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Integration of TPACK in PAI Learning in the Digital Age: A Literature Review

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Abstract:

This study aims to comprehensively examine the integration of the TPACK (Technological, Pedagogical, and Content Knowledge) framework in learning Islamic Religious Education (PAI) in the digital era through a literature review approach. The focus of the study includes three main aspects: the form of integration of technological, pedagogical, and content elements in Islamic Education learning; supporting and inhibiting factors in its implementation; and the impact of the integration on the learning process and outcomes. The analysis shows that the integration of TPACK in PAI learning is done through the utilization of interactive digital media, online learning platforms, and innovative pedagogical approaches adapted to the religious context through models in each TPACK framework. Supporting factors include teacher competence, adequate infrastructure, and institutional policy support, while barriers include limited ICT training, resistance to technology, and inequality of digital access. TPACK integration has a positive impact on improving learning effectiveness, learner engagement, and the relevance of PAI materials to the needs of the times. This study recommends the need for continuous training and systemic support to strengthen the implementation of TPACK in religious education in the digital era.

Keywords: *Integration, TPACK, PAI Learning*

Abstrak:

Abstrak Penelitian ini bertujuan untuk mengkaji secara komprehensif integrasi kerangka TPACK (Technological, Pedagogical, and Content Knowledge) dalam pembelajaran Pendidikan Agama Islam (PAI) di era digital melalui pendekatan tinjauan literatur. Fokus kajian mencakup tiga aspek utama: bentuk integrasi elemen teknologi, pedagogik, dan konten dalam pembelajaran PAI; faktor-faktor pendukung dan penghambat dalam penerapannya; serta dampak dari integrasi tersebut terhadap proses dan hasil pembelajaran. Hasil analisis menunjukkan bahwa integrasi TPACK dalam pembelajaran PAI dilakukan melalui pemanfaatan media digital interaktif, platform pembelajaran daring, dan pendekatan pedagogis inovatif yang disesuaikan dengan konteks keagamaan melalui model-model pada setiap kerangka TPACK. Faktor pendukung mencakup kompetensi guru, infrastruktur yang memadai, serta dukungan kebijakan institusional, sementara hambatannya meliputi keterbatasan pelatihan TIK, resistensi terhadap teknologi, dan ketimpangan akses digital. Integrasi TPACK memberikan dampak positif terhadap peningkatan efektivitas pembelajaran, keterlibatan peserta didik, serta relevansi materi PAI dengan kebutuhan zaman. Kajian ini merekomendasikan perlunya pelatihan berkelanjutan dan dukungan sistemik guna memperkuat penerapan TPACK dalam pendidikan agama di era digital.

Kata Kunci: *Integrasi, TPACK, Pembelajaran PAI*

INTRODUCTION

The development of digital technology has brought significant changes to various aspects of life, including the world of education. In this digital age, the demand for educators to be able to integrate technology into the learning process has become increasingly high. In the context of Islamic Religious Education (IRE), the integration of technology is not merely an option but a necessity to bridge Islamic content with modern, relevant, and engaging learning approaches for the digital generation of students. One conceptual approach deemed effective in addressing this challenge is the Technological Pedagogical Content Knowledge (TPACK) framework, which combines three key elements: content knowledge, pedagogical knowledge, and technological knowledge.(Hanik et al., 2022)

TPACK provides guidance for teachers to not only master the teaching material, but also understand how to deliver the material using appropriate pedagogical methods and optimally utilize technology. In the context of PAI learning, this integration is very important because Islamic material is often considered rigid or traditional. Previous studies have shown various forms of TPACK implementation in PAI instruction, but the results vary depending on teachers' readiness, infrastructure support, and understanding of the TPACK approach itself.(Rizal et al., 2023) Therefore, a systematic literature review is needed to summarize the forms of TPACK integration in PAI learning based on previous research findings.

The success of TPACK integration in PAI learning is also greatly influenced by various supporting and inhibiting factors. Factors such as teacher training, technology availability, school policies, and teacher attitudes and motivation are decisive in its implementation. Several studies show that PAI teachers still face obstacles in optimizing the use of technology due to limited digital competence or lack of technical support.(Widaningsih et al., 2023) Therefore, mapping these factors is important to understand the real conditions in the field and provide appropriate recommendations to improve the quality of TPACK integration.

