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From Knowledge to Practice: Investigating the TPACK Integration of Indonesian Pre-Service EFL Teachers

*¹Hilda Rakerda, ²Masyhudi Lathif, ¹Resti Amalia ¹Tri Arie Bowo, ¹Rizky Arif Afandi
¹Universitas Bangka Belitung, Indonesia
²Universitas Muhammadiyah Yogyakarta, Indonesia

*Correspondence:
hildarakerda@ubb.ac.id

Abstract

Effective technology integration in English as a Foreign Language (EFL) teaching requires teachers to develop strong Technological Pedagogical Content Knowledge (TPACK). In Indonesia, where teacher education programs increasingly emphasize digital learning, understanding pre-service EFL teachers' self-concept of TPACK is crucial for assessing their readiness before entering the profession. This study examines the TPACK profile of Indonesian pre-service EFL teachers, identifying their strengths and areas for improvement in applying technology to language instruction. The study involved 111 final-year undergraduate and first-year master's students who had completed teaching practice but had no formal teaching experience. Data were collected using a TPACK survey and analyzed through descriptive statistics to identify patterns in their TPACK mastery. Findings reveal that pre-service teachers are confident in their content knowledge (CK) and basic technological skills (TK). Still, they struggle with the full integration of technology into pedagogy (TPK), pedagogical adaptability (PK), and leadership in TPACK. While they acknowledge the importance of technology in teaching, gaps persist in their ability to select and apply diverse technologies effectively in classroom settings. Additionally, they face challenges adapting teaching strategies to different learners and assessing student understanding in varied ways. Their leadership in supporting peers with TPACK integration was also limited. These insights underscore the need for curricular enhancements in teacher education programs at both undergraduate and postgraduate levels, focusing on practical applications of TPACK, deeper technological and pedagogical training, and leadership development to better prepare future EFL educators for technology-enhanced instruction.

Keywords: EFL, TPACK, pre-service teachers, teacher education, English language learning.

INTRODUCTION

Technology integration in English as a Foreign Language (EFL) education has revolutionized how language is taught and learned. As digital advancements continue to reshape educational landscapes, technology has become indispensable for enhancing language acquisition, engagement, and accessibility. Tseng (2014) and Barrot (2022) highlight how the rise of digital tools, online platforms, and artificial intelligence-powered

learning resources has expanded instructional possibilities for EFL educators. Learning Management Systems (LMS) such as Google Classroom, Moodle, and Edmodo facilitate course organization, assignments, and real-time feedback, making learning more structured and accessible (Kumar et al., 2020; Santiago et al., 2020; Alturki & Aldraiweesh, 2021; Terzioğlu & Kurt, 2022). Additionally, mobile-assisted language learning (MALL) applications like Duolingo, Memrise, and Quizlet provide learners with interactive vocabulary-building exercises, pronunciation training, and gamified learning experiences (Karakaya & Bozkurt, 2022; Essafi et al., 2024). Moreover, the flipped classroom model allows students to engage with instructional materials—such as recorded lectures, grammar tutorials, and multimedia content—before class, enabling more interactive, discussion-based, and problem-solving activities during face-to-face sessions (Shaari et al., 2021; Shahnama et al., 2021). These advancements underscore the critical role of technology in fostering a more interactive, student-centered, and practical approach to EFL education. However, the effectiveness of these technological tools depends on teachers' ability to integrate them seamlessly with pedagogical strategies and content knowledge.

As technology continues to shape the educational landscape, teacher preparation programs must move beyond merely teaching basic technological skills and instead emphasize the effective integration of technology into pedagogy and subject content. This need is best addressed by the Technological Pedagogical Content Knowledge (TPACK) framework, introduced by Mishra and Koehler (2006), which highlights the interconnectedness of Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) in instructional design. The TPACK framework asserts that technology alone does not enhance learning outcomes unless combined with sound pedagogical strategies and subject-specific expertise (Koehler & Mishra, 2016; Abraham et al., 2022). In EFL education, mastering Content Knowledge (CK)—which encompasses linguistic proficiency, grammar structures, discourse analysis, and second language acquisition theories—is fundamental (Khani & Hajizadeh, 2016). However, Pedagogical Knowledge (PK) is equally essential, as EFL teachers must be able to adapt instructional strategies to accommodate diverse learning needs, provide meaningful feedback, and create interactive language learning environments (Hsu, 2016).

