EFL Teachers' Technological Pedagogical Content Knowledge (TPACK) Competence in Indonesian Madrasahs: A Post-Pandemic Analysis

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Abstract

This study explores the Technological Pedagogical Content Knowledge (TPACK) competence of English as a Foreign Language (EFL) teachers in Indonesian *madrasa* during the post-pandemic era. Using a descriptive qualitative design, data were gathered from ten English teachers across five provinces (Banda Aceh, Bengkulu, Salatiga, Palangkaraya and Kendari) through semi-structured interviews, classroom observations and field notes. Data were analyzed thematically through coding, categorization and interpretation aligned with TPACK dimensions. Findings reveal that teachers at the *Madrasah Ibtidaiyah* (MI) and *Madrasah Tsanawiyah* (MT) levels generally exhibit limited integration of technology in teaching, while those at *Madrasah Aliyah* (MA) demonstrate higher TPACK competence. The study underscores the role of institutional support, teacher training and resource availability in shaping teachers' technological readiness. The results provide valuable insights for policy makers and educators seeking to strengthen TPACK-based instruction in Islamic educational settings.

Keywords: *EFL teachers, TPACK, madrasa*

Introduction

The twenty-first century is characterized by an unprecedented acceleration in scientific advancement and pedagogical innovation, demanding a paradigm shift in the way educators conceptualize and deliver instruction (Loeneto et al., 2022). The exponential development of digital technologies has redefined knowledge dissemination, communication, and learning itself. Consequently, the integration of technology into education has evolved from being a pedagogical enhancement to becoming an essential prerequisite for educational relevance and quality (Suprayitno and Wahyudi, 2020). This technological turn has significantly influenced the field of English as a Foreign Language (EFL), where access to authentic materials, interactive learning environments, and intercultural communication opportunities now rely heavily on digital tools. In this new educational landscape, teachers must transcend their traditional roles as subject experts to become facilitators of digital literacy, pedagogical designers, and adaptive practitioners who align their teaching practices with global educational trends (Choi & Chung, 2021; Solikhah, 2023).

In Indonesia, particularly within the *madrasa* (Islamic school) system, the push toward technological integration occurs within a distinctive philosophical and cultural context. Historically, the Islamic intellectual tradition has deeply influenced the pursuit of knowledge, embedding it within the paradigm of *Aqeedah* (faith) as the foundational basis for rational inquiry (*Qa'idah Fikriyah*). This epistemological framework situates science and education within a moral and spiritual dimension, where knowledge serves the higher purpose of benefiting humanity rather than purely serving material or utilitarian aims (Ilmi, 2012; Zuhdi, 2015). Thus, the integration of technology in Islamic educational settings, such as *madrasa,* cannot be viewed as a mere technical adaptation; it represents an ongoing negotiation between religious values, pedagogical ideals, and global modernization. *Madrasa* are tasked with a dual mandate: preserving the moral and spiritual ethos of Islamic

education while simultaneously equipping students with the competencies required to thrive in a globalized, digitally-mediated world (Nahar, 2022).

However, this integration of technology into *madrasa* education has not been seamless. A persistent gap exists between the ideal vision of technologically-empowered teaching and the practical realities faced by educators. Studies consistently reveal that the ability of teachers to implement technology in classroom practice remains uneven, especially in developing nations (Sidi et al., 2023). Within Indonesia, this challenge manifests as a digital divide that is both geographical and institutional. While urban schools, particularly elite private institutions, rapidly adapted to digital teaching models during the COVID-19 pandemic, teachers in rural areas and religious schools often lacked access to adequate technological infrastructure, digital tools, and professional development opportunities (Danu et al., 2023). This disparity has created a systemic imbalance in educational quality and digital literacy across regions and school types.

The COVID-19 pandemic (2020–2022) served as a catalyst for educational transformation, forcing institutions worldwide into Emergency Remote Teaching (ERT). During this period, Indonesian *madrasa,* like other educational institutions, were compelled to adopt online platforms such as Zoom, Google Classroom and WhatsApp to maintain instructional continuity. However, the post-pandemic period (2023–2025) introduces a new and critical analytical context. With the return to face-to-face instruction, teachers are now challenged to sustain and integrate the digital competencies they developed during the pandemic into regular classroom practices. The central question that emerges is whether this crisis-driven exposure to digital tools has translated into long-term Technological Pedagogical Content Knowledge (TPACK) competence among teachers.

TPACK, as conceptualized by Koehler and Mishra (2016), represents the intersection of three essential domains: technology, pedagogy, and content. It reflects a teacher's ability to seamlessly integrate technology into subject-specific teaching in ways that enhance learning outcomes. In EFL education, TPACK competence enables teachers to design interactive, authentic and communicative language learning experiences. Yet, research indicates that many teachers continue to struggle with this integration. For instance, Lie and Tamah (2023) found that Indonesian EFL teachers demonstrated moderate levels of TPACK, with technological knowledge being the weakest component. Teachers reported difficulties in selecting appropriate digital tools, designing online assessments, and fostering student engagement through technology.