The impact of TPACK integration on PAI learning is also important to be explained in its entirety. Is the application of this approach capable of improving students' understanding of Islamic values, their involvement in the learning process, and the quality of interaction between teachers and students.(Musdalifa & Dimpudus, 2024) Using the literature review method, this study aims to answer three main questions regarding the integration of technological, pedagogical, and content elements in PAI learning according to previous research results, supporting and inhibiting factors in the application of TPACK integration in PAI learning in the digital era, and the impact of TPACK integration in PAI learning in the digital era. This study is expected to provide theoretical and practical contributions to the professional development of PAI teachers in the digital age.

RESEARCH METHOD

This study uses a Systematic Literature Review (SLR) approach to thoroughly examine the integration of TPACK in PAI learning in the digital age. The first stage of this SLR is to formulate specific and focused research questions. These questions form the basis for the literature search and selection process. Next, a systematic literature search was conducted using academic databases such as Google Scholar, Scopus, and Publish or Perish. The keywords used included TPACK and PAI Learning, with publication years limited to between 2020 and 2025. The literature obtained was then filtered based on inclusion and exclusion criteria, where inclusion included relevant scientific articles that had undergone peer review, while exclusion included non-scientific articles, low-quality research, and studies that did not directly address the research topic.

Studies that met the criteria were then assessed for quality using the Critical Appraisal Skills Programme (CASP) guidelines, focusing on validity, reliability, and relevance. The aim was to ensure that only studies with high methodological quality were analyzed further. After the quality assessment, data extraction was performed from each selected study, including information such as research methods, results, and conclusions. The collected data was then analyzed thematically to identify patterns, trends, and gaps in the existing literature. This process enabled the drawing of more objective conclusions regarding the integration of TPACK in PAI education.

RESULTS AND DISCUSSION

Tabel 1: Results of literature review

No	Journal Link	Author and Title	Results
1.	https://ejournal.unida.gontor.ac.id/index.php/shibghoh/article/view/11013	Dzaki, dkk: Pendekatan TPACK dalam Pembelajaran Pendidikan Agama Islam	The effective use of technology is a challenge because technology adds new variables to planning and teaching teachers' tasks
2.	https://jurnal.unipa.ac.id/index.php/jri/article/view/429/344	Arifuddin, dkk (2025): Integrating technological pedagogical content knowledge in Learning: A systematic review	Research trends related to TPACK from 2019 to 2023 show has several components such as self-efficacy, a comprehensive understanding of the TPACK dimensions, the ability to analyze challenges and obstacles in the use of technology in learning, the ability to collaborate in the digital age, and the ability to ability to build a positive paradigm in the

			integration of technology into the learning process
3	https://jurnal.iicet.org/index.php/j-edu/article/view/3203/1629	Maharani, dkk: 2023. Analisis kemampuan guru pendidikan agama Islam (PAI) dalam mengimplementasikan technological pedagogical and content knowledge (TPACK) di sekolah dasar	TPACK abilities in the areas of Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical Content and Knowledge (TPACK) are categorized as good.
4	https://prosiding.uiidalwa.ac.id/index.php/ichem/article/view/9	Titin. 2024: Inovasi Model Pembelajaran Pendidikan Agama Islam (PAI) Berbasis Technological Pedagogical and Content Knowledge (TPACK) di Era Society 5.0 dalam Meningkatkan Mutu Pembelajaran Siswa di SMK PGRI 05 Jember	The TPACK-based PAI Learning Model Innovation in the Society 5.0 Era is effective in improving the quality of student learning at SMK PGRI 05 Jember, as it is able to integrate content knowledge, pedagogy, and technology into the learning process.
5	https://lptnunganjuk.com/ojs/index.php/kartika/article/view/42	Mahfida (2024): Teori TPACK Dalam Pengembangan Bahan Ajar Pendidikan Agama Islam (PAI)	The implementation of TPACK (Technological, Pedagogical, and Content Knowledge) in teaching resources and materials can help students better understand abstract concepts, avoid misconceptions, and develop higher-level skills.
6	https://publikasi.abidan.org/index.php/jpt/article/view/949	Robi (2024): Efektivitas Pendekatan TPACK dalam Pembelajaran PAI untuk Meningkatkan Literasi Digital Siswa di SMAN 9 Padang	The TPACK approach is effective in improving students' digital literacy while also enhancing their understanding of PAI material.
7	https://journ	Yogi (2025):	The implementation of TPACK in