The challenge arises when integrating Technological Knowledge (TK), as teachers must be familiar with digital tools and ensure that these tools complement both their pedagogical approaches and content knowledge. For instance, an EFL teacher using technology-enhanced formative assessments must understand not only how to operate digital assessment tools (TK) but also how to design assessments that align with students' language proficiency levels (CK) and instructional goals (PK). Without a balanced approach to TPACK, teachers may over-rely on technology without meaningful pedagogical application or underutilize digital tools due to a lack of confidence or experience (Olofson et al., 2016; Valtonen et al., 2022). Despite the recognized importance of TPACK, many teacher preparation programs still focus heavily on theoretical instruction in technology integration rather than providing practical, hands-on training (Batane & Ngwako, 2016; Farjon et al., 2018; Lachner et al., 2021). This gap between knowledge acquisition and classroom application creates challenges, as pre-service teachers often struggle to select, adapt, and effectively integrate technology into real classroom settings.

The integration of the Technological Pedagogical Content Knowledge (TPACK) framework in teacher education has been explored in various studies, highlighting both its benefits and challenges. Ali and Waer (2023) found that pre-service EFL teachers in Egypt improved their knowledge and perception of TPACK domains after a course intervention. However, PCK remained dominant, indicating that full TPACK integration was still developing. Similarly, in Indonesia, Syamdianita and Cahyono (2021) reported that pre-service EFL teachers benefitted from the Learning by Design (LBD) approach in designing and implementing teaching materials using TPACK; however, challenges such as low computer skills, lack of content knowledge, and limited media availability hindered their effectiveness. Pradita et al. (2023) further emphasized the positive impact of TPACK on teaching practice, particularly in learning activities, assessment, and classroom management, although teachers' familiarity with TPACK varied. Meanwhile, Wulandari (2019) highlighted the importance of technological and pedagogical knowledge in materials development, revealing gaps in teachers' ability to integrate technology effectively due to insufficient training. Lastly, Drajati et al. (2021) examined the TPACK-21CL framework during teaching practicum, finding that pre-service teachers demonstrated inconsistent application of TPACK in lesson planning but acknowledged its potential for problem-solving and pedagogical improvement.

Despite the emphasis on TPACK in teacher education, little is known about pre-service EFL teachers' self-perceived readiness before entering the profession. Most studies focus on TPACK application during practicums or after training, leaving a gap in understanding how confident pre-service teachers feel across all TPACK domains before formal teaching experience. This study addresses this gap by profiling Indonesian pre-service EFL teachers' self-knowledge in TPACK, identifying strengths, weaknesses, and areas for improvement. Unlike prior research, this study examines perceived readiness rather than observed application, providing insights into whether teacher education programs sufficiently prepare future educators for technology-enhanced instruction.

METHOD

This qualitative study employed a survey method to explore pre-service teachers' self-perceived knowledge of Technological Pedagogical Content Knowledge (TPACK), a widely used approach in educational research for gathering quantifiable data on attitudes, beliefs, and perceptions. The survey method was chosen for its efficiency in reaching many participants across different institutions, as it allows researchers to collect standardized responses, enabling comparative analysis and statistical interpretation (Pitura, 2022). To ensure broad participation and accessibility, the survey was conducted online, facilitating responses from pre-service teachers across multiple locations (Ball, 2019).

In this study, participants were drawn from two state universities and one private university in Java and Kalimantan, ensuring a diverse representation of pre-service teachers across different institutional settings, which is a recommended approach to enhance generalizability and contextual relevance in educational research (Borgstede & Scholz, 2021). The participants were students enrolled in both 4-year undergraduate and 2-year master's programs in English Language Education, ensuring that the sample represents different levels of teacher preparation, a key factor in evaluating teacher education programs (Fraenkel et al., 2019). Most participants were in their final semester of study, meaning they

had completed coursework related to instructional design, pedagogical methods, and educational technology but had limited practical teaching experience, a common characteristic of pre-service teacher populations. This timing was crucial as it allowed the study to capture their self-perceived TPACK knowledge before transitioning into professional teaching roles, providing valuable insights into their readiness to integrate technology into pedagogy and content instruction, which aligns with best practices in survey-based educational research (Cohen et al., 2018k).

