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Research Article

Digital Transformation as the Key to Innovative PAI Learning Systems: Facing the Challenges of Modern Education

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Abstract

Digital transformation plays a crucial role in developing innovative learning systems to address modern educational challenges, particularly in Islamic Religious Education (PAI). This study analyzes how digital transformation supports innovative learning through a review of relevant scientific literature. The findings highlight digital literacy as an essential component that expands access to learning resources and enhances students' digital interaction and collaboration. In PAI, digital transformation encourages the adoption of e-learning, blended learning, and Artificial Intelligence (AI) to improve learning flexibility and student engagement. Digital platforms also support comprehensive assessment by evaluating learning processes, competencies, and students' application of digital knowledge and skills. However, several challenges remain, including unequal access to technology, differences in digital literacy, and limited teacher competencies in integrating technology into learning. These barriers may hinder the effective implementation of innovative educational systems. Therefore, strengthening digital competencies among educators and students is necessary to ensure meaningful technology integration. Collaboration among the government, schools, teachers, and communities is also essential to establish an effective, accessible, and inclusive learning environment. This study emphasizes that successful digital transformation requires more than technological adoption. It demands coordinated efforts to improve digital literacy, enhance teaching practices, develop appropriate assessment methods, and address inequalities in technology access. By addressing these challenges, digital transformation can support more flexible, interactive, and inclusive learning experiences in Islamic Religious Education while improving students' readiness to meet the demands of modern education.

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INTRODUCTION

The global education world is currently undergoing a fundamental paradigm shift, where digitization is no longer just an option, but an urgent need to maintain the relevance of the curriculum in the modern era. This phenomenon creates an urgency for Islamic Religious Education (IRE) to undergo a comprehensive digital transformation in order to build an innovative learning system for Generation Z, who are growing up in the Industry 4.0 ecosystem. As emphasized in the literature on digital learning environments, the integration of technology can significantly improve the effectiveness and efficiency of

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instructional activities . This transformation offers exponential opportunities for PAI to present more lively material; for example, through the use of Augmented Reality to visualize Islamic history or interactive worship procedures, which have been proven to increase student motivation and conceptual understanding. Additionally, the emergence of adaptive learning platforms and Artificial Intelligence technology enables personalized learning where religious material can be tailored to each individual's learning pace and unique needs (Isaeva et al., 2025). AI provides opportunities for PAI teachers in terms of more precise planning, instant feedback, and automatic assessment such as objective automated essay scoring (Celik et al., 2022). The use of audio- based media such as podcasting has also become a crucial instrument in modern PAI teaching, due to its flexible nature and its ability to hone literacy and critical thinking skills through logical and coherent storytelling techniques (Besser et al., 2022). By adopting these various technologies, PAI not only survives amid modernization but also transforms into a dynamic pillar of character education, capable of bridging traditional spiritual values with today's technological realities.

Empirical evidence shows that the implementation of digital transformation in PAI faces complex structural and pedagogical obstacles. PAI teachers often experience first- order obstacles in the form of limited time to design digital materials, lack of technical infrastructure support, and technological access inequality in various regions (Tawfik et al., 2021). Schools with limited resources do not have adequate equipment or stable internet networks, so the digitization process does not run optimally. Teachers also face second-order obstacles related to psychological and pedagogical dimensions, including changes in teacher-student interaction patterns in virtual spaces and challenges in maintaining students' socio-emotional engagement in screen-based learning. The lack of readiness in managing digital platforms reduces the effectiveness of learning and widens the digital competency gap among educators (Isaeva et al., 2025). The implementation of technology that is not integrated with curriculum design causes the use of digital devices to be administrative rather than pedagogical. PAI requires a strategy that systematically connects the curriculum, technology, and professional development of teachers so that digital transformation does not stop at the adoption of devices. Approaches such as technology-based Project-Based Learning can help students analyze real-world issues, including environmental and sustainability issues, through the perspective of Islamic values (Djirong et al., 2024). The integration of this approach requires pedagogical readiness and consistent institutional support.

