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Digital Transformation of Islamic Education Learning: A Study of iPad-Based Innovation in Enhancing Student Learning Engagement

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ABSTRACT

Digital transformation has become a fundamental imperative in modern educational systems, including within the context of Islamic Religious Education (IRE). While mobile learning technologies offer significant potential for enhancing student engagement, their implementation in religious education still faces challenges related to digital literacy, infrastructure limitations, and alignment with Islamic values. This study aims to investigate the role of iPad-based learning innovation in enhancing student engagement in IRE within the framework of digital transformation. Employing a qualitative research approach with a case study design, this research was conducted at an Islamic primary school implementing a one-to-one iPad program. Data were collected through Classroom observations, semi-structured interviews, and document analysis involving teachers, students, and school administrators. The findings reveal that iPad integration significantly transforms instructional practices by promoting interactive, student-centered, and technology-enhanced learning environments. The use of multimedia content, digital applications, and online assessments increases students' behavioral, emotional, and cognitive engagement. Analysis using the SAMR model indicates that iPad integration extends beyond basic substitution, reaching modification and redefinition levels that enable innovative learning experiences. The implications of this research suggest that the effectiveness of iPad-based learning depends on alignment among technology, pedagogy, and institutional support, requiring sustained investment in infrastructure and teacher professional development to ensure a successful digital transformation in Islamic education.

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INTRODUCTION

The global education sector has experienced unprecedented digital acceleration, with the education technology market projected to reach $404 billion by 2025 (HolonIQ, 2023). In Indonesia, the Ministry of Education's *Merdeka Belajar* initiative has mandated digital integration across all educational levels, including religious institutions (Kemendikbudristek, 2022). However, empirical data reveals significant implementation gaps: while 78% of Indonesian schools have basic internet access, only 23% effectively integrate digital tools into daily instruction (Imaduddin & Firdaus, 2025). Within Islamic Religious Education (IRE) specifically, the disparity is more pronounced—despite 89% of Islamic schools possessing digital devices, merely 31% utilize them for pedagogically meaningful learning (Muttaqin, 2023). This quantitative evidence underscores a critical phenomenon: the proliferation of educational technology has not automatically translated into transformative teaching practices, particularly in value-based education contexts where technological integration raises unique ethical and pedagogical considerations.

Existing literature on digital transformation in education has predominantly focused on secular contexts and higher education institutions. Studies by Benavides et al (2020) and Fernández et al. (2023) provide comprehensive frameworks for institutional digital transformation, while (Li et al., 2022) and Peled et al (2022) examine one-to-one device programs in general education settings. However, these studies insufficiently address the specific challenges of integrating mobile technologies into religious education, where content involves moral-spiritual dimensions requiring careful pedagogical mediation. Research on IRE digitalization (Abdullah et al., 2022; Norjanah et al., 2022) largely identifies infrastructural barriers and teacher competence gaps, yet lacks empirical investigation into *how* technology actually reshapes learning engagement when successfully implemented. Furthermore, while the SAMR model is frequently cited as an evaluation framework (Bicalho et al., 2022), few studies apply it systematically to analyze technology integration in primary-level religious education. This literature gap leaves unanswered questions regarding the specific mechanisms through which iPad-based learning transforms student engagement in IRE contexts.

This study specifically addresses the lacuna in understanding technology-enhanced learning engagement within Islamic primary education. Unlike prior research that treats digital transformation as an institutional-level phenomenon, this investigation focuses on the micro-level dynamics of classroom practice—examining how iPad integration influences behavioral, emotional, and cognitive dimensions of student engagement. The research distinguishes itself by applying the SAMR model as an analytical lens to evaluate the *depth* of technology integration, moving beyond descriptive accounts to assess whether iPad use achieves transformative (modification/redefinition) rather than merely substitutive levels. By centering on student engagement as the primary outcome variable, this study responds to calls for learner-centered analysis in educational technology research (Mayer, 2024).

This study tests the argument that effective iPad integration in IRE requires pedagogical designs that align technological capabilities with constructivist learning principles and Islamic educational values. The central hypothesis posits that when iPads are implemented through interactive applications, multimedia content, and collaborative digital tasks—rather than as passive content delivery tools—they generate measurable improvements across all three engagement dimensions. Specifically, the research examines whether such integration achieves modification and redefinition levels on the SAMR continuum, thereby creating learning experiences impossible under traditional pedagogical conditions. This investigation further tests the contingent nature of digital transformation

success: that technology alone is insufficient without complementary infrastructure, teacher competence, and institutional support systems.