	als2.ums.ac.id/index.php/mier/article/view/10079/3268	Implementation of the TPACK Approach in Islamic Religious Education Learning at SMA Negeri Karanganyar	PAI learning at Karanganyar State Senior High School is still in its early stages and needs to be strengthened in terms of planning, implementation, and institutional support.
8	https://www.edusoshum.org/index.php/EDU/article/view/141	Mi'raatul (2025): Implementation of Technology-Enhanced Learning Media Based on Technological Pedagogical and Content Knowledge (TPACK) to Improve Student Engagement in PAI Learning	The implementation of TPACK-based learning media in Islamic Religious Education can increase student activity.
9	https://mail.al-afkar.com/index.php/Afkar_Journal/article/view/1287	Nurlailli (2024): Penerapan Pendekatan Technological Pedagogical and Content Knowledge (TPACK) Berbasis Higher Order Thinking Skills (HOTS) dalam Pembelajaran Pendidikan Agama Islam pada Jenjang Madrasah Aliyah	The application of TPACK in learning enables the use of both non-digital and digital technology devices such as laptops and LCDs, and teachers are able to use PowerPoint, YouTube videos, and Google Classroom to create learning materials.
10	https://jurnal.stikes-ibnusina.ac.id/index.php/IHSANIKA/article/view/2413	Hartati (2025): Penerapan Technological Pedagogical and Content Knowledge (TPACK) Dalam Memenuhi Kebutuhan Guru Penggerak PAI	The implementation of TPACK at SMKS Gotong Royong Telaga in Gorontalo Regency has helped PAI teachers improve their ability to integrate technology into teaching, thereby creating a more interactive and effective learning environment.

Integrating Technology, Pedagogy, and Content in PAI Learning

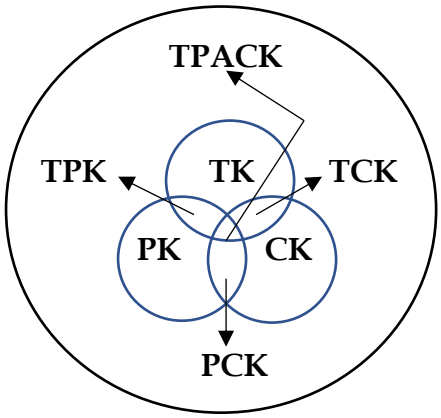

Figure 1. TPACK Figure

Technology Knowledge (TK)

Technology Knowledge covers understanding how to use computer software and hardware, presentation tools such as document and project presenters, and other technologies used in an educational context. Most importantly, TK discusses the ability to adapt and learn new technologies. Existing technologies are dynamic; they will always evolve as times change. Examples: Google Drive, the internet, laptops, LCDs, videos, PowerPoint.(Zamani Dzaki Aflah, 2023)

The integration of technology into learning can be done in a structured manner using various models developed by experts. One of the most well-known models is SAMR (Substitution, Augmentation, Modification, Redefinition) developed by Ruben Puentedura. This model outlines four levels of technology integration, starting from using technology as a replacement for traditional tools (substitution), enhancing task functionality (augmentation), modifying learning design (modification), to creating new learning experiences that were previously impossible without technology (redefinition). This model helps teachers reflect on how transformatively technology is used in the learning process. In addition to SAMR, there is the LoTI (Levels of Technology Implementation) model introduced by Christopher Moersch. This model assesses the extent to which technology is implemented in learning through seven levels, from non-use to refinement (reflective and transformative use). LoTI is highly suitable for evaluating the development of teachers' skills in integrating technology in a gradual and sustainable manner.(Zhang & Tang, 2021)

Meanwhile, the Dwyer model, developed in the Apple Classrooms of Tomorrow (ACOT) program, describes teachers' journey in adapting to technology, starting from the initial stage (entry), limited adoption (adoption), to the innovative stage (invention), where teachers create new technology-based learning approaches. This model shows that technology integration is a gradual process that involves changes in teachers' attitudes, understanding, and skills. Unlike the stage-based model, Raby's model classifies teachers' roles in technology integration into four main functions: as technology users, developers of digital

teaching materials, researchers on the effectiveness of technology in learning, and leaders in the development of educational technology in their school environment or professional community. This model is suitable for use in teacher professional development and learning community coaching.(Brianza et al., 2022)

