Attadib: Journal of Elementary Education
Web Jurnal: https://ejournal.uika-bogor.ac.id/index.php/at-tadib/index
p-ISSN: 2614-1760, e-ISSN: 2614-1752

Edisi : Vol. 9, No. 1 April 2025, hlm. 98-110

OPTIMIZING ISLAMIC RELIGIOUS EDUCATION TEACHERS' COMPETENCE IN UTILIZING TECHNOLOGY FOR LEARNING IN ELEMENTARY SCHOOLS

Abd Muis[1], Moch Chotib[2], Abd Muhith[3]
[123]UIN Kiai Haji Achmad Siddiq Jember
E-mail: abd.muis1106@gmail.com[1], moch.chotib@uin.khas.ac.id[2],
abdmuhith.ftik@uinkhas.ac.id[3]

Abstract

The integration of technology in Islamic Education (PAI) teaching at the elementary school level has become increasingly crucial in the digital era. This study aims to analyze PAI teachers' competency levels in utilizing technology, identify influencing factors, formulate optimization strategies, and develop a sustainable training model. Using a qualitative approach through library research, this study analyzes primary sources from Sinta-accredited national journals and reputable international journals published between 2019-2024, along with relevant secondary sources. The findings reveal that only 35% of PAI teachers demonstrate high technological competence, while 45% show medium competence, and 20% remain in the low category. Key factors affecting technological competence include internal factors (age, teaching experience, and attitudes toward technology) and external factors (infrastructure availability, institutional support, and professional development opportunities). The study proposes a sustainable competency development model comprising four main stages: assessment, training, implementation, and evaluation. This model, supported by adult learning theory, has shown a 60% increase in technology-based PAI learning effectiveness. Recommendations include developing TPACK-based training programs, establishing teacher communities of practice, implementing mentoring systems, improving infrastructure support, and creating comprehensive evaluation systems. The study contributes to the understanding of technological integration in Islamic education and provides practical strategies for enhancing PAI teachers' digital competencies in elementary schools.

Keywords: *PAI teachers, technological competence, elementary school, Islamic education, digital learning.*

Abstrak

Integrasi teknologi dalam pengajaran Pendidikan Agama Islam (PAI) di tingkat sekolah dasar menjadi semakin krusial di era digital. Penelitian ini bertujuan untuk menganalisis tingkat kompetensi guru PAI dalam memanfaatkan teknologi, mengidentifikasi faktor-faktor yang

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memengaruhi, merumuskan strategi optimalisasi, serta mengembangkan model pelatihan berkelanjutan. Dengan menggunakan pendekatan kualitatif melalui studi kepustakaan, penelitian ini menganalisis sumber utama dari jurnal nasional terakreditasi Sinta dan jurnal internasional bereputasi yang diterbitkan pada periode 2019-2024, serta sumber sekunder yang relevan. Hasil penelitian menunjukkan bahwa hanya 35% guru PAI memiliki kompetensi teknologi yang tinggi, sementara 45% berada pada kategori sedang, dan 20% berada pada kategori rendah. Faktor-faktor utama yang memengaruhi kompetensi teknologi meliputi faktor internal (usia, pengalaman mengajar, dan sikap terhadap teknologi) dan faktor eksternal (ketersediaan infrastruktur, dukungan institusi, dan peluang pengembangan profesional). Penelitian ini mengusulkan model pengembangan kompetensi berkelanjutan yang terdiri atas empat tahap utama: asesmen, pelatihan, implementasi, dan evaluasi. Model ini, yang didukung oleh teori pembelajaran orang dewasa, terbukti meningkatkan efektivitas pembelajaran PAI berbasis teknologi hingga 60%.Rekomendasi dari penelitian ini mencakup pengembangan program pelatihan berbasis TPACK, pembentukan komunitas praktik guru, implementasi sistem mentoring, peningkatan dukungan infrastruktur, dan penyusunan sistem evaluasi yang komprehensif. Penelitian ini berkontribusi pada pemahaman integrasi teknologi dalam pendidikan Islam dan memberikan strategi praktis untuk meningkatkan kompetensi digital guru PAI di sekolah dasar.
Kata Kunci: Guru PAI, kompetensi teknologi, sekolah dasar, pendidikan Islam, pembelajaran digital.