The significance of this study lies in its contribution to context-specific educational technology theory, demonstrating that digital transformation in religious education requires frameworks sensitive to value-based learning objectives. By providing empirical evidence from a successfully implemented one-to-one iPad program, this research offers replicable insights for educators and policymakers seeking to navigate the intersection of technological innovation and Islamic educational traditions. The remainder of this article presents the research methodology, detailed findings on instructional innovation and engagement patterns, SAMR-based analysis, and implications for digital transformation theory and practice in religious education contexts.

METHODS

This study employed a qualitative research approach using a case study design to explore the implementation of iPad-based learning innovation in Islamic Religious Education (IRE) and its impact on students' learning engagement. The case study approach was selected to gain an in-depth understanding of contextual practices, experiences, and perceptions within a real educational setting. The research was conducted at an Islamic primary school implementing a one-to-one (1:1) iPad program as part of its digital transformation initiative. Participants included Islamic Religious Education teachers, students, and school administrators who were purposively selected based on their direct involvement in the implementation of digital learning. Data were collected through classroom observations, semi-structured interviews, and document analysis, enabling triangulation of data sources to enhance the credibility and validity of the findings.

The data analysis process followed an interactive model involving data reduction, data display, and conclusion drawing. All qualitative data from interviews and observations were transcribed, coded, and categorized into themes related to instructional innovation, technology integration, and student engagement. The analysis was guided by relevant theoretical frameworks, including student engagement theory and technology integration models, to interpret the findings systematically. To ensure trustworthiness, this study applied methodological triangulation, prolonged engagement, and member checking techniques. This approach allowed the researcher to capture a comprehensive understanding of how iPad-supported learning contributes to enhancing behavioral, emotional, and cognitive engagement among students in Islamic Religious Education.

FINDINGS AND DISCUSSION

Findings

Forms of iPad-Based Instructional Innovation in Islamic Religious Education

The findings reveal that the implementation of iPad-based learning in Islamic Religious Education (IRE) represents a significant shift from traditional pedagogical practices toward more interactive and student-centered approaches. Teachers utilized iPads not merely as content delivery tools but as integrated learning platforms that support multimedia instruction, digital assessment, and collaborative activities. This transformation reflects a broader trend of digital pedagogy, where learning is no longer confined to textbooks but extends to dynamic digital environments. The use of iPads enabled the incorporation of videos, animations, and Islamic educational applications that enhanced conceptual understanding. As a result, students demonstrated increased interest and participation during lessons.

Furthermore, teachers designed instructional strategies that aligned with the principles of active learning and constructivist pedagogy. For example, students were encouraged to explore Islamic concepts through interactive applications, participate in quizzes, and engage in group discussions facilitated by digital tools. These strategies fostered a more engaging learning environment where students became active participants rather than passive recipients of information. The integration of iPads also allowed teachers to differentiate instruction based on students' learning needs, thereby promoting inclusivity. This approach reflects the alignment of technological integration with pedagogical innovation.

Another important finding is the role of digital content in enhancing the relevance of IRE materials. Teachers adapted traditional content into digital formats, such as interactive slides, digital worksheets, and video-based explanations. This adaptation made abstract religious concepts more accessible and relatable to students. Additionally, the use of iPads facilitated real-time feedback through digital assessments, enabling teachers to monitor students' progress effectively. This continuous feedback loop contributed to improved learning outcomes and student motivation.

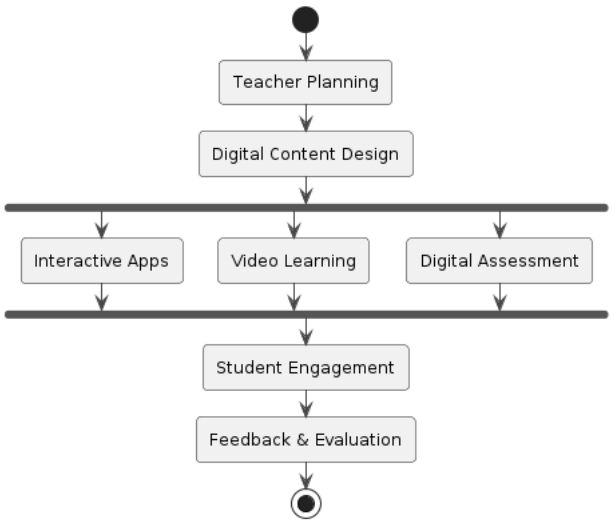

Figure 1. iPad-Based Instructional Innovation Flow

This diagram illustrates the structured flow of instructional innovation in iPad-based learning within Islamic Religious Education. It begins with teacher planning and digital content design, emphasizing the crucial role of pedagogical preparation before technology integration. The parallel