Preliminary observations across several *madrasa* in Java, Sumatra and Kalimantan reveal that these challenges are compounded by contextual barriers such as limited training opportunities, insufficient digital infrastructure, and a lack of institutional support. Many teachers, especially those from older generations, express anxiety toward technology use, struggle with basic applications, and often rely on younger colleagues or informal peer learning for assistance. Institutional mechanisms for professional development remain limited, and knowledge-sharing cultures within schools are weak. This aligns with findings from Rahmawati et al. (2023), who observed that while teachers in urban *madrasa* are gradually enhancing their TPACK competence, their rural counterparts continue to face systemic barriers, including inadequate internet access and minimal administrative encouragement for digital innovation.

Another dimension influencing TPACK enactment in *madrasa* lies in institutional culture and leadership. Many Islamic schools emphasize traditional learning modes such as rote memorization, moral instruction, and textual analysis which may inadvertently discourage experimentation with technology-driven pedagogies. However, a growing body of evidence suggests that when technological integration is aligned with Islamic

educational values (emphasizing creativity, collaboration and ethical responsibility), it can enhance both learning engagement and religious understanding (Nahar, 2022). In this sense, technology can act not as a threat to Islamic identity but as a medium for revitalizing Islamic education to meet contemporary needs.

Despite increasing scholarly attention to technology in education, the specific context of Indonesian *madrasa* remains under-researched. Most existing studies focus either on public schools or pre-service teacher education (Irwanto et al., 2022; Liando et al., 2023). Only a limited number examine how in-service EFL teachers in *madrasa* apply TPACK in post-pandemic classroom settings. This represents a critical research gap, as *madrasa* serve a significant portion of Indonesia's student population and play a crucial role in national educational equity. Understanding the dynamics of TPACK implementation across different *madrasa* levels, elementary (MI), junior (MT), and senior (MA), is essential for formulating targeted interventions, teacher training programs, and policy reforms that support digital inclusion.

Accordingly, this study seeks to fill the existing empirical void by investigating the current state of TPACK competence among EFL teachers in Indonesian *madrasa* during the post-pandemic era. It aims to explore how these teachers conceptualize, apply and sustain technology-integrated pedagogy amid the evolving demands of education. Specifically, the study addresses the following research questions:

1. How do EFL teachers in Indonesian *madrasa* implement TPACK in their post-pandemic classroom practices?

2. What barriers hinder English teachers in *madrasa* from integrating technology into their pedagogy?

3. What strategies are being implemented to enhance teachers' TPACK understanding and practice in *madrasa*?

Literature Review

1. The TPACK Framework

To understand teacher competence in the digital age, this study utilizes the Technological Pedagogical Content Knowledge (TPACK) framework introduced by Koehler and Mishra (2016). TPACK is an extension of Shulman's (1986) Pedagogical Content Knowledge (PCK). It argues that effective technology integration requires more than just knowing the subject matter (Content Knowledge—CK) or how to teach (Pedagogical Knowledge—PK), or how to use a computer (Technological Knowledge—TK).

The framework consists of seven components: (1) Content Knowledge (CK): Knowledge about the subject matter (e.g., English grammar, vocabulary);; (2) Pedagogical Knowledge (PK): Knowledge about the processes and practices of teaching; (3) Technological Knowledge (TK): Knowledge about standard and advanced technologies; (4) Pedagogical Content Knowledge (PCK): Knowledge of teaching strategies specific to the content area; (5) Technological Content Knowledge (TCK): Understanding how technology can create new representations for specific content; (5) Technological Pedagogical Knowledge (TPK): Understanding how various technologies can be used in teaching and understanding that using technology may change the way teachers teach; and (6) TPACK: The synthesis of all three, representing the knowledge required to integrate technology into teaching in complex, context-specific ways (Koehler et al., 2013).
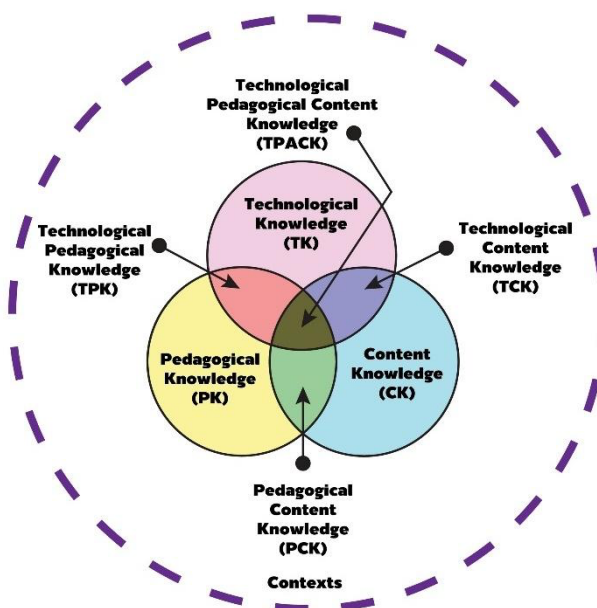
Figure 1. *TPACK Framework*

In this study, TPACK is not viewed as a static set of skills, but as a 'dynamic interplay' necessary for teachers to navigate the complex environment of a *madrasa* classroom.