The questionnaire used in this study was primarily adapted from Schmidt et al. (2009) TPACK-based survey, ensuring that it aligned with an established and validated measurement tool in the field of technology integration in teacher education, which is essential for ensuring construct validity and reliability in educational research. The questionnaire included 29 statements measuring pre-service teachers' knowledge across TPACK domains, using a five-point Likert scale ranging from strongly disagree (SD) to agree (SA). The Likert scale was selected because it allows for nuanced responses, capturing varying degrees of confidence and uncertainty in participants' self-assessments. It is a widely accepted method in survey-based educational research (Boone & Boone, 2012). An invitation link was sent via telephone number and email to distribute the survey, following a convenience sampling strategy, a method commonly used in educational research to maximize response rates and ensure participant accessibility (Dornyei, 2007). This approach effectively reached a diverse group of pre-service teachers from different institutions, minimizing time constraints and logistical challenges associated with in-person data collection (Carter et al., 2021). After approximately two weeks, the researchers collected 111 completed responses, ensuring a sufficient sample size for descriptive statistical analysis (Tabachnick & Fidell, 2019).

Furthermore, simple descriptive statistics were employed to analyze pre-service teachers' responses to the questionnaire, a widely used method in survey research to summarize and interpret data patterns (Creswell, 2014). The results were presented in tabular format, displaying the percentage distribution for each response category. It allowed for a clear visualization of how participants rated their knowledge of technology integration in instructional design and practice. The analysis was based on the TPACK framework developed by Mishra and Koehler (2006), which encompasses seven key domains: Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Knowledge (TK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK).

FINDING AND DISCUSSION

This study randomly selected participants from various universities in the Java and Kalimantan regions, representing undergraduate and graduate students enrolled in English Language Teaching (ELT) programs at universities and teacher training colleges offering pre-service teacher education. The undergraduate participants were in their eighth semester or beyond, ensuring they had completed the core components of their teacher training. Meanwhile, master's degree students were in their first year of study, consisting of those in either the first or second semester, depending on their program intake. Although the participants had relatively little or no formal teaching experience, they had all previously

completed a teaching practicum in schools as part of their academic curriculum. This prior exposure to teaching practice made them suitable participants for this study, as their experiences would influence how they conceptualize their Technological Pedagogical Content Knowledge (TPACK) and assess their readiness to integrate technology into teaching.

Table 1. Demographic table of participants

No	Aspect	Number	Percentage
1	Male	23	20.7%
2	Female	88	79.3%
3	Completed teaching practicum	111	100%
4	Undergraduate students	77	69.4%
5	Postgraduate students	34	30.6%
6	Enrolled in universities	81	72.97%
7	Enrolled in teacher training colleges	30	27.03%

The study involved 111 pre-service teachers, with 23 male participants (20.7%) and 88 female participants (79.3%), reflecting the higher representation of female students in English Language Teaching (ELT) programs. All participants (100%) had completed a teaching practicum at schools, ensuring that they had some practical exposure to teaching despite being pre-service teachers. Regarding educational background, 77 participants (69.4%) were undergraduate students, while 34 participants (30.6%) were postgraduate students, ensuring representation from both bachelor's and master's levels of teacher training. Additionally, the participants were drawn from two types of institutions, with 81 students (72.97%) enrolled in universities and 30 students (27.03%) from teacher training colleges. This diverse academic representation provided valuable insights into how pre-service teachers at different levels and institutional backgrounds perceive their Technological Pedagogical Content Knowledge (TPACK).