Another matrix-based model is the Technology Integration Matrix (TIM), which combines five learning characteristics (active, collaborative, constructive, authentic, and goal-oriented) with five levels of technology integration (entry, adoption, adaptation, infusion, and transformation). TIM is very helpful for teachers in designing and assessing the quality of technology integration in the classroom from both a pedagogical and practical perspective. As a complement to planning, the Technology Integration Planning Model (TIP) developed by Roblyer provides a systematic framework for designing technology-based learning. TIP consists of six steps: identifying instructional needs, formulating learning objectives, determining the role of technology, selecting teaching strategies, preparing the learning environment, and evaluating the learning process and outcomes. TIP is highly beneficial for teachers in efficiently and effectively developing technology-based lesson modules or lesson plans.(Nusa et al., 2021)

Pedagogical Knowledge (PK)

Pedagogical Knowledge is the teacher's in-depth knowledge of teaching theories and practices or methods. This includes, among other things, the fundamentals of education as a whole, values, and the ultimate goals to be achieved. This general form of knowledge relates to understanding how students learn, general classroom management skills, lesson planning, and student assessment. It includes knowledge about the techniques or methods used in the classroom, the nature of the target audience, and strategies or evaluations to measure student understanding. Examples include: constructivism, scientific inquiry, discovery learning, problem-based learning, guided inquiry, question-and-answer sessions, discussions, and presentations.(HERMANSAH et al., 2024)

In modern education, various learning models have been developed to create a more active, meaningful, and student-centered learning process. One such model is the Collaborative Learning Model, which emphasizes cooperation among students in completing tasks or solving problems together. This model fosters social skills, communication, and shared responsibility. Additionally, the Problem-Based Learning (PBL) Model guides students to learn through solving real, complex, and open-ended problems. Teachers act as facilitators, while students learn independently and in groups to find solutions, which encourages critical and reflective thinking skills.(Demirtaş & Mumcu, 2021)

In addition, Role Playing Models provide students with the opportunity to explore specific roles, situations, or events through simulation or drama. This model is highly effective in learning related to values, attitudes, or communication skills, as students learn from direct experiences that involve emotions and empathy. Inquiry-Based Learning encourages students to build knowledge through the process of asking questions, investigating, analyzing, and drawing conclusions independently. This approach is ideal for fostering curiosity and scientific thinking skills in students.(Susanti et al., 2022)

In the context of technology integration, the Flipped Classroom is a learning model where students first study the material outside of class through videos, digital modules, or other online sources, then use class time for discussion, question-and-answer sessions, and problem-solving. This model provides flexibility in learning and maximizes direct interaction between teachers and students. Additionally, gamification is a learning approach that uses game elements such as points, levels, challenges, and rewards to enhance student motivation and participation. Gamification not only makes learning more enjoyable but also increases engagement and healthy competition among students.(Aslanyan-rad, 2024a)

Content Knowledge (CK)

Content knowledge is a teacher's knowledge of the subject matter to be studied or taught. The material is outlined in the curriculum. For example, a PAI teacher uses Content Knowledge (CK) in teaching students about the history of Islam. He has a deep understanding of the content and wants to ensure that students gain a comprehensive understanding of the important aspects of the history of Islam.(Ritonga et al., 2023)

In the Merdeka Curriculum, the organization of learning content is divided into two levels, namely macro and micro organization. Macro organization refers to long-term planning that covers all learning materials for one year or one phase (e.g., Phase D for junior high school/MTs grades 7–9). At this stage, teachers refer to Learning Outcomes to determine the scope of the material, the general sequence of delivery, and the overall learning objectives. In PAI subjects, the macro scope includes materials such as creed, worship, morals, the Qur'an and Hadith, and the history of Islamic civilization, which are arranged in a syllabus or learning objective flow as the main guide for one academic year.(Wangdi et al., 2023)

Meanwhile, micro-organization is the arrangement of content for each meeting or learning unit. At this level, teachers organize materials in more detail and operationally, usually in the form of teaching modules. Micro content can be arranged based on various organizational models, such as chronological (based on time sequence), thematic (based on a specific theme), spiral (starting from simple to complex concepts gradually), hierarchical (based on structure from basic to advanced), causal (based on cause-and-effect relationships), or conceptual (based on the interconnection between concepts). In PAI education, these models can be used flexibly according to the characteristics of the material and the needs of the students. For example, the history of the Prophet Muhammad SAW can be organized chronologically, while moral education material can be developed through a thematic or causal approach to show the relationship between attitudes and their consequences in life.(Setyo et al., 2023)