2. TPACK in EFL Contexts'

In English as a Foreign Language (EFL) instruction, TPACK takes on specific characteristics. It involves using technology to facilitate language acquisition, often referred to as Computer-Assisted Language Learning (CALL). A teacher with high TPACK does not just use PowerPoint to display text (which is merely digitizing a textbook). Instead, they might use digital storytelling tools to enhance speaking skills (TPK), or online corpora to teach lexical collocations (TCK) (Tseng et al., 2022). Research by Ma et al. (2024) suggests that EFL teachers often possess high technological proficiency in their personal lives (using social media, smartphones) but

struggle to transfer this into pedagogical practice. This disconnect is often due to a lack of TPK, knowing how to use the tool to support learning objectives rather than just using the tool for its own sake.

3. The Post-Pandemic Educational Context

The COVID-19 pandemic served as a catalyst for digital adoption, but the nature of this adoption is contested. Sidi et al. (2023) note that the pandemic experience varied wildly. For some, it was a period of rapid upskilling; for others, particularly in resource-poor environments, it was a period of learning loss and frustration. In the post-pandemic era, the expectation is that teachers will blend the digital skills acquired during lockdowns with face-to-face instruction. However, recent studies (Petko et al., 2025) warn that without sustained infrastructure and support, teachers in rural or disadvantaged areas are likely to revert to pre-pandemic, teacher-centered methods once the 'emergency' is over. This study investigates this phenomenon within the specific context of Indonesian *madrasa*.

Method

This study employed descriptive qualitative design to explore the Technological Pedagogical Content Knowledge (TPACK) competence of English teachers within the Indonesian *madrasa* context. A qualitative approach was deemed most appropriate because it seeks to uncover meaning, process, and lived experience rather than to quantify variables or measure frequencies (Freeman, 1998; Lim, 2024). Since TPACK represents an internal cognitive and pedagogical construct that manifests through teachers' external classroom behaviors, a qualitative methodology enables the researcher to capture the subtle dynamics of practice, contextual challenges, and personal perceptions that may otherwise be obscured by standardized survey instruments (Moleong,

2005). Through this approach, the study aimed to obtain a comprehensive understanding of how EFL teachers interpret, adapt and enact technology integration in their everyday teaching.

The participants comprised ten English teachers, coded T1 through T10, representing three educational levels within the Islamic school system: *Madrasa Ibtidaiyah* (MI/elementary), *Madrasa Tsanawiyah* (MT/junior high), and *Madrasa Aliyah* (MA/senior high). They were selected purposively using a maximum variation sampling strategy to ensure a rich diversity of teaching experience, regional background, and institutional characteristics. The participants were drawn from five regions across the Indonesian archipelago such as Banda Aceh, Bengkulu, Salatiga, Palangkaraya and Kendari.

The choice of these particular sites was informed by two key considerations. First, the selection aimed to mitigate the well-documented 'Java-centric bias' in Indonesian educational research, which often concentrates on schools located in Java due to greater resource availability and easier access. By incorporating schools from Sumatra (Banda Aceh, Bengkulu), Java (Salatiga), Kalimantan (Palangkaraya) and Sulawesi (Kendari), the study provides a more balanced and holistic portrayal of technology integration across the nation. Second, the inclusion of geographically diverse sites enabled the examination of infrastructural disparities such as internet connectivity, electricity stability and access to digital facilities that may directly influence teachers' ability to implement TPACK in practice. Table 1 summarizes the demographic and professional characteristics of the participants, including their school level, region, years of teaching experience and gender.

Table 1. *Participant Demographics*

Teacher Code	School Level	Location	Teaching Experience	Gender
T1	Elementary	Banda Aceh	> 15 Years	F
T2	Senior High	Salatiga	5–10 Years	M
T3	Junior High	Bengkulu	> 20 Years	F
T4	Elementary	Palangkaraya	10–15 Years	F
T5	Senior High	Kendari	< 5 Years	F
T6	Senior High	Banda Aceh	5–10 Years	M
T7	Junior High	Salatiga	> 15 Years	F
T8	Junior High	Bengkulu	10–15 Years	M
T9	Elementary	Kendari	> 20 Years	F
T10	Senior High	Palangkaraya	5–10 Years	M

To ensure comprehensive data collection and strengthen validity through triangulation, three complementary instruments were employed: semi-structured interviews, classroom observations, and field notes.