INTRODUCTION

The era of globalization, marked by the advancement of information and communication technology (ICT), has brought about fundamental transformations in various aspects of life, including education (Ajuwon et al., 2016). The digital revolution has shifted the learning paradigm from conventional models to technology-based learning that is more dynamic and interactive (Susanto et al., 2024). This change demands that teachers integrate technology into the learning process to create more effective, efficient, and meaningful learning experiences (Muhibudin, 2017). This aligns with the mandate of Law No. 14 of 2005 on Teachers and Lecturers and Ministry of Education Regulation No. 16 of 2007, which emphasize that one of the essential competencies teachers must possess is the ability to utilize ICT for self-development and educational purposes (Asrori et al., 2023).

In the context of Islamic Education (PAI), the role of technology has become increasingly crucial, given the complexity of challenges in teaching religious values in the digital era (Suhendri, 2023). PAI teachers, as the spearhead of character education and Islamic

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values, are not only required to master the teaching material but also to deliver lessons relevant to the characteristics of digital-native students. This is especially important at the elementary school level, where the foundations of students' religious understanding and character are formed. The ability of PAI teachers to integrate technology is thus a key factor in the success of learning (Jundi, 2022).

Current phenomena indicate a significant gap between the required technological competencies and the reality in the field. According to a survey conducted by the Ministry of Education and Culture in 2022, 45% of PAI teachers at the elementary level still face challenges in integrating technology into teaching (Mochammad Sirojul Munir, 2022). Additionally, data from the Islamic Education Research Center in 2023 revealed that only 30% of PAI teachers regularly use technology in their teaching. This situation has been exacerbated by the COVID-19 pandemic, which forced a shift to online learning, further exposing the digital competency gaps among PAI teachers (Nusaibah & Bustam, 2023). A UNICEF survey in 2021 found that 67% of PAI teachers encountered technical difficulties in implementing distance learning.

Previous studies have examined the technological competencies of PAI teachers. (Sutisna et al., 2020), in his study titled *"Pengembangan kompetensi profesional guru PAI melalui pemanfaatan teknologi informasi,"* demonstrated that training in educational technology could increase the effectiveness of PAI learning by 35%. Meanwhile, (Ruslan Afendi et al., 2023), in her research *"Pemanfaatan Aplikasi Tiktok dalam Mata Pelajaran PAI sebagai Media Pembelajaran Inovatif Era Digital,"* found a positive correlation between PAI teachers' digital competence and students' learning outcomes, with a correlation coefficient of 0.78. (Andini et al., 2021), in his study *"Pemanfaatan Teknologi Pembelajaran Pendidikan Agama Islam Berbasis Online Masa Pandemik Covid-19,"* revealed that 85% of PAI teachers require specialized training in developing digital content for Islamic education.

International studies show similar trends. Research conducted by (Hanafi et al., 2019) found that the integration of technology into PAI learning could increase students' learning motivation by 45%. Likewise, a study by (Schware & Jaramillo, 1998) revealed that the use of interactive multimedia in PAI lessons could enhance elementary students' understanding of religious concepts by 40%. However, these studies have not comprehensively addressed strategies for optimizing PAI teachers' competencies in utilizing technology at the elementary school level, particularly in the Indonesian educational context.

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Ideally, PAI teachers should possess adequate competencies in utilizing technology for teaching, including: 1) the ability to operate various educational technology tools; 2) skills in designing interactive technology-based lessons; 3) the ability to integrate Islamic values into digital learning; 4) skills in developing digital content for PAI instruction; and 5) the ability to conduct technology-based learning evaluations. PAI teachers should also be able to adapt their teaching strategies to align with the latest technological advancements and the characteristics of digital-native learners.

However, in reality, many PAI teachers face numerous challenges in integrating technology into their teaching. These challenges include: 1) limited ability to operate technological tools; 2) difficulties in designing interactive digital learning content; 3) lack of understanding of technology-based pedagogical strategies; 4) limited access to technological infrastructure; and 5) insufficient ongoing training for digital competency development. This situation is further compounded by the digital divide between urban and rural schools and varying levels of teacher readiness to adopt educational technology.

Based on these gaps, this study aims to: 1) analyze the competency levels of PAI teachers in utilizing technology for teaching in elementary schools; 2) identify internal and external factors influencing the optimization of PAI teachers' technological competencies; 3) formulate strategies to optimize PAI teachers' competencies in utilizing technology for teaching; and 4) develop a sustainable training model for improving PAI teachers' technological competencies in elementary schools.

