

## Bridging the Gap: The Reality of Digital Technology Integration by Indonesian Pre-service EFL Teachers

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### Abstract

**Background:**

This research investigates the integration of digital technology into teaching practices among pre-service English as a Foreign Language (EFL) teachers in Indonesia, using the Technological Pedagogical Content Knowledge (TPACK) framework. The exploration focuses on the contextual challenges and limited technological infrastructure that hinder effective technology use during teaching practicums.

**Methodology:**

Employing a qualitative case study design, the research involved six pre-service teachers from three junior high schools in Indonesia. Data were collected through Video-Stimulated Recall (VSR) interviews, direct observations, and analysis of teaching materials, including lesson plans and multimedia resources used in classroom settings.

**Findings:**

The findings reveal that while pre-service teachers were theoretically prepared for integrating technology into education, practical implementation was often compromised by infrastructural deficiencies. Teachers frequently encountered issues such as insufficient internet access and lack of support from supervisory staff, which forced them to rely on basic and offline technological tools despite their preparedness to employ more sophisticated resources.


**Conclusion:**

The research underscores a significant gap between the theoretical training provided by teacher education programs and the practical realities in Indonesian schools. It suggests that enhancing technological infrastructure and mentorship in these settings is crucial to effectively translate pedagogical and content knowledge into technology-integrated teaching practices.

**Originality:**

This research contributes to the field by highlighting the specific challenges faced by pre-service teachers in developing countries like Indonesia and provides empirical evidence on the discrepancies between their training and actual teaching experiences. The study advocates for an integrated approach in teacher education that aligns theoretical knowledge with practical abilities to navigate technological constraints.

**Keywords** : Digital Technology Integration; TPACK Framework; Pre-service EFL Teachers

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## 1. INTRODUCTION

There is extensive study on difficulties and solutions faced by teacher education programmes and pre-service teachers (henceforth PSTS) in practise teaching across the world (Gudmundsdottir & Hatlevik, 2018; McGarr & Gallchoir, 2020). How to plan, represent specific content with appropriate pedagogy, select and use appropriate digital technology, and evaluate those intersections continues to present significant challenges for teacher education programmes and PSTS (Koehler & Mishra, 2006), remains below expectations (Tondeur et al., 2015), due to teacher education programmes' poor ICT training (Gudmundsdottir & Hatlevik, 2018).

The PSTS use of ICT in the classroom continues to fall short of expectations for a number of reasons, some of which have been recognised. First, the teacher preparation programmes lacked technology expertise comparable to that found in schools. Because of this, PSTS were unable to create particular activities, depict specific topics using suitable pedagogy, and assess how those intersections were implemented across their programmes (Tondeur, 2016).

Second, despite the adequate technological environment of the training schools, the attitudes and skills of placement supervisors and class teachers often did not model and implement ICT for specific lessons that could be observed by prospective teachers during the teaching placement. These were critical factors in inhibiting the use of technology in their internship (Mørk & Krumsvik, 2016). Additionally, collaboration between the faculty of teacher training is an important factor influencing the PSTS use of technology in the teaching practice program (Li, & Franklin, 2016). In addition, the context of the internship school was also a crucial factor that had to be considered (Kafyulilo et al., 2016; Swallow & Olofson, 2017).

To overcome these obstacles, teacher education programs in Indonesia should not only include technological skills, but also show how content, pedagogy and technology can be integrated into the teaching and learning process, so that PSTS can observe and practice their implementation during their programs (Tondeur et al., 2016). During the teaching practicum program, the highly qualified PSTS mentor must have excellent teaching skills (ability to use various technologies relevant to their subject area, understanding of effective teaching methods and how to adapt them for technology integration, and mastery of the subject matter they teach) and be willing to share this knowledge and experience with the PSTS (Ambrosetti, 2014; Izadinia, 2015). In addition, mentors are also need to understand the

context level of Micro factors include classroom design and layout; Meso factors include technological resources (the availability, accessibility, and quality of technology infrastructure within the school) [Greene & Jones \(2020\)](#) and [Kafyulilo et al. \(2016\)](#) in guiding PSTSs to implement technology during teaching practicum.