Table 2. Pre-service teachers' Technological Knowledge (TK)

No.	Items	SD	D	N	A	SA
1	I know how to solve my technical problems	0.9%	6.3%	35.1%	42.3%	15.3%
2	I can learn technology easily	0%	0.9%	21.6%	62.2%	15.3%
3	I keep up with critical new technologies	0.9%	6.3%	30.6%	46.8%	15.3%
4	I frequently play around with the technology	0%	5.4%	28.8%	42.3%	23.4%
5	I know about a lot of different technologies	0%	9%	53.2%	32.4%	5.4%
6	I have the technical skills I need to use technology.	0%	11.7%	40.5%	37.8%	9.9%
7	I have had sufficient opportunities to work with different technologies.	0%	10.8%	42.3%	36%	10.8%

The findings show that pre-service teachers generally feel confident in their ability to learn and use technology, with a majority (62.2%) agreeing that they can easily acquire technological skills. However, 35.1% remained neutral about their ability to solve technical problems, suggesting uncertainty in troubleshooting skills. While many participants (46.8%) agreed to keep up with new technologies, a significant portion (30.6%) remained neutral, indicating passive engagement with technological advancements.

Although 42.3% actively experiment with technology, 28.8% remained neutral, showing that not all pre-service teachers regularly use digital tools beyond academic use. The largest area of uncertainty is familiarity with diverse technologies, with 53.2% neutral and only 32.4% agreeing, highlighting limited exposure. Additionally, 40.5% were unsure about their technical skills, and 42.3% were uncertain about having sufficient hands-on experience, emphasizing the need for more practical training in technology integration.

While pre-service teachers possess foundational technological knowledge, there is a clear need for greater exposure and hands-on practice with diverse technologies. Although many participants expressed confidence in their ability to learn and adapt to new technologies, uncertainty remained in technical problem-solving and proficiency in utilizing various digital tools. This aligns with Baek and Sung (2020) and Pradita et al. (2023), who found that pre-service teachers often lack sufficient training in technology integration despite meeting basic competency standards. Similarly, Greene et al. (2023), Farjon et al. (2018), and Batane & Ngwako (2016) demonstrated that structured online technology courses significantly enhance technological knowledge, suggesting that more guided instruction could help pre-service teachers build confidence in applying technology effectively. Additionally, Hastomo et al. (2024) highlighted the moderate proficiency of Indonesian EFL pre-service teachers in using AI-powered tools, reinforcing the need for digital pedagogy training. These findings emphasize the importance of teacher education programs incorporating structured, practice-oriented training in technology integration. This ensures that pre-service teachers understand technological concepts and gain practical experience in applying them effectively in instructional settings.

Table 3. Pre-service teachers' Content Knowledge (CK)

No.	Items	SD	D	N	A	SA
8	I have sufficient knowledge of English.	0%	4.5%	21.6%	61.3%	12.6%
9	I can use an English way of thinking.	0%	3.6%	30.6%	55.9%	9.9%
10	I have various Ways and strategies for developing my understanding of English.	0%	3.6%	23.4%	52.3%	20.7%

Table 3 reveals that pre-service teachers generally view their content knowledge (CK) in English as adequate, with 61.3% agreeing that they have a firm grasp of the language. However, 21.6% were neutral, showing uncertainty in their proficiency or areas requiring further development. Regarding cognitive fluency, 55.9% agreed they can think in English naturally, while 30.6% remained neutral, suggesting that some still face challenges in internalizing the language for seamless use. Additionally, 52.3% agreed that they employ various strategies to enhance their English proficiency, yet 23.4% were neutral, implying that not all pre-service teachers actively explore different approaches to improve their skills. These results suggest that while most pre-service teachers are confident in their English abilities, strengthening cognitive fluency and encouraging more diverse learning strategies could further enhance their preparedness for language instruction.

The findings provide insights into pre-service teachers' self-perception of their English content knowledge (CK), particularly concerning linguistic proficiency, cognitive fluency, and learning strategies. While most participants expressed confidence in their English proficiency, some were neutral about their ability to think in English and develop strategies for continuous improvement. This suggests that while many pre-service teachers

feel comfortable with their English knowledge, some are still developing their ability to engage with the language more naturally and strategically, which is essential for effective classroom instruction (Soruç & Griffiths, 2018; Pazilah et al., 2021). One key aspect of these findings is the role of self-directed learning and metacognitive awareness in strengthening content knowledge. Research has shown that pre-service teachers who actively engage in self-monitoring, goal-setting, and reflection tend to improve their language proficiency and teaching competence (Teng & Reynolds, 2019). The uncertainty expressed by some participants regarding their ability to improve their English through various strategies highlights the need for greater emphasis on reflective learning and self-assessment in teacher education programs (Warsi & Khurshid, 2022). Encouraging pre-service teachers to actively track their progress, explore different learning approaches, and engage in continuous language development may help them become more confident in their abilities over time, as self-regulated learning has been linked to long-term language acquisition and teaching effectiveness (Bai & Wang, 2020).