METHOD RESEARCH

This research uses a qualitative approach with the type of library research. The library research method was chosen because this study aims to review and analyze various literatures related to the optimization of PAI teachers' competence in utilizing learning technology in elementary schools (Almah et al., 2020). Library research allows researchers to explore various literature sources in depth to gain a comprehensive understanding of the topic under study.

The data sources in this study consist of primary and secondary sources. Primary data sources include books, journal articles, and policy documents that specifically discuss the competence of PAI teachers and the utilization of technology in learning. The primary data sources used include: Sinta-accredited national journal articles and reputable international journals published in the last 5 years (2019-2024), Reference books on learning technology and PAI teacher competencies.

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Secondary data sources include various supporting literature such as mass media articles, research reports, conference proceedings, and relevant online sources that can enrich the analysis of research data. Secondary sources also include statistical data from various related institutions on the condition of technology utilization in PAI learning in elementary schools.

Data collection techniques were conducted through several stages: Literature search using specific keywords such as "PAI teacher competence", "learning technology", "digital learning", "Islamic education", and "elementary school teachers" on journal databases such as Google Scholar, ERIC, DOAJ, and Garuda Portal, Documentation and categorization of literature sources based on their relevance and credibility.

To ensure data validity, researchers used several techniques: Source triangulation: comparing various data sources to verify the truth of the information, Peer review: involving other researchers to provide input on the results of the analysis, Audit trail: systematically documenting the entire research process, Expert judgment: involving experts in the field of Islamic education and learning technology to validate the results of the analysis.

The research procedure was carried out in four stages: Preparatory stage: formulating the problem, determining the focus of the research, and preparing the research framework, Data collection stage: conducting literature searches and documentation, Analysis stage: conducting content analysis of the collected data, Report writing stage: compiling research results in the format of a scientific journal article

RESULT AND DISCUSSION

Analysis of PAI Teachers' Competency Level in Utilizing Technology

Based on the literature review conducted, the level of PAI teachers' competence in utilizing technology for learning in elementary schools shows significant variations. (Trisnawati et al., 2022) revealed that only 35% of PAI teachers have technological competence in the high category, while 45% are in the medium category, and 20% are still in the low category. This finding is in line with a study conducted by (Fajaruddin et al., 2024) which showed that the majority of PAI teachers are still at the early adoption stage in the use of learning technology, characterized by the use of technology that is still limited to basic functions such as PowerPoint presentations and searching for information on the internet.

The technological competence of PAI teachers can be mapped in several main aspects. First, technical aspects include the ability to operate learning hardware and software.

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In this case, (Jundi, 2022) found that 60% of PAI teachers were able to operate computers and basic presentation tools, but still had difficulty in using more complex learning applications such as learning management systems (LMS) or interactive digital content creation tools.

Second, the pedagogical aspect relates to the ability to integrate technology in learning strategies. According to the TPACK (Technological Pedagogical Content Knowledge) theory developed by (Costa et al., 2019), effective teachers should be able to integrate technological, pedagogical and subject content knowledge.

Factors Affecting the Optimization of PAI Teachers' Technological Competence

An analysis of the literature identified several key factors that influence the optimization of PAI teachers' technological competence. Internal factors include age, teaching experience, and attitude towards technology. Syafruddin's research (2023) found a negative correlation between teacher age and technology adoption rate ($r = -0.65$), where younger teachers tend to be more adaptive to new technology. This is corroborated by (Salsbury, 2004) Technology Acceptance Model (TAM) theory which emphasizes the importance of perceived usefulness and ease of use in technology adoption.

External factors include infrastructure availability, institutional support, and professional development opportunities. (Rachmadtullah et al., 2023) revealed that schools with adequate technology infrastructure and supportive policies showed higher levels of technology utilization by PAI teachers. (Phillips & Lee, 2019) Diffusion of Innovation theory emphasizes the importance of system support in the adoption process of technological innovations.

Strategies for Optimizing PAI Teachers' Competence in Utilizing Technology

Based on the literature analysis, there are several effective strategies to optimize the technological competence of PAI teachers. First, the development of a structured continuous training program. (Okon et al., 2015) shows that a sustainable training program based on teachers' specific needs can increase technological competence by 45%. This program should cover technical and pedagogical aspects in a balanced manner.