Besides the use of technology, PSTS in Indonesia encounter problems with learning materials or resources, teaching tools or media and poor internet connection. According to [Abidin et al. \(2018\)](#), access to technology in Indonesia is still seen as a sign of modernity. This results in a decision by the PSTS on the acceptance or rejection of digital technology as part of the teaching practicum. This phenomenon underscores the importance of language teacher education programs in preparing, teaching and inspiring PSTS to integrate sophisticated and off-the-shelf hardware and software applications into their offline and online curricula.

To do this, the English Education Department at Etam University (psydonomus) provides technology courses that use the TPACK framework to simulate the introduction of digital technologies for language instruction. Specifically, how technology courses teach prospective teachers more than just how to use it ([Angeli & Valanides, 2008](#)); rather, they teach them how to use technology, pedagogy, and content to help them learn more and become more proficient ([Koehler & Mishra, 2009](#); [Kurt et al., 2014](#)). PSTS are ultimately required to effectively integrate digital technology into their teaching practicum program by completing these technological courses.

Since the PSTS were supported in the process of implementing content, pedagogical and technological knowledge to deal with pedagogical problems (classroom management/learning theories/learning styles) within the framework of technology courses, the focus of this present study is on the technology integration during the PSTS experiences in conducting their teaching practice. The aim of the study was to examine the gaps in PST experiences of adopting digital technology learned during their university courses and challenges prevented the integration of technology throughout TPACK framework during their teaching practice program. The research questions in guiding this study is How do pre-service English teachers with limited technology and weak support overcome these limitations to use technology in their teaching practicum, and how does this experience affect their ability to learn how to best use TPACK in the classroom?

## 2. LITERATURE REVIEW

### 2.1. TPACK Framework

Mishra and Koehler (2006) developed the Technological Pedagogical Content Knowledge (TPACK) framework to guide technology integration in education. This model expands Shulman's (1986) Pedagogical Content Knowledge (PCK) to include the role of technology. TPACK focuses on the knowledge teachers need to effectively integrate technology into the classroom. It emphasizes the importance of pedagogical knowledge, as point out (Harris and Hofer., 2011).

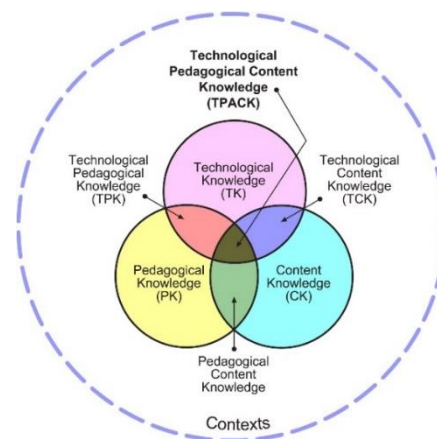


Figure 1 TPACK framework model (M. Koehler & P. Mishra, 2009)

TPACK includes Content Knowledge (CK), which is knowledge about the material to be taught or learned, Pedagogical Knowledge (PK), which is the process and practises or methods of teaching and learning and how they encompass things, general educational purposes, values, and goals (Koehler & Mishra, 2006), and Technological Knowledge (TK), the knowledge of standard technologies such as books, chalk and blackboard and more advanced technologies (Schmidt et al., 2009).

Educators require a multifaceted knowledge base encompassing content (CK), teaching methods (PK), and technological skills (TK) (Koehler & Mishra, 2006). These elements combine to form even more specialized areas of expertise, such as effectively teaching specific subjects (Pedagogical Content Knowledge - PCK) and using technology to enhance that teaching (Technological Pedagogical Content Knowledge - TPACK) (Koehler & Mishra, 2006; Shulman, 1987). For instance, in language instruction, teachers need knowledge of the target language and culture (Brown, 2007), along with the ability to leverage technology to effectively convey that knowledge to students (Olphen, 2008). This specialized knowledge is known as Technological Content Knowledge (TCK) (Harris & Hofer, 2011).