Previous studies provide empirical evidence on the benefits of integrating technology into learning. Studies on digital learning environments show an increase in instructional effectiveness through the planned use of technology (Khairunnisa & Aziz, 2021a). Research on Artificial Intelligence confirms that adaptive systems support personalized learning and improve assessment accuracy (Isaeva et al., 2025). Studies on podcasting in education show an increase in literacy and critical thinking skills through a structured narrative approach (Besser et al., 2022). Research on technology-based Project- Based Learning confirms the relevance of this method in connecting religious values with contemporary issues (Djirong et al., 2024). Another study identifies digital implementation barriers, including infrastructure factors and psychopedagogical aspects, as key determinants of success (Tawfik et al., 2021a). Although these studies discuss the benefits and constraints partially, studies that integrate the potential of technology, map first- and second-order barriers, and formulate PAI digital transformation strategies within a single operational conceptual framework are still limited. This gap indicates the need for a comprehensive analysis that systematically links the dimensions of technology, pedagogy, and the normative characteristics of PAI.

This study focuses its analysis on the formulation of a PAI digital transformation strategy based on curriculum integration, technological innovation, and strengthening teacher competencies. This study aims to identify relevant technology implementation models in PAI learning, map institutional and psychopedagogical barriers that affect effectiveness, and develop an applicable and contextual strategic framework. This analysis places teachers as key actors in the transformation process by emphasizing the importance of digital literacy, pedagogical competence, and reflective abilities in the use of technology. This study also examines how technology integration can maintain the spiritual and ethical dimensions in PAI learning without reducing the substance of the teachings. This focus directs the discussion on the relationship between digital innovation and the strengthening of religious values in educational practice.

The theoretical contribution of this research lies in the development of an integrative framework that combines the theory of educational technology integration with the principles of value-based Islamic

education. The framework connects the concepts of personalized learning, digital instructional design, and character education theory into a single operational analytical model. This research expands the discourse on digital transformation by placing PAI as a context of study that has distinctive normative and pedagogical characteristics. The empirical contribution of this research is manifested in the formulation of strategic recommendations based on the analysis of the latest literature and the mapping of implementation barriers at the institutional and teacher levels. The originality of this paper emerges from the synthesis between the potential of cutting-edge technologies such as Augmented Reality, Artificial Intelligence, and podcasting with a project-based pedagogical approach within the framework of Islamic values. This synthesis produces a measurable, contextual, and relevant model of PAI digital transformation for contemporary educational dynamics. This study positions digital transformation not merely as a process of technology adoption, but as a reconstruction of a learning system based on data, pedagogical reflection, and consistency of religious values in a global context.

METHOD

This study applies a descriptive qualitative approach with a literature study design to examine digital transformation in Islamic Religious Education (PAI) as the foundation of an innovative learning system. This study does not involve field locations and subjects because the analysis focuses on published scientific documents. This study uses secondary data sources in the form of reputable journal articles, academic books, scientific proceedings, and education policy reports relevant to digital transformation, digital literacy, artificial intelligence in education, and pedagogical innovation. The researcher searched the literature through academic databases such as Google Scholar, DOAJ, and Scopus, considering the relevance of the substance, credibility of the source, and recency of publication within the last five to ten years (Creswell & Creswell, 2017).

The researchers collected data through documentation techniques by identifying, classifying, and recording relevant information from each selected source. The researchers analyzed the data through reduction, categorization, and conceptual synthesis stages to map patterns and argumentative relationships regarding PAI digitization. The researchers applied thematic analysis to group the literature into themes of technology integration in pedagogy, digital literacy as an instrument of tabayyun, the transformation of the teacher's role, and the digital access gap . The researchers maintained data validity through source triangulation by comparing theoretical perspectives and findings across studies to ensure consistency of interpretation in accordance with qualitative research principles (Creswell & Creswell, 2017).

RESULTS AND DISCUSSION

Results

The findings of this study indicate that digital transformation in education has evolved into a systemic process that redefines structures, content, and instructional methods to create a more open and flexible learning environment. According to research by Korol and Vorotnitsky (2022), it is found that digitalization demands a redefinition of the role of educational institutions, moving beyond traditional one-way knowledge transmission to equip students with critical thinking skills in the information age (Korol & Vorotnitsky, 2022). The integration of Information and Communication Technology (ICT), including Learning Management Systems (LMS) and adaptive platforms, has proven to be a fundamental key to creating competitive human resources in the 21st century (Qureshi et al., 2021).