Pedagogical Content Knowledge (PCK)

The concept of pedagogical content knowledge refers to pedagogical knowledge that is appropriate for teaching specific content/subjects. For example, teaching speaking skills requires student-centered activities in which students engage in authentic and meaningful communicative tasks. In this sense, PCK means understanding the unique interaction between content and pedagogy,

rather than simply being a content expert or knowing general pedagogical guidelines.(Zamani Dzaki Aflah, 2023)

Teachers of Islamic Education (PAI) need to continuously develop their Pedagogical Content Knowledge (PCK). There are several important aspects that must be considered in efforts to improve teachers' pedagogical competence, namely Knowledge of Content and Students (KCS), Knowledge of Content and Teaching (KCT), and Knowledge of Curriculum (KC). Pedagogical competence plays a crucial role in the PAI learning process, as it influences students' understanding of Islamic Education concepts. This is closely related to how teachers design and deliver materials, as well as effectively manage the classroom. PCK itself is the integration of in-depth content knowledge with appropriate pedagogical skills, tailored to the learning context.(Mudrikah et al., 2020)

PAI teachers must master pedagogical knowledge that forms the basis of teaching, as part of PAI learning. This knowledge includes learning strategies, classroom management, and classroom evaluation. For example, teachers must have a deep understanding of the pillars of faith, including their definitions, principles, and implications in everyday life. Teachers select appropriate teaching methods, such as lectures, discussions, problem-solving, and real-life examples, to help students better understand concepts.(Yunisari, 2023)

Technological Content Knowledge (TCK)

Technological Content Knowledge is an understanding of how technology and content influence and constrain each other. Teachers must understand which technologies are best suited to teaching subjects in specific domains, as well as how content determines or even changes technology, or vice versa.(Nurhidayati, 2024)

In PAI learning, teachers must determine what type of technology is appropriate for the topic to be taught to students. For example, teaching how to shroud a corpse. This lesson is characterized by the need for students to master practical or psychomotor skills. To simulate the process of shrouding a corpse, the technology used can be digital technology such as videos or conventional technology like dolls and shroud cloth. This technology can facilitate students' practice with the material taught by the teacher.(Aslanyan-rad, 2024b)

Technological Pedagogical Knowledge (TPK)

Technological Pedagogical Knowledge identifies the reciprocal relationship between technology and pedagogy. For example, as a substitute for face-to-face meetings, collaborative writing can be done using Google Docs or Google Hangouts, expanding collaborative activities from a distance. In addition, the introduction of online learning and, more recently, massive open online courses (MOOCs) has required teachers to develop new pedagogical techniques that are compatible with existing technology.(Saputro et al., 2025)

In PAI learning, integrating technological and pedagogical knowledge is also important. PAI teachers can determine and consider the selection of appropriate technology for students if they have the ability to understand student characteristics and the best learning strategies. For example, when a teacher teaches high school students about ethical issues and Islamic behavior. Individual learning patterns can be applied at this level because the teacher's pedagogical

knowledge of the general characteristics of high school students is that they have a high level of independence and are well-organized. Teachers use TPK to facilitate collaboration and discussion among students through secure online platforms or social media. Teachers provide space for students to share their thoughts on ethical issues and Islamic behavior, so they can learn from each other and deepen their understanding. E-learning is one of the technologies that is suitable for these characteristics.(Drajati et al., 2021)

Technological Pedagogical Content Knowledge (TPACK)

TPACK describes the knowledge synthesized from each of the above-mentioned knowledge sets, with an emphasis on how technology can be uniquely tailored to meet pedagogical needs for teaching specific content in a particular context.(Adolph, 2016)

Students will be highly motivated to participate in learning activities if technology-based learning is supported by the teacher's pedagogical skills and mastery of the content. Example: The teacher has a deep understanding of the concepts of ethics and morality in Islam, the teacher identifies relevant technological resources for the lesson material, the teacher integrates religious content with technology, the teacher applies active learning methods, and the teacher uses interactive applications.(Drajati et al., 2021)