TPACK is the capacity to blend technology with content and pedagogy to achieve meaningful student results (Angeli & Valanides, 2009; Koehler & Mishra, 2006). TPACK is instructors' capacity to teach particular content-based material using technologies that best represent and support it (Harris & Hofer, 2011). According to Koehler et al., (2007) effective technological integration needs instructors to comprehend curricular material, general pedagogies, and technologies. In EFL context, effective language teaching using technology requires (a) an understanding of how linguistic and cultural concepts can be represented using technology; (b) pedagogical approaches that draw on constructivist and socio-constructivist philosophies to develop students' linguistic and cultural competence; and (c) an awareness of what facilitates or hinders language acquisition, particularly Computer Assisted Language Learning (CALL) (Olphen, 2008).

## 2.2. Guidelines to Overcome Challenges in Integrating Digital Technology

Research indicates that although many pre-service teachers (PSTS) are proficient users of technology for personal purposes, this competence often does not translate effectively into professional educational applications (Gill et al., 2015; Mpugose, 2020). In the Indonesian context, PSTS also face challenges in effectively using technology in their professional educational applications. Research has shown that although many PSTS are proficient users of technology for personal purposes, this competence often does not translate effectively into professional educational applications (Limbong, 2015; Mali et al., 2023).

One of the challenges that PSTS face in Indonesia is a lack of confidence in using technology in the classroom. This is due to the limited opportunities they have to practice using technology in a real classroom setting during their teacher education program (Soepriyanti et al., 2022). Additionally, PSTS may struggle with classroom management and controlling disruptive behavior among students, which can hinder their ability to effectively use technology in their teaching (Oliver et al., 2011).

To address these challenges, teacher education programs in Indonesia should focus on providing PSTS with more opportunities to practice using technology in a real classroom setting (Habibi et al., 2022). This can be achieved through the integration of technology throughout the curriculum, rather than relying on standalone educational technology courses (Gronseth et al., 2010; Howard et al., 2021). Furthermore, teacher educators should be trained to effectively use technology in the classroom and to support PSTS in developing their technology skills (Fougler et al., 2012).

In conclusion, the challenges faced by PSTS in Indonesia in effectively using technology in their professional educational applications are similar to those faced by PSTS in other contexts, such as South Africa (Mpungose, 2020). Addressing these challenges requires a comprehensive approach that includes the integration of technology throughout the teacher education curriculum, the training of teacher educators to effectively use technology, and the provision of opportunities for PSTS to practice using technology in a real classroom setting.

### **3. METHODOLOGY**

#### ***3.1. Design***

Case study design was employed as a technique by the researchers George (2019) and Yin (2018) to acquire and discuss comprehensive, in-depth, and more succinct information Schostak (2006) and Yin (2018) regarding the experiences that PSTS had with integrating technology during classroom practise. This research specifically looks at their experiences in choosing and executing teaching techniques in the context of integrating content, pedagogy, and technology while delivering a particular English lesson via the use of their video instruction and lesson plans tailored to each circumstance (Yin, 2003, 2018).

Specifically, this study used the Video-Stimulated Recall (VSR) method, a technologically advanced observational protocol that involves replaying videotaped segments of a teacher's instructional instruction and asking questions about the pedagogical reasoning of PSTS (Sturtz & Hessberg, 2012). By assisting in explaining what happened during a lesson, videos can support the use of evidence to improve teaching (Endacott, 2016; Osterman & Kottkamp, 2004). With VSR, the participant can pause the tape at any time and discuss any aspect of the class while reflecting on their thoughts while observing (Cinkara, 2016; Endacott, 2016).

#### ***3.2. Participants Recruitment***

In this study, the researchers used a technique known convenience sampling, in which they chose to participate in the research by selecting a group of six PSTS students from the seventh semester who had been assigned to four junior high schools (Table 1) (Creswell, 2012). They had completed all the courses required for enrollment in the teaching practicum, including content, pedagogy, and ICT. Therefore, it can be assumed that all PSTS selected for

this research have sufficient English and technical skills to provide the most comprehensive information on the subject under study (Merriam, 1998; Patton, 2002).