Table 4. Pre-service teachers' Pedagogical Knowledge (PK)

No.	Items	SD	D	N	A	SA
11	I know how to assess student performance in a classroom	0%	6.3%	33.3%	46.8%	13.5%
12	I can adapt my teaching based on what students understand or do not understand.	0%	6.3%	35.1%	49.5%	9%
13	I can adapt my teaching style to different learners.	0%	14.4%	30.6%	43.2%	11.7%
14	I can assess student learning in multiple ways.	0%	14.4%	30.6%	43.2%	11.7%
15	I can use a wide range of teaching approaches in a classroom setting.	0.9%	9.9%	36.9%	39.6%	12.6%
16	I am familiar with common student understandings and misconceptions.	0%	12.6%	43.2%	34.2%	9.9%
17	I know how to organize and maintain classroom management.	1.8%	11.7%	32.4%	43.2%	10.8%

The findings show that pre-service teachers have moderate confidence in their pedagogical knowledge (PK), but many remain uncertain. While a majority feel capable of assessing student performance (46.8%) and adapting teaching based on student understanding (49.5%), a significant portion (over 30%) remain neutral, suggesting uncertainty in applying these skills effectively. Differentiated instruction and assessment pose challenges, with 30.6% to 36.9% neutral about adapting teaching styles, using varied assessment methods, and employing diverse instructional approaches. Similarly, recognizing student misconceptions (43.2% neutral) and managing classrooms (32.4% neutral) remain areas of uncertainty, indicating the need for more vigorous hands-on training in classroom practices.

The data on pre-service teachers' pedagogical knowledge (PK) highlights competencies and gaps in their self-perceptions of teaching practices. Most participants feel confident in assessing student performance and employing multiple assessment methods, reflecting a solid understanding of evaluation strategies essential for effective teaching (Syamdianita & Cahyono, 2021; Guskey, 2022). Similarly, many pre-service teachers express proficiency in classroom management and adapting teaching strategies for diverse learners,

key skills for fostering productive learning environments (Hsu, 2016). However, many respondents remain uncertain about identifying common student misconceptions, suggesting that additional training is needed to strengthen their ability to address learning difficulties (Costache et al., 2019). The findings in the EFL (English as a Foreign Language) context reveal a nuanced perspective on teaching competencies. While many participants exhibit confidence in assessing student performance and adapting instructional strategies, gaps persist in recognizing student misconceptions and employing a full range of teaching approaches. EFL teachers often struggle with linguistic and cultural barriers (Gurbuz & Yildirim, 2022), face challenges in implementing student-centered methods for developing critical language skills (Abraham et al. 2022), and require tailored strategies to manage multi-level proficiency classrooms effectively (Hsu, 2016).

Table 5. Pre-service teachers' Pedagogical Content Knowledge (PCK)

No.	Items	SD	D	N	A	SA
18	I can select practical teaching approaches to guide student thinking and learning in English	0.9%	8.1%	36.9%	41.4%	12.6%

The table above shows pre-service teachers have mixed confidence in their Pedagogical Content Knowledge (PCK). While 41.4% agreed they could select practical teaching approaches to guide student thinking and learning in English, 36.9% remained neutral, indicating uncertainty in applying appropriate instructional strategies. Additionally, 8.1% disagreed, suggesting that some pre-service teachers require further training in aligning pedagogy with content knowledge to enhance teaching effectiveness. The findings suggest that while many pre-service teachers feel confident in selecting teaching approaches, a significant portion remains uncertain, highlighting a gap in pedagogical content knowledge (PCK). This aligns with research indicating that pre-service teachers often struggle to translate theoretical knowledge into practice (Khani & Hajizadeh, 2016; Pazilah et al., 2021). The high number of neutral responses (36.9%) suggests a lack of hands-on experience, making it difficult for them to apply instructional strategies effectively (Olofson et al., 2016). One possible reason for this uncertainty is limited exposure to diverse teaching methods during training. Studies emphasize that mentorship, lesson planning, and classroom simulations enhance teachers' ability to adapt instructional strategies (Hsu, 2016). Additionally, the complexity of EFL teaching requires a balance between content knowledge, linguistic scaffolding, and adaptable pedagogy, which novice teachers often find challenging (Wulandari, 2019).