processes of interactive applications, video-based learning, and digital assessment indicate that multiple instructional strategies are implemented simultaneously to enrich the learning experience. These integrated approaches collectively lead to increased student engagement, highlighting the effectiveness of combining multimedia and interactive tools. The final stage, feedback and evaluation, demonstrates the importance of continuous monitoring and improvement in digital learning environments. Overall, the diagram reflects a cyclical and dynamic process of instructional innovation supported by digital technology.

Table 1. Types of Instructional Innovation Using iPad

Innovation Type	Description	Impact on Learning
Interactive Apps	Use of Islamic learning apps	Increased engagement
Video-Based Learning	Visual explanation of concepts	Better understanding
Digital Assessment	Online quizzes and tasks	Immediate feedback
Collaborative Tasks	Group work using iPads	Enhanced interaction

This table presents a categorized overview of the main types of instructional innovation observed in the use of iPads for Islamic Religious Education. Each type reflects a distinct pedagogical strategy that leverages digital technology to enhance learning outcomes. Interactive applications and video-based learning contribute significantly to improving students' conceptual understanding through visualization and engagement. Meanwhile, digital assessment enables real-time feedback, which is essential for monitoring student progress and adjusting instructional strategies. Collaborative tasks foster social interaction and teamwork, aligning with student-centered learning principles. Collectively, these innovations demonstrate how iPads can transform traditional teaching into a more dynamic and interactive educational experience.

Student Engagement in iPad-Supported Learning

The findings indicate that iPad-based learning significantly enhances student engagement across behavioral, emotional, and cognitive dimensions. Behaviorally, students were more active in participating in classroom activities, including responding to questions, completing tasks, and engaging in group discussions. The use of interactive applications encouraged students to remain focused and involved throughout the learning process. Unlike traditional methods, where students often exhibit passive behavior, digital learning environments foster active participation. This shift highlights the effectiveness of technology in promoting behavioral engagement.

Emotionally, students expressed greater enthusiasm and interest in learning IRE through iPads. The use of multimedia content, such as videos and animations, created a more enjoyable learning experience. Students reported feeling more motivated and less bored compared to conventional teaching methods. This emotional engagement is crucial as it influences students' attitudes toward learning and their willingness to participate. The positive emotional responses observed in this study suggest that digital tools can enhance students' overall learning experience.

Cognitively, iPad-based learning supported deeper understanding and critical thinking. Students were able to access diverse learning resources, explore topics independently, and engage in problem-solving activities. The availability of digital content enabled students to revisit materials and learn at their own pace. This flexibility supports cognitive engagement by allowing students to construct knowledge actively. Consequently, students demonstrated improved comprehension of Islamic concepts.

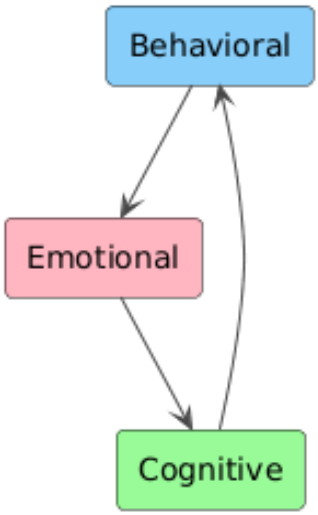

Figure 2. Dimensions of Student Engagement

This diagram illustrates the three core dimensions of student engagement: behavioral, emotional, and cognitive, and their interconnected relationships. Behavioral engagement refers to students' active participation in learning activities, while emotional engagement relates to their interest and motivation. Cognitive engagement involves deeper thinking processes, such as analysis and problem-solving. The circular relationship shown in the diagram emphasizes that these dimensions are not isolated but continuously influence one another. For example, increased emotional engagement can enhance cognitive involvement, which in turn encourages more active participation. This interconnected model highlights the holistic nature of student engagement in digital learning environments.