### 3.3. Data Collection techniques

We asked PSTS for recorded lessons and lesson plans. Six PSTS (one male and five females) from three junior schools provided recorded instructions, visual materials, and lesson plans (Saldaña & Omasta, 2018). Two PSTS from one school (a male and a female) did not record their lessons but provided lesson plans and multimedia and slide presentations. We did not use VSR Cinkara (2016) and Endacott (2016) these two PSTS. The researchers used cell phones to contact the six PSTS and record their video lesson. An appointment was made at the meeting to ask the six PSTS to personally participate in the research. Once they understood the aim of the study and agreed to participate, they filled out an interview permission form. All PSTS were given a pseudonym; that is to keep the participants confidential and to make them feel safe as participants, and personal information about the participants was not reported (Lincoln & Guba, 1985).

Table 1 PSTS' Participation in the phases of data collection

Participant Pseudonym	Gender	Practicum Placement (Pseudonym)	Watching	VSR
Purwati	F	SMP A	√	√
Jannah	F	SMP B	√	√
Safira	F	SMPN B	√	√
Ayun	F	SMPN B	√	√
Suhatmadi	M	SMPN C	√	√
Rohana	F	SMPN C	-	√

### 3.4. Data Analysis technique

The aim of this study was to locate and examine six PSTS experiences of adopting technology during their teaching practice. The specific technique the researchers used was stimulated recall interviews (VSR) (Cinkara, 2016; Endacott, 2016), in which individuals are interviewed while audio or audiovisual recordings of their own behavior in social situations are played to them (Dempsey, 2010). Procedures of conducting VSR in this study were

described. Firstly, we prepared an instrument for assessing the six teaching video recordings by adopting the TPACK questionnaire developed ([Schmidth et al. 2009](#)).

Second, we played back six video recordings of PSTS lessons using Windows Media Player (WMP) and used the seek slider, fast forward, rewind, and fast forward buttons to assess how the English lesson with Pedagogy and Technology (or the TPACK Framework) became. We used a logical technique to identify CK, PK, TK, PCK, TCK, TPK and TPACK activities. From these activities, we recorded Indonesian interview questions on TCK, TPK, and TPACK.

Third, we interviewed six PSTS members by playing their instructional video in the computer room. We used the seek slider, forward, rewind, and fast-forward buttons of a WMP to examine how they taught English using TPACK framework. Fourth, all interview material was translated and transcribed using MS Word. We used deductive and inductive methods to code interview data to see behaviors associated with CK, PK, TK, PCK, TCK, TPK, and TPACK. [Rivas \(2012\)](#) emphasizes that the combination of deductive and inductive coding for interview and observation data analysis is effective to analyze the data from the interviews and observations. [Patton \(2014\)](#) and [Rivas \(2012\)](#) in the deductive method, researchers introduce a tentative TPACK framework or adopt themes from the literature to engage with and analyze data. When using the deductive technique, the researcher must locate topics in the literature before beginning the study. According to [Rivas \(2012\)](#), the deductive approach asserts that the researcher must draw themes from the literature before beginning the analysis.

The interview data were partially transcribed to find the data relevant to the research questions ([Lincoln & Guba, 1985](#)). The process conducted through repeated careful listening-observing, listening-again-watching, and writing the instructional data from the video recordings. During this process, the researcher focused, simplified, and abstracted information related to TPACK ([Monette et al., 2005](#)).

In the next step, the data obtained from individual interviews were coded using open coding, axial coding and selective coding ([Cohen et al., 2011](#); [Strauss & Corbin, 1998](#)). Open coding involves first highlighting the common emerging themes from the interview and observation logs. All central topics and information are divided into groups. From this first open coding, the researchers gain a variety of information from the raw data. The data is then grouped into categories. Within each category, the researcher classifies subcategories to



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summarize the interview and observation results. After all data has been encoded, it is broken down into themes or patterns that make the data meaningful and easy to digest (Cohen et al., 2011; Rivas, 2012). The applied cross-case analysis focused on examining issues across cases to identify issues common to all cases (Creswell, 2007). The researcher employed a variety of encodings, but the encodings changed often and continuously evolved throughout the study (Miles & Huberman, 1994).