In terms of specific technological implementation, data processed from the study by Isaeva et al. (2025) reveals that Artificial Intelligence (AI) powered adaptive systems effectively support personalized learning by tailoring religious materials to each individual's unique learning pace (Isaeva et al., 2025). Furthermore, AI offers PAI educators opportunities for more precise instructional planning, instant feedback, and objective automated assessment. A study by Khairunnisa and Aziz (2021) confirms that Augmented Reality (AR) technology has significant potential to increase student motivation and conceptual understanding by visualizing abstract religious concepts, such as Islamic history or worship procedures, making them more vivid and interactive (Khairunnisa & Aziz, 2021). Additionally, research regarding educational podcasting by Besser et al. (2022) highlights that structured audio narratives are crucial instruments for honing literacy and critical thinking through flexible access to instructional content (Besser et al., 2022).

Regarding pedagogical methodologies, the results consistently identify *Project-Based Learning* (PBL) as the most effective strategy for fostering flexibility in the modern PAI curriculum. According to Lavado-Anguera et al. (2024), PBL places students as the primary subjects with full control over their learning process, while educators transform into facilitators or guides of intellectual exploration (Lavado-Anguera et al., 2024a). This methodology is proven to push students beyond low-level cognition toward higher-order thinking skills in Bloom's Taxonomy, including analyzing, evaluating, and creating innovative solutions. Furthermore, a study by Djirong et al. (2024) confirms that PBL is highly relevant for connecting spiritual values with contemporary global challenges, such as the environmental crisis and Sustainable Development Goals (SDGs), making religious education more dynamic and responsive to social realities (Djirong et al., 2024a).

However, the findings also map significant challenges in this transformation process. Based on the classification proposed by (Tawfik et al., 2021), integration barriers are divided into first-order barriers, which include limitations in physical infrastructure and internet connectivity, and second-order barriers, which relate to the psychopedagogical readiness of teachers in managing virtual dynamics (Tawfik et al., 2021). A persistent digital gap among students remains a major issue that can exacerbate educational inequality if not systematically addressed.

In response to these challenges, this study finds an urgent need to reconstruct the role of the PAI teacher into an "orchestrator" capable of utilizing technology to provide immediate feedback while maintaining moral integrity (Celik et al., 2022). The processed data shows that digital literacy in the PAI context now serves as an instrument of *Tabayyun* (information verification), empowering students with the cognitive ability to distinguish authoritative religious sources from hoaxes or radical content. Finally, the implementation of School-Based Management (SBM) is found to provide the necessary institutional autonomy for schools to design digital visions aligned with their local needs (Quaicoe et al., 2023a). Through collective synergy between the madrasah, parents, and government, digital transformation is directed toward realizing *Maslahah Mursalah* (the public interest), ensuring that technology enriches the spiritual and intellectual substance of religious education.

Table 1. Tables Synthesis of Innovative Technology and Methodology Findings

No	Transformation Component	Key Findings	Strategic Impact on Learning Systems
1	**Artificial Intelligence**	Supports personalization through real-time student data analytics.	Increases assessment accuracy and material adaptation speed.
2	**Augmented Reality**	Enables 3D visualization of abstract theological and historical concepts.	Enhances multi-sensory engagement and student learning motivation.
3	**Podcasting**	Provides flexible audio narratives to sharpen critical literacy.	Develops independent thinking skills and information retention.
4	**Project-Based Learning**	Shifts focus from memorization to real-world problem-solving (SDGs).	Encourages students to reach the highest cognitive levels (Creation).
5	**Management (SBM)**	Grants institutional autonomy for local digital visioning.	Ensures innovation sustainability through stakeholder involvement.

Discussion

Digital transformation in Islamic Religious Education (IRE/PAI) is a systemic change that integrates technology into pedagogy to create flexible, inclusive, and interactive learning environments. Rather than focusing solely on administrative automation or digital content delivery, this transformation connects Islamic values with students' social realities while developing critical thinking, adaptability, and digital literacy. Integrating Information and Communication Technology (ICT), Massive Open Online Courses (MOOCs), and learning management systems (LMS) improves accessibility and enables personalized learning. Digital platforms, podcasts, augmented reality (AR), and artificial intelligence (AI) can enhance student engagement,

conceptual understanding, and instructional effectiveness (Korol & Vorotnitsky, 2022; Khairunnisa & Aziz, 2021a; Sato et al., 2023; Isaeva et al., 2025b; Besser et al., 2022).