Table 6. Pre-service teachers' Technological Content Knowledge (TCK)

No.	Items	SD	D	N	A	SA
19	I know about technologies that I can use to understand and learn English.	0%	2.7%	21.6%	55.9%	19.8%

The findings reveal that most pre-service teachers feel confident in their Technological Content Knowledge (TCK), particularly in identifying and using technology for learning and teaching English. A majority (55.9%) agreed, and 19.8% strongly agreed, demonstrating awareness of digital tools that support English language learning. However, 21.6% remained neutral, suggesting uncertainty or limited experience in applying technology effectively in language instruction. A small percentage (2.7%) disagreed, indicating difficulty selecting appropriate technologies for English learning tasks. The results

show that while pre-service teachers recognize the role of technology in English learning, some lack the confidence or experience needed to integrate it effectively into teaching. This aligns with studies showing that many pre-service teachers know educational technology but require more hands-on training to use it effectively in subject-specific contexts (Farjon et al., 2018; Lachner et al., 2021). One reason for this uncertainty is insufficient exposure to practical technology-based instruction during teacher training. Research indicates that while digital tools are widely available, their effective integration depends on structured training and opportunities for experiential learning (Koehler & Mishra, 2016). Without practical application, pre-service teachers struggle to connect technological tools with meaningful language instruction (Valtonen et al., 2022). Additionally, TCK in English language teaching (ELT) requires more than just familiarity with digital tools. Teachers must understand how specific technologies enhance language acquisition, promote engagement, and support differentiated instruction (Ali and Waer, 2023).

Table 7. Pre-service teachers' Technological Pedagogical Knowledge (TPK)

No.	Items	SD	D	N	A	SA
20	I can choose technologies that enhance the teaching approaches for a lesson.	0%	5.4%	27%	54.1%	13.5%
21	I can choose technologies that enhance students' learning for a lesson.	0%	4.5%	29.7%	53.2%	12.6%
22	My teacher education program has caused me to think more deeply about how technology could influence the teaching approaches I use in my classroom.	0%	5.4%	25.2%	46.8%	22.5%
23	I am thinking critically about how to use technology in my classroom.	0%	4.5%	28.8%	47.7%	18.9%
24	I can adapt the use of the technologies that I am learning about different teaching activities.	0%	3.6%	27%	52.3%	17.1%

The findings indicate that pre-service teachers generally feel confident in their Technological Pedagogical Knowledge (TPK), particularly in selecting and adapting technologies for teaching. A majority (54.1% and 53.2%) agreed that they could choose technologies that enhance teaching approaches and student learning, though 27% and 29.7% remained neutral, suggesting uncertainty in fully integrating technology into instruction. Regarding critical thinking about technology use, 46.8% and 47.7% agreed that their teacher education program has helped them reflect on how technology influences teaching. However, 25.2% and 28.8% were neutral, implying that not all pre-service teachers have developed a strong critical awareness of technology's role in instruction. Similarly, while 52.3% agreed that they can adapt technologies to different teaching activities, 27% remained neutral, indicating that some still struggle with applying technology flexibly across various contexts.

The findings suggest that while pre-service teachers are generally confident in selecting and using technology to enhance instruction, some remain uncertain about fully integrating it into diverse teaching scenarios. This aligns with research indicating that teacher education programs introduce digital tools but often lack hands-on, practical training to build confidence in technology integration (Batane & Ngwako, 2016). A key challenge is bridging the gap between theoretical knowledge and helpful application. Studies

highlight that pre-service teachers require structured, experiential learning opportunities to develop confidence in making pedagogical decisions involving technology (Koehler & Mishra, 2016). Without adequate practice in actual or simulated classrooms, some teachers hesitate to modify their instructional strategies to incorporate technology effectively (Backfisch et al., 2021). Another critical area for improvement is crucial thinking about technology's role in education. While many pre-service teachers recognize the value of digital tools, some struggle to evaluate their effectiveness in supporting student learning. The research underscores the importance of explicit training in digital pedagogy, particularly in assessing educational technology's impact on learning outcomes (Haleem et al., 2022; Antonietti et al., 2022). To address these gaps, increasing interactive training opportunities, such as microteaching with digital tools, can significantly enhance pre-service teachers' confidence and ability to integrate technology effectively across different teaching contexts (Ledger & Fischetti, 2019).