1. Semi structured interviews

The semi-structured interview protocol was developed based on the seven domains of the TPACK framework and further adapted to reflect the specific context of *madrasa* education. Guiding questions explored teachers' technological proficiency, pedagogical integration and contextual constraints. For example, to assess Technological Knowledge (TK), participants were asked about their familiarity with digital platforms such as Zoom, Canva or Learning Management Systems (LMS). To

investigate Technological Pedagogical Knowledge (TPK), teachers were prompted to describe how these tools were used to facilitate complex English language concepts. Finally, questions relating to Contextual Knowledge (CK) sought to uncover the infrastructural, policy-based or cultural barriers that shaped their use of educational technology.

2. Classroom observations

Classroom observations were conducted to corroborate and enrich the self-reported data. The observation rubric was structured around key indicators of technology integration, including media utilization, interaction patterns and functional purpose. Observers noted whether teachers predominantly relied on traditional resources such as textbooks or incorporated digital media like presentation slides, videos and interactive applications. Interaction patterns were analyzed to determine the extent of student engagement during technology-mediated instruction. Furthermore, the functional dimension was assessed to identify whether digital tools were used for substantive pedagogical purposes (indicating high TPACK competence) or merely for administrative or decorative functions (indicating low TPACK competence).

Table 2. *Classroom Observations Checklist*

Indicator	Observation Focus	Rating Scale
Media Utilization	• Use of printed materials (textbooks, worksheets)	1 = None
	• Use of presentation slides (PowerPoint, Canva, etc.)	2 = Minimal
		3 = Moderate
	• Use of audiovisual aids (videos, songs, animations)	4 = High

	• Use of interactive applications or online platforms (LMS, Kahoot, Quizizz, etc.) • Blended use of traditional and digital media	
Interaction Patterns	• Teacher-centered (lecture-based) • Question-and-answer interaction • Collaborative group activities via digital tools • Student-led presentations or discussions • Feedback or assessment through digital platforms	1 = Passive 2 = Limited 3 = Active 4 = Highly Interactive
Functional Purpose	• Technology used primarily for administrative tasks (attendance, grades, etc.) • Technology used for lesson delivery only (presentation, explanation). • Technology used for active learning or practice (interactive quizzes, virtual tasks). • Technology used for higher-order learning (collaboration, creativity, critical thinking).	1 = Low 2 = Basic Instructional 3 = Applied Pedagogical 4 = Transformative Pedagogical
Teacher Confidence and Competence	• Hesitant or dependent on technical assistance. • Basic operation with limited adaptability.	1 = Low 2 = Moderate 3 = Good

	• Confident integration with minor issues.	4 = Excellent
	• Seamless and creative use of multiple tools.	
Student Engagement	• Off-task or disengaged	
	• Occasionally attentive	1 = Low
		2 = Fair
	• Consistently attentive and responsive	3 = Good
	• Highly engaged, initiating interaction	4 = High

3. Field notes

Field notes complemented these two instruments by capturing contextual and reflective information during data collection. Descriptive notes recorded tangible classroom conditions, such as the availability of projectors, internet stability and seating arrangements, whereas reflective notes documented the researcher's interpretations of teacher confidence, classroom atmosphere and the interplay between technological tools and pedagogical choices. These notes were instrumental in contextualizing observed behaviors and providing insights that extended beyond structured interview responses.

Data analysis followed the interactive model proposed by Miles, Huberman and Saldaña (2014), which emphasizes the iterative and cyclical nature of qualitative inquiry. The process involved three main steps that occurred simultaneously and continuously throughout the study:

- **Step 1: Data Condensation**

  The researcher reviewed and organized the raw data from interviews, classroom observations and field notes. Irrelevant information was removed, and key statements were coded to identify emerging themes related to teachers' TPACK practices and challenges.

- **Step 2: Data Display**

  The condensed data were arranged into tables, charts and thematic matrices to visualize relationships and patterns. This helped in comparing teachers' technological integration across different *madrasa* levels (MI, MT and MA) and regions.

- **Step 3: Conclusion Drawing and Verification**

  The researcher interpreted the displayed data to draw conclusions about TPACK implementation. Findings were verified through triangulation by cross-checking information from interviews, observations and field notes to ensure consistency and credibility.

Results

This section focuses on presenting teachers' experiences in utilizing reflective practices in their teaching, specifically to reflect on the use of technology within the TPACK framework. The findings are organized based on three focuses: implementation, obstacles, and efforts.

