valuable information on how and for what purposes this platform could be applied. For example, Andrew said:

> At first, we had no idea of what Flipgrid looked like. We have never had any experience using this application yet, but we wanted to try this application. Therefore, we researched this application before deciding to involve Flipgrid in our teaching practices. I became the teacher while John and Mark became the students. Afterward, we thought we could use Flipgrid in our teaching using the flipped classrooms. (Andrew, March 2019)

In the meantime, they had been very acquainted with YouTube and websites as they often searched for some teaching materials from these sources. In addition, John, Mark, and Andrew's lecturers from both pedagogy and technology courses also took some materials from these sources. Consequently, the use of both sources was well known.

John, Mark, and Andrew then explained their flipped classroom implementation using those technology tools mentioned above. They then explained profoundly how they implemented Schoology, YouTube, and websites for home learning activities. For instance, John described:

> We used Schoology only to share YouTube links and materials to the students to review before coming to class. Then, we also used the discussion forum to ask the students to discuss the contents. Sometimes I gave my comments if I found they need clarification over a material. (John, March 2019)

They also explained how they implemented Flipgrid as a means of students' assignment submission (see figure 3). After submitting their videos, John, Mark, and Andrew also explained what they did in F2F activities. For example, Mark mentioned,

> We asked the students to record their performances using Flipgrid. Then, I asked the students to give their comments on their friends' performances. I would also remind them if they had not given their comments yet. After I gave my comments, I asked them in F2F activities to respond to my comments. (Mark, March 2019)

Figure 3

An Example of the Students' Videos on Flipgrid

Discussion

Since ELT activities' interest has grown in flipped classrooms, exploring how the TPACK-related programs support EFL pre-service teachers' flipped classroom implementation is necessary. Nevertheless, previous studies did not treat this issue in much detail. Therefore, by conducting a phenomenological study, this research proposed exploring (1) how a TPACK-related program supported the EFL pre-service teachers' understanding of flipped classrooms and their implementation and (2) how a TPACK-related program supported the EFL pre-service teachers' technology integration in their flipped classrooms.

The first research question explored how a TPACK-related program helped the EFL pre-service teachers to understand flipped classrooms. John, Mark, and Andrew confessed that, at first, they did not have any sufficient knowledge of what a flipped classroom was only from one course. Moreover, this course only talked about flipped classrooms in general, resulting in participants' low interest in implementing this approach in their future practice teaching. However, the interview results revealed that the participants knew flipped classrooms quite well as they eventually could enhance their understanding of flipped classrooms from other courses that explained this approach in depth. Therefore, less information about flipped classrooms might not benefit the EFL pre-service teachers to gain sufficient knowledge and might affect their motivation to implement the approach. Mehring (2018) argued that teachers who did not know flipped classrooms' fundamentals would be problematic when designing an EFL flipped course. In addition, the participants also experienced the implementation of this approach during their studies. It is surmised that these experiences later enhanced their knowledge of flipped classrooms and provided them with ideas for their teaching practices. Hofer and Grandgenett (2012) claimed that TPACK could only be attained if the TEPs could provide technology courses, content-specific and teaching methods, and course experiences. Thus, it is predicted that the TPACK-related program in this study had given the participants sufficient knowledge to implement flipped classrooms by providing them with relevant courses and learning experiences.

The second research question explored how a TPACK-related program supported the EFL pre-service teachers' technology integration in their flipped classrooms. The findings showed that the three

participants did not get any material from their courses about technology tools to support flipped classrooms. However, they could incorporate various technological tools to support their flipped classrooms. Their choice of technology tools seems to be primarily influenced by their experiences using those tools during their TPACK-related program. It therefore confirms Batane and Ngwako's (2017) claim that pre-service teachers would implement what they attain from their TEPs into their teaching practices. Moreover, their familiarity with these tools evidently led them to think of some possible instructional activities for their students in their flipped classrooms. This phenomenon therefore confirms Thomas et al.'s (2013) claim that knowledge and experiences during teachers' college years will radically affect their technology integration in teaching. Consequently, the college years' experiences may play an essential role in developing considerations for selecting appropriate technology tools to support their teaching.