Table 8. Pre-service teachers' Technological Pedagogical Content Knowledge (TPACK)

No.	Items	SD	D	N	A	SA
25	I can teach lessons that appropriately combine English, technologies, and teaching approaches.	0.9%	9.9%	33.3%	50.5%	5.4%
26	I can select technologies in my classroom that enhance what I teach, how I teach, and what students learn.	0.9%	8.1%	29.7%	49.5%	11.7%
27	I can use strategies that combine content, technologies, and teaching approaches that I learned about in my coursework in my classroom.	0%	10.8%	36.9%	37.8%	14.4%
28	I can provide leadership in helping others coordinate using content, technologies, and teaching approaches at my school and/ or district.	2.7%	12.6%	49.5%	27%	8.1%
29	I can choose technologies that enhance the content of a lesson.	0%	7.2%	26.1%	51.4%	15.3%

The table shows that many remain uncertain, while pre-service teachers feel moderately confident in integrating content, technology, and pedagogy (TPACK). A majority (50.5%) agreed that they could teach lessons that appropriately combine English, technology, and teaching approaches, yet 33.3% were neutral, suggesting uncertainty in effectively blending these components in practice. Similarly, 49.5% agreed they could select technologies that enhance teaching and learning, but 29.7% remained neutral, highlighting hesitation in making instructional decisions. Regarding applying TPACK strategies from coursework, 37.8% agreed, while 36.9% were neutral, indicating that many pre-service teachers struggle to implement what they have learned in practical teaching settings. Leadership in coordinating technology use among peers received the lowest agreement (27% agreed, while 49.5% were neutral), demonstrating that pre-service teachers lack confidence in guiding others in technology integration.

The findings highlight that while pre-service teachers grasp the theoretical aspects of TPACK, they struggle with its practical application in the classroom. This gap stems from limited hands-on experience in teacher education programs, where exposure to digital tools,

lesson planning, and microteaching remains insufficient (Koehler & Mishra, 2016; Olofson et al., 2016). Without structured opportunities to practice integrating technology with pedagogy and content, many pre-service teachers lack confidence in applying TPACK effectively (Valtonen et al., 2022). Beyond individual proficiency, leadership in technology integration is another weakness, as pre-service teachers do not yet see themselves as capable of mentoring peers or guiding technology use in instructional settings. Research emphasizes that collaborative learning, peer mentoring, and reflective practice are essential for strengthening TPACK competence (McDougall & Phillips, 2024). Providing interactive training sessions, technology-based teaching simulations, and group projects in teacher preparation programs could help pre-service teachers move beyond theoretical knowledge and develop practical skills for actual classroom implementation.

CONCLUSION

This study aimed to examine pre-service teachers' self-perceived competencies in TPACK, focusing on their content knowledge (CK), technological knowledge (TK), and ability to integrate technology into pedagogy (TPK). It sought to identify strengths and challenges in their pedagogical adaptability (PK), instructional decision-making, and leadership in technology integration. The study highlights pre-service teachers' confidence in their content knowledge (CK) and basic technological skills (TK) but identifies challenges in integrating technology into pedagogical practice (TPK). While they acknowledge the role of technology in teaching, many struggle to select and apply appropriate digital tools in classroom instruction. Additionally, difficulties in adapting teaching strategies and assessing student understanding in varied ways suggest a need for more support in pedagogical knowledge (PK). Another key finding is the limited leadership in TPACK, as pre-service teachers do not see themselves as capable of supporting peers in technology integration. This suggests that while they may be comfortable using technology individually, collaborative and instructional leadership in digital learning environments remains an area for improvement. Furthermore, the teacher education programs could benefit from more hands-on training in technology-supported pedagogy, differentiated instruction, and classroom assessment methods. Providing structured practice, peer collaboration, and guided mentorship may help pre-service teachers develop more confidence in applying TPACK effectively in real teaching contexts.

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