Supporting and inhibiting factors in the application of TPACK integration in PAI learning in the digital age

In applying the TPACK model integration in Islamic Religious Education (IRE) learning in the digital era, there are various supporting factors that determine its success. One of the main factors is the availability of technology and digital infrastructure such as computers, projectors, and adequate internet access. In addition, teachers' competence in mastering technology, pedagogy, and religious content is key to creating effective and relevant learning. Support from educational institutions, whether in the form of policies, training, or learning facilities, also plays a significant role in promoting optimal TPACK integration. Students' motivation and enthusiasm toward using technology in the learning process further enhance the effectiveness of this model. The availability of digital learning resources aligned with religious values enriches the learning process and helps students understand the material in a more contextual manner.(Maimanah et al., 2025).

Meanwhile, there are obstacles that can reduce the effectiveness of TPACK implementation. One of them is limited access to technology, especially in remote areas that do not yet have adequate facilities. In addition, many teachers have not received intensive training on the use of technology in learning, so they are not yet able to integrate TPACK optimally. Resistance to change, both from teachers and institutions, is also an obstacle when conventional approaches are still dominant. Time constraints and high administrative burdens often make it difficult for teachers to design innovative learning activities. A curriculum that does not fully support the integration of technology in PAI subjects can also hinder the consistent and sustainable implementation of TPACK-based learning.(Hidayati & Choiriyah, 2024)

The impact of TPACK integration in PAI learning in the digital age

The implementation of the TPACK (Technological Pedagogical Content Knowledge) learning model has proven effective in improving students' understanding of Islamic Religious Education material. Through the integration of technology, pedagogy, and content, students not only gain a deeper understanding of religious teachings but also learn to apply them to their daily lives. Technology is used as an integral part of the learning process through media such as educational videos, digital presentations, and interactive applications, which help students understand the material more deeply and practically. Additionally, the TPACK model encourages students to use technology wisely and responsibly to support the learning process. This indirectly enhances students' digital literacy skills, particularly in accessing, evaluating, and utilizing information from various digital sources in a critical and relevant manner.(Ahaya et al., 2025)

TPACK-based learning contributes to improving students' spiritual and social attitudes. The use of interactive methods such as group discussions and digital presentations makes students more actively involved in the learning process, not only in terms of religiosity but also in building positive social interactions. This active involvement also impacts the improvement of students' learning motivation. More engaging and participatory learning makes students show higher enthusiasm in attending lessons, contributing to discussions, and participating in various group activities. The impact is reflected in the learning evaluation results, which show improvements in terms of understanding, attitude, and student participation throughout the learning process.(Zeng et al., 2022)

CONCLUSION

The integration of the TPACK (Technological, Pedagogical, and Content Knowledge) framework in Islamic Religious Education (IRE) learning in the digital age is a strategic approach that can address the challenges of learning in the 21st century. This integration is evident through the use of interactive digital media, online learning platforms, and the application of innovative pedagogical approaches tailored to Islamic values. Technology is not merely a tool but also a means to create more contextual, engaging, and relevant learning experiences for students in the digital age. The success of TPACK integration is supported by several key factors, including teachers' competencies in managing technology and pedagogy, the availability of adequate digital infrastructure, and policy support from educational institutions. However, this integration process also faces several challenges, including limited training in information and communication technology (ICT) for teachers, resistance to change from conventional methods, and digital access disparities that still exist in some areas. Despite this, overall, the application of TPACK in PAI learning has proven to have a positive impact on learning effectiveness, increase student engagement, and make religious content more relevant to contemporary developments.

To optimize the application of TPACK in PAI learning, several strategic steps are needed. First, teachers need to receive structured continuing education to strengthen their integrated mastery of technology, pedagogy, and Islamic

content. Second, efforts are needed to improve and equalize digital infrastructure, especially in areas that still have limited access to technology, so that there is no gap in the application of digital learning. Third, educational institutions and policymakers must promote policies that support learning innovation, including providing incentives and creative space for teachers developing TPACK-based learning. Fourth, further research is needed to explore the application of TPACK in the broader context of Islamic education, including its effectiveness across different educational levels, student characteristics, and long-term outcomes. With systemic support and a sustainable approach, the integration of TPACK has significant potential to reform Islamic education, making it more adaptive, transformative, and meaningful in the digital age.

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