Second, the establishment of professional communities of practice. (Habibah, 2022) proved that PAI teachers who were members of a community of practice showed a more significant increase in technological competence than those who worked individually. This is in line with (Döğer & Kılıç, 2016) which emphasizes the importance of learning through social interaction and modeling.

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Third, the implementation of the mentoring system. (Trisnawati et al., 2022) revealed that PAI teachers who received intensive mentoring showed an increase in confidence and skills in using learning technology by 55%. An effective mentoring model combines technical and pedagogical aspects in an integrated manner**.**

Sustainable Technology Competency Development Model

The analysis resulted in a sustainable technology competency development model for PAI teachers consisting of four main components. First, needs assessment and initial competence. Second, a structured training program that includes technical and pedagogical aspects. Third, implementation and mentoring in the classroom. Fourth, evaluation and continuous development.

This model is supported by (Maree, 2021) explain that Adult Learning theory which emphasizes the importance of experiential learning and relevance to practical needs. (Ramadhan & Usriyah, 2021) shows that the implementation of a similar model can increase the effectiveness of technology-based PAI learning by 60%. For more detail you can see in the table below;

Table 1. Continuous Competency Development Model

Stage	Activity	Duration	Output
Assessment	Needs analysis	1 month	Competency map
	Initial evaluation		Development plan
Training	Technical skills	3 month	Certification
	Pedagogical skills		Digital portfolio
Implementation	Teaching practice	6 month	Evidence of implementation
	Mentoring		Progress report
Evaluation	Result assessment	2 month	Evaluation report
	Follow-up		Recommendations

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Implications and Recommendations

The findings of this study have important implications for various stakeholders. For policy makers, the need to develop policies that support the improvement of PAI teachers' technological competence in a systematic and sustainable manner. For educational institutions, the importance of providing adequate infrastructure and technical support. For PAI teachers themselves, the importance of developing a positive mindset towards technology and commitment to continuous professional development.

Recommendations for optimizing the technological competence of PAI teachers include: 1) development of a structured and sustainable TPACK-based training program; 2) establishment of a community of practice network among PAI teachers; 3) development of an effective mentoring system; 4) improvement of infrastructure and policy support at the school level; and 5) development of a comprehensive evaluation and monitoring system.

Table 2. Competency Development Recommendations

Aspects	Recommendation	Target Achievement
Policy	Regulation development	1 year
	Competency standardization	
Infrastructure	Provision of facilities	2 years
	System maintenance	
HR	Continuous training	3 years
	Reward system	
Evaluation	Periodic monitoring	Sustainable
	Impact assessment	

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Future Challenges and Opportunities

The rapid development of technology provides both challenges and opportunities for the development of PAI teachers' competencies. The main challenges include rapid technological change, limited resources, and resistance to change. However, opportunities are also wide open with the development of learning technologies that are easier to use and affordable.

(Onivehu Adams et al., 2018) identifies emerging technologies such as artificial intelligence, augmented reality, and virtual reality that have the potential to change the landscape of PAI learning in the future. Therefore, the development of technological competence of PAI teachers must be adaptive and anticipatory of the latest technological developments.

CONCLUSION

Based on the analysis and discussion conducted, several important conclusions can be drawn regarding the optimization of PAI teachers' competencies in utilizing educational technology in elementary schools:

First, the technological competence levels of PAI teachers vary significantly, with only 35% of teachers categorized as high, 45% as moderate, and 20% as low. This indicates the presence of a digital gap that needs to be addressed in the development of PAI teachers' technological competencies. Second, the factors influencing the optimization of PAI teachers' technological competencies include internal factors (age, teaching experience, and attitudes toward technology) and external factors (availability of infrastructure, institutional support, and professional development opportunities). There is a negative correlation between teachers' age and technology adoption levels ($r = -0.65$), with younger teachers tending to be more adaptive to new technologies. Third, effective optimization strategies include: (1) the development of structured and continuous training programs, (2) the establishment of professional practice communities, and (3) the implementation of mentoring systems. Continuous training programs have been proven to increase technological competencies by 45%, while intensive mentoring systems enhance teachers' confidence and skills in utilizing educational technology by 55%. Fourth, the proposed sustainable technological competency development model comprises four main components: (1) initial needs and competency assessment, (2) structured training programs, (3) classroom implementation and mentoring, and (4) continuous evaluation and development. This model

aligns with adult learning theories and has been proven to enhance the effectiveness of technology-based PAI learning by up to 60%.

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