1. **The Implementation of TPACK by English Teachers at *Madrasa* in Indonesia**

   English instructors in *madrasa* possess a fundamental understanding of technology, however they infrequently implement it in

the classroom's teaching and learning processes. The results of interviews with T1, T3, T4, T7, T8 and T9 said that:

> *Our comprehension of technology utilization in the classroom is minimal; we primarily employ it for administering questions or providing exercises through cellphones during online sessions. Meanwhile, we lack comprehension regarding the utilization of computer or laptop media in the classroom teaching and learning process.*

On the other hand, T2, T5, T6 and T8 stated different perspectives:

> *The integration of technology in the educational process facilitates our role as educators, enhancing material delivery and engaging students' interest in learning.*

The observational results indicate that T1, T3, T4, T7, T8 and T9 lack understanding of how to use technology in the teaching and learning process, whereas T2, T5, T6 and T8 demonstrate an understanding of its use. These findings are corroborated by field notes indicating that T1, T3, T4, T7, T8 and T9 relied solely on textbooks, while T2, T5, T6, and T8 incorporated various technological platforms into their classroom instruction. s

Media is an essential supporting element in the teaching and learning process. At the MI and MT levels, English teachers predominantly rely on school textbooks as their primary media. In contrast, the utilization of technology is observed only among T2, T5, T6 and T8, most of whom are English educators at the MA level. This is derived from interviews with English teachers at the MI and MT levels, who indicated that:

We primarily utilize school textbooks to instruct English content in class. We need students to download an electronic dictionary for each English topic to assist with challenging terminology. The material I utilize is exclusively derived from textbooks. Daily inquiries or assignments derived from textbooks.

The interviews conducted by researchers with English teachers who teach at the MA level are as follows:

In addition to using school textbooks, we sometimes also create materials using Microsoft PowerPoint, Canva or also use several platforms on the internet such as Google Classroom to deliver materials or give assignments to our students.

The interview findings indicate that most EFL teachers at the MI and MT levels have not utilized technology in their instruction, such as laptops, computers, gadgets, or other media. In contrast, EFL teachers in MA classes demonstrate greater familiarity with the use of technology in their teaching, including laptops, computers, social media and online digital platforms. The observations are elucidated by field notes indicating that T1, T3, T4, T7, T8 and T9 predominantly rely on textbooks for material delivery and assignments, while T2, T5, T6 and T8 have integrated technology and digital devices into the teaching and learning process.

The use of technology in the teaching and learning process can assist teachers in delivering materials more effectively. It not only facilitates instruction but also supports student engagement. However, in this study, many English as a second language (EFL) teachers in *madrasa* have not fully implemented the use of technology, particularly software, in the teaching. Based on interviews with T1, T2, T3, T4, T7 and T8, teachers

expressed their opinions on the use of technology in classroom instruction which states that:

We perceive the utilization of technology as a component of Technological Knowledge. We can still utilize hardware and software on computers; nevertheless, we did not engage in the production of materials employing technology.

Meanwhile, regarding the use of technology for EFL teachers in *madrasa*, T5, T6 and T9 stated that:

The integration of technology in the educational process facilitates the delivery of instructional materials. While not employed in every lesson, we acknowledge that technology significantly enhances our teaching effectiveness and fosters student enthusiasm for learning English.

The observational results were further corroborated by field notes. According to the data, T1, T3, T4, T7, T8 and T9 did not utilize software for English learning, whereas T2, T5, T6 and T10 presented materials utilizing *Infocus* and software on a laptop. Interviews, observations and field notes indicate that, generally, English teachers at the *Madrasa* Aliyah level demonstrate a stronger understanding of technology compared to their counterparts teaching at other levels within *madrasa*. Nonetheless, it can be asserted that English teachers at *madrasa* are not yet able to consistently integrate technology into the teaching and learning process.

The following table summarizes these findings across teacher groups and educational levels:

Table 3. *Implementation of TPACK*

Teacher Code	*Madrasa* Level	Technology use	Example	Teaching Focus	Observation Notes
T1, T3, T4, T7, T9	MI/MT	Limited	Occasionally cellphone use	Textbook-based	Relied heavily on textbooks
T2, T5, T6, T8	MA	Moderate to High	PowerPoint, Canva, Google Classroom	Interactive and media-supported	Used digital tools for assignments and presentations
—	Overall Pattern	Partial integration	—	Varies by level	Higher use at MA level

These results indicate that while *madrasa* English teachers recognize the importance of technology, its classroom application remains uneven. Most EFL teachers at the MI and MT levels still rely heavily on textbooks, occasionally supplementing lessons with simple digital aids like electronic dictionaries. In contrast, MA-level teachers have begun integrating multimedia tools and online platforms to support student learning. Nevertheless, even among these teachers, technology use tends to be limited to presentation or assignment delivery rather than deeper pedagogical integration.

Overall, findings from interviews, observations and field notes suggest that although teachers demonstrate awareness of the TPACK framework, they have yet to fully apply it in their instructional practices. Continuous professional development and contextualized support are essential to strengthen teachers' technological, pedagogical and content integration in *madrasa* English classrooms.

2. Obstacles to the Implementation of TPACK in *Madrasa* English Classes

Constraints are impediments encountered by English teachers in *madrasa* when employing educational technology in the classroom, resulting in suboptimal learning implementation. Most English teachers in *madrasa*, particularly those at the elementary and junior high school levels, do not utilize technology in the teaching and learning process due to a perceived lack of necessity to comprehend its application. Furthermore, field notes show that T1, T3, T4, T7, T8 and T9 believe their students do not yet require technology-based tools for learning.