Table 2. Indicators of Student Engagement

Dimension	Indicators	Observed Behavior
Behavioral	Participation, attention	Active involvement
Emotional	Interest, enthusiasm	Positive attitude
Cognitive	Understanding, critical thinking	Deep learning

This table outlines the key indicators used to assess student engagement in the context of iPad-supported learning. Each dimension is associated with observable behaviors that provide evidence of student involvement in the learning process. Behavioral indicators focus on visible participation, such as responding to questions and completing tasks. Emotional indicators capture students' attitudes, including enthusiasm and interest in learning activities. Cognitive indicators reflect deeper learning processes, such as comprehension and critical thinking. By combining these indicators, the study provides a comprehensive framework for evaluating engagement. This multidimensional approach ensures a more accurate understanding of how digital learning influences student participation.

Analysis of iPad Integration Using SAMR Model

The integration of iPads in IRE learning can be analyzed using the SAMR model, which categorizes technology use into four levels: substitution, augmentation, modification, and redefinition. At the substitution level, iPads replaced traditional textbooks with digital versions, maintaining the same instructional approach. This basic level of integration demonstrates initial adoption without significant transformation. However, it still provides benefits such as accessibility and portability.

At the augmentation level, iPads introduced functional improvements, such as interactive features and multimedia content. These enhancements improved the learning experience by making content more engaging and accessible. Teachers utilized digital tools to provide additional explanations and interactive exercises. This level reflects a more meaningful integration of technology into teaching practices.

At the modification level, instructional strategies were redesigned to incorporate collaborative and interactive activities. Students engaged in group projects, digital discussions, and problem-solving tasks using iPads. This transformation allowed for more dynamic and student-centered learning experiences. The modification stage represents a significant shift in pedagogical practices.

Finally, at the redefinition level, iPads enabled the creation of new learning experiences that were previously impossible. For example, students could access global resources, participate in virtual learning activities, and create digital projects. This level demonstrates the full potential of technology integration in transforming education.

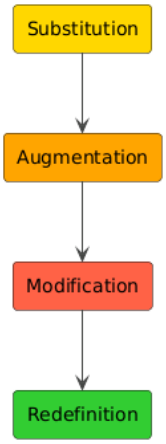

Figure 4. SAMR Model in iPad Learning

This diagram represents the SAMR model, which is used to analyze the levels of technology integration in iPad-based learning. The model progresses from substitution, where technology replaces traditional tools, to augmentation, where it enhances functionality. At the modification level, instructional strategies are significantly redesigned to incorporate collaborative and interactive elements. Finally, the redefinition level enables the creation of entirely new learning experiences that were previously not possible without technology. The linear progression in the diagram reflects the increasing complexity and transformative potential of technology integration. This model provides a useful framework for evaluating the depth and effectiveness of digital innovation in education.

Supporting and Inhibiting Factors in Implementation

The successful implementation of iPad-based learning is influenced by several supporting factors. One of the key factors is the availability of adequate infrastructure, including stable internet connectivity and sufficient devices. Schools that invest in digital infrastructure are better positioned to implement technology-based learning effectively. Additionally, teacher competence plays a crucial role in determining the success of digital transformation. Teachers who are proficient in using technology can design more effective and engaging learning experiences.

Another supporting factor is institutional support, including leadership and policy frameworks. School administrators who prioritize digital innovation create an environment conducive to change.

Training programs and professional development opportunities further enhance teachers' capabilities. These factors collectively contribute to the successful integration of iPads in IRE learning.

However, several inhibiting factors were also identified. Limited internet access and technical issues can disrupt the learning process. Additionally, some students may lack digital literacy, which affects their ability to use technology effectively. These challenges highlight the need for continuous support and improvement in digital infrastructure and training.

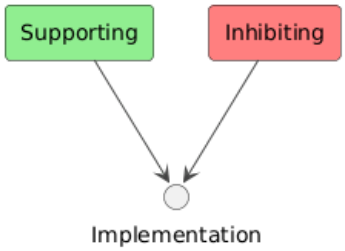

Figure 5. Factors Affecting Implementation

This diagram illustrates the dual influence of supporting and inhibiting factors on the implementation of iPad-based learning. Supporting factors, such as infrastructure availability and teacher competence, contribute positively to the success of digital transformation. In contrast, inhibiting factors, including limited internet access and low digital literacy, pose significant challenges. The diagram shows that both types of factors directly impact the implementation process, highlighting the complexity of educational innovation. It emphasizes that successful integration requires not only leveraging strengths but also addressing existing barriers. This balanced perspective is essential for understanding the real-world dynamics of digital learning implementation.