#### 4. FINDINGS

##### 4.1. *Pre-service EFL teachers experienced unsophisticated technology and slow Internet connection in classroom practice.*

The interview data revealed all PSTS experienced unstandardized technology software and hardware availability. There were no multimedia videos on CD or DVD, a limited number of LCD projectors, few active speakers, a slow Internet connection, and no spare laptops and computers. Their similar answers were voiced by Rohana:

*"Basic standards were used for all technologies." Only three LCD projectors, two laptops, and some active speakers are available at my school. There was no more English software or apps that could be used. Only the teachers' office had a slow Internet connection, and students weren't allowed to use the school's Internet. "Most of the time, we have to wait in line to borrow these LCD projectors and active speakers."*

In addition, Ayun repeated Rohana's answers with slow internet connection and unavailable multimedia English lessons on CD to support English books in her internship school.

*"My school lacked internet." I haven't been able to expand my teaching and learning using online resources. The problem deteriorated since the school didn't supply CDs with English courses. When the internet is accessible, teaching and learning will be better since it has everything. Internet-based enquiry learning helps individuals learn and utilise English outside the classroom.*

All PSTS had to bring and use their own computers installed with Audacity, YouTube Downloader, Camtasia, Filmora, Idea Mapping, PowerPoint and an audio dictionary when enrolling in ICT courses at the university. They also needed Bluetooth speakers and an LCD projector from the university. PSTS had experience with the first level, access to ICT, and this may have had an impact on the second level (Hargittai, 2002). As suggested by Adhikari (2018), suggests that PSTS carry a personal learning device. This helped overcome the lack of technological tools and application software to use digital technology via TPACK during

classroom practice (Hargittai, 2002). As suggested by Adhikari (2018), PSTSS carry a personal device for learning. Bring your own device (BYOD) helped to overcome the lack of technological tools and application software to use digital technology via TPACK during classroom practice.

Unsophisticated technology and slow Internet in a teaching practicum harmed PSTS technology integration expertise. Without suitable technology tools, systems, and services, instructional approaches couldn't revolutionise teaching and learning practises (Adhikari et al., 2017). Implementing technology in the classroom required updating not only the hardware and software but also the knowledge and skills of the teachers (Mørk & Krumsvik, 2016).

#### ***4.2. Experience of pre-service EFL teachers of merging simple available technology and pedagogy in classroom practice***

In terms of their technology knowledge (TK), the interview data clearly described that while they found the lack of technology support disruptive to their teaching, with their self-confidence, they could use their technological skills in editing and modifying media or multimedia from the Internet and websites to incorporate into their teaching technology. It can be implied from Safira's statements:

*"I've used PowerPoint, Audacity, Camtasia, Filmora, and Photo Story and can search and download internet content from websites like YouTube. My university taught me all these IT skills. These talents help me educate. My school only has a few LCD projectors and active speakers without Internet connectivity, yet I can still use offline apps to their full potential. I downloaded YouTube videos using a free programme. I used Camtasia and Filmora to modify effects, chop large films, combine them, and generate a small video."*

From the excerpt, all PSTS agree that these technologies offer ample resources and potential to improve the teaching and learning process, leading to better understanding and performance of learners and supporting their teaching. In this case, the PSTS unconsciously developed their technological knowledge through the solutions they carried out during the teaching practicum program. Aside from the online technology problems they faced during the teaching practicum, the technology preparation from the teacher education program also results in their technology content knowledge (TCK) expressed by Ayun.