However, increased access to digital information also creates challenges related to source credibility, misinformation, and the preservation of spiritual depth. Digital literacy in PAI must therefore incorporate Tabayyun, or information verification, to help students distinguish reliable religious sources from hoaxes and radical content. Teachers must act as facilitators and ethical guides who provide feedback, encourage critical thinking, and use technology responsibly. Effective transformation also requires professional development, curriculum updates, and project-based approaches that strengthen students' moral integrity and prepare them for global challenges (Celik et al., 2022; Bertel et al., 2021; Khairunnisa & Aziz, 2021).

Project-Based Learning (PBL) offers an effective approach to making PAI more flexible, practical, and interactive. By positioning students as active learners and teachers as facilitators, PBL connects religious knowledge with real-life challenges through activities such as managing philanthropic programs, developing Islamic social campaigns, and analyzing contemporary issues in Islamic law. These activities develop empathy, communication, leadership, and problem-solving skills while encouraging higher-order thinking, including application, analysis, evaluation, and creation. Interdisciplinary projects, such as integrating Islamic economics with mathematics, further demonstrate how Islamic values can be applied across academic disciplines. Digital platforms and online discussions can strengthen this approach, while environmental projects can connect Islamic ethics with sustainability and climate change (Lavado-Anguera et al., 2024; Djirong et al., 2024).

Despite these opportunities, implementing innovative and technology-based PAI learning faces challenges related to teacher readiness, digital competencies, and infrastructure. Some teachers lack the professional ICT skills needed for classroom instruction or feel threatened by technological developments. Consequently, technology may become merely a digital addition without meaningful pedagogical improvement. Addressing these challenges requires teacher training in digital literacy and project management, cross-disciplinary collaboration, and assessment methods that evaluate learning processes, portfolios, character development, and practical competencies. Teachers must also promote student-centered learning, collaborative discussion, and higher-order thinking while ensuring that digital activities uphold Adab, empathy, transparency, and responsible online behavior (Quaicoe et al., 2023; Qureshi et al., 2021; Rof et al., 2022; Lavado-Anguera et al., 2024).

Digital inequality remains another significant barrier to inclusive Islamic education. Limited devices, unstable internet connections, and geographical constraints can restrict students' access to digital learning, particularly in remote areas. Differences in digital literacy and teachers' confidence can further widen educational disparities. Therefore, digital transformation requires inclusive policies, accessible learning resources, continuous teacher training, and collaboration among madrasahs, Islamic boarding schools, families, communities, and government institutions. Madrasahs should develop innovative learning practices and share digital resources, while parents support students' academic progress and emotional well-being. Government involvement is essential to provide infrastructure and regulations that ensure equitable access to education (Sato et al., 2023; Rogozin et al., 2022; Bertel et al., 2021; Turnbull et al., 2021).

Ultimately, successful digital transformation in PAI depends on balancing technological innovation with Islamic values, ethical responsibility, and social inclusion. Technology should serve as a means of strengthening religious moderation, social cohesion, and *Maslahah Mursalah*, or the public interest, rather than becoming an educational goal in itself. Educational institutions must also address data privacy, information confidentiality, and academic integrity. Through collaboration, ethical technology use, and continuous pedagogical improvement, PAI can develop a learning environment that enhances students' spiritual and intellectual growth while preparing them to navigate the challenges of the digital age (Bertel et al., 2021; Turnbull et al., 2021; Rogozin et al., 2022).

CONCLUSION

Digital transformation in Islamic Religious Education (PAI) represents a fundamental paradigm shift to maintain the relevance of spiritual values in the Industry 4.0 era. Technologies such as Artificial Intelligence (AI), Augmented Reality (AR), and e-learning platforms create interactive, innovative, and personalized learning experiences while expanding students' access to religious knowledge. Through Project-Based Learning (PBL),

students apply Islamic values to real-world challenges, such as philanthropy and environmental sustainability, strengthening character education. Teachers must act as facilitators who integrate technology while preserving spiritual depth, ethical values, and Adab in digital learning.

Despite these opportunities, digital transformation faces challenges, including unequal technology access, limited infrastructure, and insufficient teacher competencies. Without meaningful pedagogical changes, technology may create only a "digital facade." Strengthening digital literacy through Tabayyun is essential to verify information and distinguish reliable sources from hoaxes and radical content. Therefore, collaboration among madrasahs, communities, and the government is crucial to ensure inclusive implementation. Ultimately, PAI digital transformation aims to realize *Maslahah Mursalah*, or public interest, by strengthening religious moderation and social cohesion while developing graduates with strong moral integrity, spiritual depth, and the competencies to face future challenges.

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