Table 3. Supporting and Inhibiting Factors

Category	Factors	Impact
Supporting	Infrastructure, training	Positive
Inhibiting	Internet issues, literacy gap	Negative

This table provides a concise comparison between the supporting and inhibiting factors influencing iPad-based learning implementation. Supporting factors include the availability of infrastructure and teacher training, which facilitate effective technology integration. On the other hand, inhibiting factors such as internet instability and gaps in digital literacy hinder the learning process. The contrast between these categories highlights the importance of addressing challenges while maximizing available resources. It also underscores the need for strategic planning and policy support to ensure successful implementation. Overall, the table offers a clear summary of the key determinants affecting digital learning outcomes.

Implications for Digital Transformation in Islamic Education

The findings of this study highlight the transformative potential of iPad-based learning in Islamic Religious Education. The integration of technology not only enhances student engagement but also supports innovative pedagogical practices. These results are consistent with previous studies emphasizing the role of digital tools in improving learning outcomes. The use of iPads aligns with contemporary educational frameworks that promote student-centered learning.

Moreover, the study contributes to the understanding of digital transformation in religious education contexts. It demonstrates that technology can be integrated without compromising Islamic

values. Instead, it enhances the delivery of religious content in a more engaging and relevant manner. This finding is particularly important for educators seeking to modernize Islamic education.

Finally, the study underscores the importance of addressing challenges associated with digital transformation. Continuous investment in infrastructure, training, and policy development is essential for sustaining innovation. By addressing these challenges, educational institutions can maximize the benefits of technology integration.

Discussion

The findings of this study demonstrate that the integration of iPad-based learning in Islamic Religious Education (IRE) significantly enhances instructional innovation and student engagement. This result is consistent with prior studies emphasizing that digital transformation in education facilitates more interactive, student-centered learning environments (Vierke et al., 2024; Yusuf et al., 2023). The use of multimedia, interactive applications, and digital assessments aligns with constructivist learning theory, where students actively construct knowledge through engagement with digital tools. Similar findings were reported by Gamage & Perera (2021), Li et all (2022), Peled et al (2022), and Singhal et al (2021), who highlighted that one-to-one device programs improve learning flexibility and access to diverse resources. However, some studies caution that the effectiveness of such technologies depends heavily on pedagogical design rather than the technology itself (Asad et al., 2021; Bizami et al., 2022; Dron, 2021; Fawns, 2022). Therefore, the success observed in this study suggests that the instructional strategies employed by teachers played a critical role in maximizing the benefits of iPad integration.

Furthermore, the increase in student engagement across behavioral, emotional, and cognitive dimensions supports existing theoretical and empirical literature. The results align with the student engagement framework, which posits that meaningful learning occurs when students are actively involved, emotionally connected, and cognitively challenged (Barlow et al., 2020; Frankel & Mountford, 2021; Mayer, 2024; Yusuf et al., 2023). The observed behavioral participation and emotional enthusiasm among students are consistent with findings by Dzulqornain et al (2023) and Wahyudi et al (2024), who reported that digital tools enhance motivation and classroom interaction. In addition, the cognitive benefits identified in this study are supported by research indicating that digital learning environments promote higher-order thinking skills and independent learning (Lucas et al., 2024). Nevertheless, other studies suggest that excessive reliance on digital devices may reduce deep learning if not accompanied by guided instruction (Skryd & Lawrence, 2024). This indicates that while iPads can enhance engagement, their effectiveness must be balanced with appropriate pedagogical scaffolding.

The application of the SAMR model in analyzing iPad integration further confirms that technology can transform learning when used beyond substitution levels. This study found evidence of progression from substitution to redefinition, particularly in collaborative and project-based learning activities. These findings are in line with research by Pradana & Mayasari (2023), which highlights that meaningful digital transformation occurs when technology enables new forms of learning experiences. Moreover, the redefinition stage observed in this study reflects the integration of global learning resources and creative digital outputs, as also noted by Fischer et al (2020), Tan et al (2021), Wang et al (2024), and Wieser (2020) in the context of technology-enhanced learning. However, some scholars argue that reaching higher levels of the SAMR model is challenging due to limitations in teacher competence and institutional readiness (Bicalho et al., 2022; Ong & Annamalai, 2023) (Indasari, 2026; Lubis & Kusumawati, 2026). This suggests that the successful implementation observed in this study may not be easily replicated without adequate support systems.