*The school where I finished my internship had only an LCD and an active speaker. I was fortunate to own a device that could access the Internet. I could still make interactive lessons using these technologies, as well as my technical know-how and proficiency with tools like Camtasia and Filmora. I can encourage my students to learn English by showing them a variety of short video clips on YouTube. On YouTube, type "find the*

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*Nemo movie" to find the movie's subtitle. Using Camtasia, I can take a portion of this video and show its description to fit it into my lessons. After watching this video, my students were ecstatic. They had a stronger desire to learn, and they were successful in achieving their learning objectives. Can this kind of content be used? Maybe mention it. Copyrighty?*

Purwati, who taught pronunciation to her students, also prepared her classes for an offline mode, so students didn't have to go online to learn specific content. She notices:

*"I used Audacity to capture some Western song vocabulary. I utilised PowerPoint's insert audio clicking feature. I played, rewound, stopped, then repeated the words to ensure proper pronunciation. I utilised mouse clicking and a hyperlink to get the right pronunciation and translation."*

Despite the fact that all PSTS had completely inadequate technological facilities and infrastructure, especially access to the Internet, which was very limited, and multimedia of English lessons on CD and DVD were not available (Kafyulilo et al., 2016), they were nevertheless motivated to integrate multimedia such as short video clips, animations, songs, photos and images, and combinations of text, sound and image. For example, although all PSTS had totally deficient technological facilities and it can reasonably be assumed that the PSTS and teacher preparation programs have been able to continue to offer a theoretical perspective of teaching from high to low technologies in hardware and software that are accessible because they recognized a more realistic environment (Yeh et al., 2017).

Due to the lack of technology, the PSTS pedagogical content knowledge (PCK) was tested during teaching in the internship program. Their lesson planning is the first challenge in their preparation. The majority of the participants were able to communicate the learning objectives of the class they were teaching and had previous lesson plan (PCK) writing experience. However, as recommended in the 2013 curriculum, two of the PSTS were unable to conduct an assessment based on High-Order Thinking Skills (HOTS). They had prepared an online quiz to assess students' performance and give them confidence in taking the exam, as set out in the learning objectives and activities in their lesson preparation. This may be due to not having an opportunity to see their mentors combining PCK and TPK in teaching and assessment activities to achieve learning goals (Olphen, 2008).

Unfortunately, due to the lack of internet access, the PSTS had to change their plan and run a paper-based test for their students. It was conveyed by Jannah, *"I didn't think I would have to change the first centimeter's activity in my lesson plan to do a warm-up session. But that's the fact. No internet access stressed me out."*

Suhatmady added:

*“In the Technology in Education course, our lecturer often asked us in groups to find an online application to create a test. Due to the task, I planned to use Quizizz in my teaching practice. Unfortunately, it would have been difficult for the students to use their own internet quota for this test. Then I changed my mind.”*

Ayun also stated the same problem he encountered:

*“First, in my lesson plan, I wrote that I would use the video I made while I was in your class, sir. But when I saw the problems with the sound and the LCD I changed my mind and used some pictures and printed them out to share with the students.”*

The source of all problems began with the unavailability of sophisticated technology and internet connectivity, which is considered critical to any good school facility.. Due to these problems, the technology adoption learned and practiced at the university was not easy to implement in the teaching practicum. However, the PSTS decision making in the classrooms is seen as the development of their knowledge in technology integration (Abidin et al., 2018).

#### **4.3. *Insufficient mentoring support and guidance to implement and model effective teaching assessment with digital technology in classroom practice.***

In addition to the lack of assistive technologies, the mentoring support of the maintainers also influenced PSTS PCK. The results indicated that all PSTS still need a teaching and assessment model from supervisors. Some PSTS experiences were reflected in the following voices:

*“My English instructor couldn't help me teach Recount using video and multimedia. She didn't give assistance, a model, or instructions on how to choose a teaching style and strategy. I did search online for a video to teach Recount text. I added signals, zoomed in and out, and added subtitles to assist students learn new terms.”*

Related to language assessment Ayun and Jannah echoed:

*“All PSTS are worried about the inability to select and employ certain technologies for evaluating students' tasks to immediately acquire the result and feedback. In their bachelor's classes, students didn't learn much about technology, software, and hardware used to evaluate writing, reading, listening, and speaking. They anticipated the English study programme to include tools, software, or programmes to measure English abilities.”* Ayun.