Furthermore, it seems that the TPACK-related program has developed the pre-service teachers' efficacy and technology competence. As some studies examined (Khine et al., 2017; Tondeur et al., 2017; Yerdelen-Damar et al., 2017), TPACK-related programs developed pre-service teachers' efficacy and technology competence. On the other hand, Thomas et al. (2013) and Hu and Fyfe (2010), argued that good technology knowledge would have a good impact on the future teaching implementation using technology. Perhaps, the EFL pre-service teachers' technology knowledge and competence in this study motivated them to try another tool they had never experienced before. In their study, Koh and Divaharan (2011) found that after following the TPACK-related program, the teachers became proficient and developed good attitudes toward using technology. Therefore, Koh and Divaharan's findings could also explain that the TPACK-related program of the participants in this study had seemingly developed good attitudes toward using technology. Thus, they were open to implementing technology tools they had learned and experienced during their program and other technology tools they had never experienced before.

Another point that should be considered when analyzing the findings in this study is the EFL pre-service teachers' considerations before implementing flipped classrooms. It seems that EFL pre-service teachers in this study developed an awareness of implementing technology tools. It was marked by the fact that these EFL pre-service

teachers analyzed the school, situations, and the students' backgrounds to evaluate the possibility of technology being applied in their teaching. As Martinovic and Zhang (2012) argued, knowing schools' current technology integration situations is pivotal for teachers. Thus, not only does the TPACK-related program help to develop skills of implementing technology tools in teaching but also to develop an awareness of its implementation. This awareness could lead the pre-service teachers to have positive or negative considerations for technology integration in teaching. As the results showed, however, this understanding would also lead EFL pre-service teachers to think about some solutions to problems they predicted during implementation.

Three implications can be drawn from the above discussion to improve TPACK-related programs for EFL pre-service teachers, especially when teaching content about flipped classrooms. Firstly, it is suggested that TEPs should provide sufficient knowledge of teaching with flipped classrooms approach. Implementing flipped classrooms might be challenging for novice teachers (Hung, 2018) because it requires TPACK to support this approach's effective implementation. While flipped classrooms seem easy to implement, it will be complicated if the teachers do not know this approach's essence. Mehring (2018) argued that some English teachers might think implementing a flipped classroom is easy even though it is not. Thus, teachers frequently face issues during the implementation. Therefore, TEPs must provide technology courses, content-specific and teaching methods, and course experiences that comprise flipped classrooms approach in-depth as one of the materials.

Secondly, the TPACK-related program, through educational technology courses, should include a discussion of some potential technology tools to support flipped classrooms. Mehring (2018) contended that flipped classrooms are more than just flipping the classrooms. It needs technology tools to make the implementation successful. Therefore, having more information on some technology tools that can be used to support flipped classrooms will help the EFL pre-service teachers for future implementations.

Thirdly, as TPACK influences EFL pre-service teachers to consider some aspects of technology integration, the TPACK-related program should provide them with various flipped classroom implementation scenarios. It is always helpful to know some future technological integration situations in flipped classrooms, including the solutions to the

problems. Accordingly, EFL pre-service teachers could develop their confidence to implement flipped classrooms, although they are novices.

Conclusion

From the findings in this study, it can be concluded that courses that comprise flipped classrooms as teaching content and experiences of joining flipped classrooms are necessary to provide the pre-service English teachers with sufficient knowledge in advance. Sufficient knowledge is pivotal to developing teachers' efficacy in effective flipped classroom implementation. In addition, it can be concluded that the TPACK-related program also supports EFL pre-service teachers to integrate various technology tools in their flipped classroom implementation. The experience of learning and using technology instruments in education during college years could enable them to incorporate appropriate technology tools in their flipped classrooms. This study showed surprisingly that pre-service English teachers developed an awareness of technology integration in teaching. This awareness could thus lead the pre-service teachers to analyze the teaching sites, situations in those sites, and the students' background. Later, this awareness could help identify some possible issues during the technology integration in teaching, including the solutions to cope with them.

However, this study is far from perfect as it has several limitations during the implementation. Firstly, this study only had three participants that happened to implement flipped classrooms as their capstone projects. Moreover, these EFL pre-service teachers also discussed their flipped classrooms implementations altogether. Thus, how TPACK influenced individual implementation is unknown. Secondly, this study did not observe the EFL pre-service teachers' flipped classroom implementations since the data about the implementations were based only on the participants' confessions and documents. Thus, future studies should address these limitations to expand the literature on TPACK, TPACK-related programs, and flipped classrooms in ELT.

About the Author

I Putu Indra Kusuma: An assistant professor in English Language Education, Universitas Pendidikan Ganesha. His research interests are in

English education, technology-enhanced language learning, technology-enhanced assessment, and teacher education program. He has several publications, including books and articles in those areas mentioned above.

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