Data drawn from interviews, observations, and field notes indicate that English teachers at the MI and MT levels encounter many obstacles to implementing technology in the classroom. These challenges include insufficient teacher comprehension of technology integration, limited school facilities for media-focused learning, the advanced age of educators, and low students' motivation to learn English. As a result, many teachers continue to rely heavily on school textbooks for explaining and delivering educational content. This is substantiated by interviews with several English educators, particularly T1, T3, T4, T7, T8 and T9, as reflected in the following statement:

> *The use of technology in the teaching and learning process makes it easier for teachers to deliver materials, but we still do not understand that its use will experience difficulties.*

While *madrasa* EFL teachers have different opinions regarding the difficulties in implementing TPACK in their classes, in this case T2, T5, T6 and T8, stated that:

We understand the use of technology in teaching, although not deep, but we regularly use some technology platforms to support the teaching and learning process as a necessity in working as educators. However, sometimes we are also still less responsive at the speed of improving teaching technology, which often changes.

In addition to the interview results, classroom observation also revealed that T1, T3, T4, T7, T8 and T9 who mostly teach English at the MI and MT levels face greater obstacles in implementing technology in their teaching practices. In contrast, T2, T5, T6 and T8, most of whom teach English at the MA level, and one teacher at the MI level, reported fewer difficulties in implementing technology into the teaching and learning process. Field notes support these findings, showing that EFL teachers at the MI and MT levels rarely apply technology in their classrooms, whereas EFL teachers at the MA level, and a small number at MI and MT levels, have applied technological tools in their English lessons.

The obstacles to teaching English also stem from students' lack of interest in learning English, and their limited concentration, as many students are still easily distracted and prefer to play. However, teachers such as T2, T5, T6 and T8 have been relatively successful in overcoming these obstacles by implementing technology and adopting engaging teaching methods. On one hand, based on the results of interviews conducted with English teachers:

The obstacles we experience in teaching are more about the students' interests. The lack of interest of students in learning English makes teachers have to actively equate learning, even though the curriculum requires students to be more active, but students still have to be given an understanding of the material from the teacher as a whole.

Meanwhile, in this case, based on interviews with EFL teachers T1, T3, T4, T7, T8 and T9, it was stated that:

Students in madrasa are often less interested in learning English in class, so teachers have to use extra effort in teaching, so that sometimes we are less able to carry out teaching using technological devices because we do not have much time in class.

Sometimes in utilizing technology, teachers experience obstacles in its application or use. There are several factors of difficulty experienced by EFL teachers in *madrasa* in utilizing technology in the classroom, such as age factors, lack of facilities in schools, and the rapid development of technology so that teachers need to learn how to utilize it. Based on interviews conducted with T1, T4, T7, T8 and T9, who stated that:

The obstacles we experience are quite significant in the use of technology, because we do not understand the concept of the TPACK framework and understand only a few aspects of TPACK. Moreover, related to our age factor, we already find it difficult to learn technology and it is quite time consuming, so we often only provide material from school textbooks and in accordance with the lesson plan and syllabus.

However, the results of interviews with EFL teachers T2, T3, T5, T6 and T8 provide different experiences. They stated that:

For now, we feel that we still have to learn more about the use of technology, because the rapid development of digital media

requires us to be literate in using technology and also madrasa facilities that are often less supportive, but in terms of understanding we try to always update and upgrade ourselves personally.

The interview statements were corroborated by the field notes. T1, T4, T7, T8 and T9 did not utilize technology in the English teaching and learning process, whereas T2, T5 and T6 incorporated technology only twice. In contrast, T3 and T8 consistently integrated technology into nearly every English class session.

The integration of technology in the educational process supports teachers in delivering or aligning instructional materials more effectively. It not only facilitates lesson delivery and explanation but also increase students' engagement and enthusiasm for learning English through technological applications. Nevertheless, many teachers still lack sufficient understanding of technological development and usage, which limits their ability to effectively implement it in the classroom. In relation to this, interviews conducted with all EFL teachers (T1 to T10) revealed the following:

We believe that the integration of technology in the educational process is really beneficial. Teachers proficient in technology will undoubtedly find it easier to do their duties. Nonetheless, we believe it is essential to implement rigorous and continuous training on the application and utilization of learning technology for EFL teachers in madrasa. Many EFL teachers in madrasa still lack comprehension regarding its application and utilization in the teaching and learning process.

Based on these findings, the main obstacles encountered by English teachers in *madrasa* can be grouped into several categories, as shown in Table 4.