*“After they understood and answered the questions, I rewarded those who were brave enough to answer them. I hadn't seen an example of how to use a specific technology to make this task more exciting when I watched in my supervisor's classroom twice.”* Jannah.

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Another finding uncovered in this study related to the classroom supervisor and the managerial attitudes. All PSTS had some challenges in implementing a seating plan to support the learning process due to the traditional classroom seating plan in schools, complaints from other teachers about the new PSTS seating plan, learners' disrespect towards PSTS, and the lack of guidance from supervisors. As a result, the PSTS were unable to innovate in the teaching of English. Below are some of their comments. For example, Suhatmady explained:

*"When I taught recount text, I wanted my classroom seating was in a U shape or circle so I could operate my laptop and all students could view my PowerPoint slides on the LCD projector and hear the speakers well. Wood tables and chairs were too heavy to move. I intended to put it into a "circular arrangement," as I did in "microteaching," but the classroom instructor did not assist me. She feared other instructors who used the room afterward me would be unhappy. Some, if not all, of the students didn't view us as English instructors. The loudness increased."*

These results indicated that all PSTS, despite having experience with little available technology (e.g. slow internet connection), were still able to optimize the instructional video they create using PowerPoint Audacity Camtasia Internet Filmora and Conceptmapping from YouTube or websites and other multimedia or had modified. It showed that their ability to translate the selected multimedia content into the main teaching objectives (knowledge of the curriculum) with instructional videos was sufficiently implemented. This means that the technology courses have successfully developed their CK, TK and TCK.

However, the PSTS PCK were poorly implemented, in particular they still lacked the ability to link specific teaching methods to activities (through inquiry-based learning). They were, for example, anxiety/nervousness, lack of relevant teaching methods, lack of classroom management skills, and inability to control disruptive students in the classroom (Mpungose, 2020). As a result, PSTS TPK were poorly implemented. This could be due to the fact that PSTSS had little experience in observing their mentors modeling TPACK during their teaching practicum. This situation was understandable due to the fact that schools did not have good technological facilities (contextual issues), resulting in inefficient teaching and learning processes with technology (Kafyulilo et al., 2016; Swallow & Olofson, 2017). English classroom teachers' ability to model lessons using technology was also still insufficient (Mørk & Krumsvik, 2016). Consequently, inaccurate and insufficient knowledge in implementing the connection between technological, pedagogical and content knowledge still existed in Indonesia.

## 5. DISCUSSION

This study conducted a thorough analysis of the difficulties encountered by pre-service teachers (PSTs) in Indonesia while incorporating digital technologies into their teaching methods. The key findings indicate a notable discrepancy between the theoretical instruction offered by educational programs and the actual implementation during teaching practicums, especially in relation to the use of the Technological Pedagogical Content Knowledge (TPACK) framework. Our research provided new and factual information that demonstrates how pre-service teachers (PSTs) use clever techniques to overcome limitations in technology by making use of basic tools and resources that do not require an internet connection.

This study thoroughly investigated the difficulties encountered by Indonesian pre-service teachers (PSTs) when incorporating digital technologies into their teaching methods. It revealed a substantial disparity between the theoretical knowledge gained from educational programs and its actual implementation during teaching practicums. The study included fresh empirical data on how pre-service teachers utilize fundamental and non-internet-based technology to overcome these difficulties. This discovery contributes a subtle dimension to the current body of research, exemplified by [Rafiq et al. \(2022\)](#), who emphasized a general state of readiness among pre-service teachers of English as a Foreign Language (EFL) in terms of technological aspects. However, they also observed a weak correlation in terms of broader Technological Pedagogical Content Knowledge (TPACK) readiness, indicating a disparity between being prepared and effectively applying that preparedness. In a similar vein, [Syamdianita & Cahyono \(2021\)](#) discovered that the Learning by Design (LBD) approach was advantageous for designing materials employing Technological Pedagogical subject Knowledge (TPACK). However, they also noted that issues such as limited computer skills and insufficient subject knowledge persisted, which aligns with our own discoveries of obstacles in implementing practical technology applications.