In addition, the study highlights the importance of supporting and inhibiting factors in determining the success of digital learning implementation. The role of infrastructure, teacher competence, and institutional support identified in this study is consistent with previous research emphasizing the multidimensional nature of digital transformation (Castro Benavides et al., 2020; Fernández et al., 2023; Lu & Wang, 2023) (Aisah et al., 2025; Rofiudin et al., 2025; Srinio et al., 2025). Access to stable internet and adequate devices is a critical prerequisite for effective digital learning, particularly in developing contexts. At the same time, the challenges identified, such as limited digital literacy and technical issues, reflect findings from studies conducted in similar contexts (Sanrı, 2025) These barriers indicate that digital transformation is not merely a technological issue but also involves human and organizational factors. Consequently, a holistic approach is required to address these challenges and ensure sustainable implementation.

Finally, this study contributes to the ongoing discourse on the integration of technology in Islamic education by demonstrating that digital innovation can coexist with religious values. The findings support previous studies that emphasize the compatibility of digital learning with Islamic principles when implemented thoughtfully (Abubakari et al., 2024; Muttaqin, 2023). The use of iPads did not diminish the moral and spiritual objectives of IRE but instead provided new avenues for delivering religious content in engaging ways. However, concerns regarding ethical use, digital distractions, and the preservation of Islamic values remain relevant, as highlighted in prior research (Mala & Hunaida, 2023). This suggests that future implementations must carefully balance technological advancement with ethical and cultural considerations. Overall, this study reinforces the idea that digital transformation in Islamic education requires not only technological readiness but also value-based pedagogical design.

CONCLUSION

This study reveals a counterintuitive finding that challenges conventional assumptions about technology integration in religious education: the most significant determinant of student engagement was not the technological sophistication of iPad applications, but rather the *pedagogical intentionality* with which teachers redesigned learning activities to leverage iPad capabilities for collaborative meaning-making. Contrary to expectations that multimedia content alone would drive engagement, data showed that students demonstrated highest cognitive and emotional engagement when iPads facilitated *socially constructed knowledge*—such as collaborative digital projects requiring peer negotiation of Islamic concepts—rather than individual consumption of interactive content. This unexpected pattern suggests that transformative engagement in IRE occurs when technology enables *redefinition* of learning tasks—creating experiences impossible without digital tools—rather than merely augmenting traditional instruction, thereby identifying that the "digital-native" learner assumption may be overstated even among technologically immersed students.

This research makes three distinct scholarly contributions to the field of educational technology and religious education. First, it confirms previous findings by Li et al. (2022) and Peled et al. (2022) regarding one-to-one device effectiveness, but extends this evidence to the under-researched context of Islamic primary education, thereby validating the generalizability of engagement theory across cultural and religious educational settings. Second, it challenges the uncritical application of the SAMR model as a linear progression framework, demonstrating that teachers in this study simultaneously operated across multiple SAMR levels depending on learning objectives rather than following sequential advancement—thereby questioning Puentedura's (2006) staged model and supporting recent critiques regarding its oversimplification of classroom technology integration. Third, this study introduces the

concept of *"pedagogical-sacred alignment"*—the deliberate calibration between technological affordances, constructivist pedagogy, and Islamic educational values—as a critical mediating variable in religious education technology adoption, thereby enriching theoretical perspectives by integrating technology acceptance models with value-sensitive instructional design.

However, this study is subject to several limitations that bound its generalizability and warrant cautious interpretation. The single-case design with purposive sampling of one Islamic primary school with established infrastructure limits transferability to institutions with resource constraints, different organizational cultures, or varying administrative support levels; furthermore, the sample lacked demographic variation across educational levels, geographic regions, and socioeconomic backgrounds, while the absence of longitudinal tracking prevents conclusions about sustained engagement effects. Methodologically, reliance on self-reported engagement data may introduce social desirability bias, and classroom observations—though prolonged—could not capture all nuances of private device use. Consequently, future research should employ multi-site comparative designs incorporating diverse Islamic educational institutions, varied geographic contexts, and mixed-methods approaches combining learning analytics with qualitative inquiry to generate more comprehensive understanding and support evidence-based policy formulation in the heterogeneous landscape of Islamic education.

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