Table 4: *Obstacles to the Implementation of TPACK*

Category	Description	Representative Teacher Statement	Affected Level
Limited digital literacy	Teachers lack TPACK understanding	'We do not understand the concept of TPACK; we only use textbooks.' (T1, T4, T7)	MI/MT
Infrastructure constraints	Insufficient facilities (e.g., projectors, internet)	'*Madrasa* facilities are often not supportive.' (T5, T6)	All levels
Age-related challenges	Difficulty adapting to technology	'It is quite time-consuming to learn new media.' (T8, T9)	MI/MT
Low student motivation	Students uninterested in English	'Students are less interested in learning English.' (T3, T4)	MI/MT
Rapid tech changes	Difficulty keeping up with updates	'We must constantly update our skills.' (T2, T5)	MA

As presented in Table 4, these obstacles illustrate that while some teachers at the MA level have begun adopting technological tools, the overall implementation of TPACK remains limited across *madrasa* due to human, infrastructural and pedagogical constraints.

3. Efforts to Implement TPACK in *Madrasa* English Classes

Efforts are a way to overcome problems or obstacles faced by teachers. Based on the results of interviews, observation and field notes, English teachers described various efforts made in developing learning technology in *madrasa* targeted in this study. These efforts include: a) Understanding the pedagogical assumptions underlying the use of technology in learning, for example educational relevance, social impact, suitability to the classroom environment, cooperative learning, and peer interaction; b) Understanding learning technology and its potential to improve student learning outcomes; c) Increasing awareness of various adaptive applications and technologies to support student learning; d) Effective use of learning technology applications to support further learning; e) Improved skills in designing a series of Technology-based assessment tasks in learning that use clear assessment criteria related to lesson planning; f) Understanding the requirements that teachers and students use electronic information appropriately; g) Understanding the ability to use software to compose texts, create presentations, and provide digital audio and visual series for classroom learning; and h) Understanding of self-evaluation of English based on technology in learning and software for educational purposes.

In line with these efforts, English teachers in *Madrasah* Ibtidaiyyah and *Madrasah Tsanawiyah* also noted other challenges in developing learning technology, particularly the limited availability of educational technology media in the form of facilities and infrastructure, such as computers, projectors *(Infocus)* and supporting software. Due to these constraints, teachers at the MI and MT levels often conduct learning without using educational technology media, relying instead on simpler tools such as learning modules.

Based on the results of interviews, observations and field notes, it is important to explain that efforts to improve understanding of TPACK should not place responsibility solely on teachers. This issue is also closely

related to the institutional policies of the *madrasa*, which must be aligned with their vision, mission and strategic objectives to develop teachers' professional potential, including that of English teachers.

Furthermore, findings from other *madrasa* that prioritize improving their English teachers' TPACK abilities show that several initiatives have been implemented to stimulate and support teacher development. These include: (1) Internal school development programs are organized regularly by school administrators and supervisors to enhance teacher professionalism; (2) Active involvement of teachers in school activities, particularly in subject teacher forums (MGMP), to improve educational quality and foster collaboration; (3) Participation in training initiatives and seminars, including workshop and professional development for English teacher, aimed at strengthening teachers' competence in integrating technology into learning.; and (4) Aligning the vision and perception of English teachers regarding the implementation of current education (including awareness of the massive use of digital technology platforms) to continue to improve their competence as teaching professions.

These collective efforts and initiatives are summarized in Table 5, which outlines the various strategies employed to support TPACK implementation in *madrasa* English classes.

Table 5. *Efforts and Initiatives to Support TPACK Implementation*

Type of Effort	Description	Example	Responsible Party
Pedagogical understanding	Aligning technology with educational goals	Cooperative learning, peer interaction	Teacher

Technological literacy	Increasing awareness of apps and software	Microsoft PowerPoint, Canva, LMS	Teacher
Institutional support	Providing regular workshops	School-based training, MGMP forums	*Madrasa*/School
Professional development	Encouraging participation in training	Seminars, professional certification	Teachers + Government
Infrastructure improvement	Enhancing access to digital tools	Computers, projectors, internet	Institution

The efforts reveal a gradual institutionalization of TPACK, where technological knowledge is being extended into pedagogical applications through collaboration and structured development. However, sustainable success depends on simultaneous strengthening of all TPACK dimensions (technological, pedagogical and content knowledge) across all *madrasa* levels.

Discussion

The findings of this study highlight the urgent need for a deeper understanding and more effective application of TPACK components among English teachers in Indonesian *madrasa*. When teachers fail to integrate technology into the teaching and learning process, lessons often become monotonous and overly dependent on textbooks, diminishing students' motivation to learn English. This pattern was clearly observed at

the MI and MT levels, where technology use was minimal and instruction remained largely teacher centered.

These findings confirm earlier research by Suryani et al. (2025) and Rahmawati et al. (2023), who also reported that Indonesian EFL teachers exhibit moderate TPACK competence, being particularly weak in the technological dimension. Both studies noted that many teachers understood the value of technology but struggled to integrate it into pedagogical practice. Similarly, Koehler and Mishra's (2006) theoretical model supports this study's finding that technological knowledge alone is insufficient, teachers must also possess pedagogical and content knowledge that interact dynamically with technology to create meaningful learning experiences.