The employment of Video-Stimulated Recall (VSR) interviews in this study provided a methodologically robust means to delve deeply into the technology integration strategies of pre-service teachers (PSTs). This approach not only enhanced the granularity of our data but also aligned with the rigorous methodologies used in similar studies, such as those by [Yeh et al. \(2017\)](#), which also utilized introspective methods to gauge educational practices. Significantly, our analysis extended beyond previous research by unpacking how PSTs reconcile their well-developed technological knowledge with the realities of resource constraints in the classroom. This exploration into the practical application of theoretical

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knowledge underlines a crucial dynamic that has been underexplored in the literature, offering new insights into the adaptability and innovation required by PSTs in resource-limited settings.

In line with this, [Novita et al. \(2022\)](#) and [Sari et al. \(2021\)](#) have conducted studies that further explore the topic. Novita et al. highlight the barriers in sociocultural TPACK applications, while Sari et al. discuss the advantages of reflective practices in mastering technology integration. Novita et al. specifically emphasize the limited cultural understanding that hinders TPACK implementation, which aligns with our own findings on the deficiencies in infrastructure and mentorship that affect the practical technology integration of pre-service teachers. [Budianto et al. \(2023\)](#) highlighted the different perspectives held by stakeholders on TPACK competencies, emphasizing the need for comprehensive training that covers technological, pedagogical, and content knowledge. These studies provide valuable insights into the many difficulties and flexible approaches in applying TPACK, enhancing our comprehension of how theoretical training is used in actual educational settings across distinct cultural and infrastructural conditions.

This study conducted in Indonesia investigates the utilization of basic, non-internet-based resources by pre-service teachers to overcome technical constraints, hence questioning assumptions in the TPACK framework. Video interviews provide insights into how individuals handle the intersection of theoretical knowledge and practical restrictions. The results indicate the need to modify the Technological Pedagogical Content Knowledge (TPACK) framework to better suit environments with limited resources. This calls for adjustments in educational policies and teacher training. The study highlights the necessity for enhanced mentorship and infrastructure during teaching practicums in order to successfully use technology. This study contributes to both theoretical discussions on Technological Pedagogical Content Knowledge (TPACK) and practical methods to teacher training and technology integration on a worldwide scale. It encourages additional examination of the influences of culture, infrastructure, and mentorship.

## 6. CONCLUSION

This research uniquely addresses the challenges pre-service teachers (PSTs) face in integrating digital technologies into their teaching practices, particularly focusing on the disconnect between theoretical training and practical application during teaching practicums. It highlights the gaps in implementing the Technological Pedagogical Content Knowledge (TPACK) framework in Indonesian junior high schools, where infrastructural and mentorship

supports are lacking. The research emphasizes the Indonesian educational context, providing critical insights specific to the region's challenges with technology in education. Unlike many theoretical explorations of TPACK, this work presents original empirical evidence on PSTs' real-world experiences and adaptive strategies when faced with technological constraints.

In response to these challenges, a joint initiative between an Australian University and an Indonesian University has been established. The objective of this initiative is to create a network of educators throughout Indonesia to encourage the exchange of knowledge with their Australian counterparts. The community of practice workshops, facilitated by scholars and seasoned educators, will enable teachers from both nations to exchange their cultural viewpoints on the incorporation of technology in education, based on the TPACK framework. This collaborative endeavor shows potential for improving teacher professional development and fostering the use of technology in classrooms across various situations.

The research revealed restrictions that limit its practical use. The findings are constrained by Indonesia's focus on pre-service EFL teachers and provide only a brief insight into instructors' opinions without examining long-term effects on teachers or student learning. Thus, more research is needed to overcome these limitations. Evaluation of teacher training programs designed for low-resource contexts is crucial. Another important consideration is improving mentorship for TPACK development. Additionally, studying teachers' methods' sustainability and comparing them in different situations can help create efficient technology integration strategies for low-resource schools. These limits can be addressed in future studies to improve digital technology integration into teaching practices in diverse situations.

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