Furthermore, this study extends the work of Tseng et al. (2022) and Larasati and Widyasari (2021), who emphasized the role of teacher creativity and reflection in using digital media to foster student engagement. The teachers in this study who integrated tools such as PowerPoint, Canva and Google Classroom (mainly at the MA level) demonstrated that technology, when used purposefully, can make language learning more interactive and motivating. However, most teachers used technology only for presentation or administrative purposes, reflecting a surface-level adoption of digital pedagogy. This suggests a need to move from 'technological substitution' toward 'transformative integration', a distinction highlighted in Koehler et al. (2013) and Voogt et al. (2017).

At the same time, the results partly contradict findings from studies conducted in more technologically-advanced or resource-rich contexts. Research from Western and East Asian settings (e.g., Voogt et al., 2017; Nilsson, 2024; Visona and Kurt, 2024) typically reports higher levels of TPACK competence and more consistent integration of digital tools. In contrast, this study reveals persistent barriers in the *madrasa* context such as limited infrastructure, digital literacy gaps, and age-related challenges

which restrict teachers' capacity to apply their knowledge. This divergence supports Petko et al. (2025), who argue that TPACK implementation must be interpreted within specific cultural and institutional settings rather than assumed to be universally achievable.

The finding that teachers often overestimate their digital competence also confirms results from Ma et al. (2024), who observed a similar discrepancy between teachers' self-perception and their actual classroom practice. In this study, teachers reported being familiar with digital platforms but lacked the confidence and consistency to apply them effectively. Such findings suggest that professional development should move beyond one-off workshops toward long-term, practice-based mentoring models, consistent with Darling-Hammond and Bransford's (2007) call for continuous, contextually grounded teacher learning.

Institutionally, this study's findings extend the work of Nahar (2022) by emphasizing that successful technology integration in *madrasa* depends not only on teacher initiative but also on organizational culture and policy alignment. Schools that provided internal training, supported participation in MGMP forums, and encouraged professional collaboration showed greater progress in teachers' TPACK development. However, these efforts remain uneven and often depend on individual motivation rather than systemic support. This is consistent with Kusuma and Widyarsa (2025), who stressed that national initiatives to enhance digital competence must be backed by infrastructure investment and sustained follow-up at the institutional level.

Overall, this study confirms that awareness of technology's potential is growing among *madrasa* EFL teachers but contradicts any assumption that such awareness automatically leads to pedagogical transformation. It extends previous literature by providing empirical insights from post-pandemic *madrasa* and underscores the importance of contextualizing TPACK within religious, cultural and infrastructural realities.

Conclusion

The outcomes of this study underscore the necessity for teachers to comprehend the facets of TPACK in relation to technology utilization. In the contemporary digital age, all teachers, particularly those teaching English, must leverage technology for instructional purposes. Consequently, they should receive enhanced training in technological applications, as technology can supplement traditional teaching with diverse resources, including online media. The findings indicate that effective implementation requires educating instructors on how to integrate technology meaningfully into their teaching practices.

English teachers in *madrasa* can strengthen their understanding of technology utilization by aligning it with pedagogical principles such as educational relevance, social effect, classroom suitability, collaborative learning and peer interaction. Moreover, recognizing the role of technology in improving student learning outcomes is essential. Teachers must also develop familiarity with adaptive applications and technological tools that support students' learning, as well as refine their skills in designing technology-based assessment tasks with clear criteria. Equally important is fostering an awareness of the responsible and ethical use of electronic information among both teachers and learners.

If teachers develop a solid understanding of the TPACK framework and how to use technology effectively, they can move beyond reliance on textbooks and provide more interactive and engaging English language instruction. This approach not only enhances foreign language learning but also motivates students by offering varied and dynamic learning experiences. Therefore, it is recommended that English teachers in *madrasa* optimize the use of available resources, such as computers and projectors, while also leveraging internet connectivity to design and deliver innovative instructional materials.

The findings further emphasize that effective TPACK implementation requires collaborative commitment from all educational stakeholders. For

teachers, this means engaging in ongoing professional learning and reflective practice to improve technological and pedagogical integration in English instruction. For school leaders, it involves providing consistent mentoring, organizing workshops, and supporting peer learning through subject teacher forums (MGMP) that focus on technology-based pedagogy. Policy makers, meanwhile, should prioritize investment in educational technology infrastructure and design inclusive programs to ensure equitable digital access across different *madrasa* levels. Curriculum developers also play a key role in embedding TPACK-oriented approaches into national English education frameworks, thereby promoting student-centered, technology-enriched learning environments. When all these stakeholders collaborate effectively, *madrasa* can move toward a more modern, engaging and equitable model of English language teaching that not only enhances learning outcomes but also prepares both teachers and students to thrive in the digital age.

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