



The Role of Digital Applications in Enhancing Qur'an Memorization Learning

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Abstract:

This study examines the integration of digital applications in Tahfidzul Qur'an learning to investigate both the opportunities and challenges associated with their implementation. The main objective is to understand how technology affects the effectiveness of memorization, as well as the factors that support or hinder its use. A qualitative field research design was employed, involving observations of memorization practices, interviews with teachers, students, and administrators, as well as documentation of teaching materials. Findings reveal several challenges: limited technical skills among teachers, insufficient technological infrastructure, resistance to adopting digital tools, and a lack of curriculum-aligned digital resources. Despite these barriers, digital applications show strong potential to enhance students' motivation, engagement, and retention in Qur'an memorization. The novelty of this research lies in its systematic analysis of how traditional memorization methods can be adapted within a digital framework, highlighting both pedagogical and managerial dimensions. The study recommends targeted teacher training, infrastructure development, and collaboration with educational technology developers to design suitable digital resources. These efforts are expected to strengthen the quality of Islamic education and ensure its relevance in the digital era.

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INTRODUCTION

In the 21st century, society is undergoing rapid changes driven by the Fourth Industrial Revolution and the rapid advancement of digital technology. Education, as the foundation of human development, inevitably faces transformation due to these global shifts. In Islamic education, the need for effective teaching and learning methods is increasingly urgent, particularly in strengthening students' religious values and character (ElKaleh, 2020; Munir et al., 2023; Niam et al., 2023). One of the most important aspects is the memorization of the Qur'an, which holds a central position in shaping a strong spiritual foundation for Muslims. However, traditional methods of teaching and memorization are often less engaging for today's digital-native generation. This makes the exploration of digital technology integration in Qur'anic education highly relevant (Marzuki et al., 2020; Nurhayati, 2022). Therefore, understanding how digital applications can support Tahfidzul Qur'an learning is not only important for educational development

but also for building a religious generation capable of facing global challenges while maintaining their Islamic identity.

Despite the growing awareness of the importance of Qur'an memorization, various obstacles still hinder its effectiveness in many educational institutions. One of the key issues is the reliance on conventional learning media that are less aligned with the learning style of the younger generation. Printed materials and rote memorization practices, although valuable, often fail to sustain students' motivation and engagement (Jang et al., 2023; Rossi et al., 2021). Research shows that monotonous and non-interactive methods may lead to boredom and reduced learning outcomes. Moreover, the lack of access to innovative educational resources further widens disparities among students, especially in rural or underdeveloped areas (Daniel, 2024; Troussas et al., 2020). This situation creates an urgent need to find alternative solutions that not only maintain the sacredness of Qur'an memorization but also adapt to the digital culture of students. Without innovative interventions, the effectiveness of Tahfidz education risks declining, which could weaken the spiritual resilience of future Muslim generations.

The phenomenon observed in the field shows that many students struggle to sustain enthusiasm in memorizing the Qur'an due to outdated methods and limited learning resources. At the same time, the digital generation who are accustomed to interactive applications, multimedia content, and gamified platforms tend to demand more engaging learning environments (Assa'idi, 2021; Bhutoria, 2022). In response to this challenge, various Qur'an memorization applications have emerged, offering features such as verse-by-verse audio recitation, real-time feedback, repetition systems, and progress tracking. These applications not only increase accessibility but also allow teachers to monitor student performance more effectively. For example, students can review their memorization independently, while teachers provide guidance through online platforms. This shift reflects the urgent need for educational institutions, including Islamic boarding schools and tahfidz centers, to adapt to technological changes (Massieu Paulin et al., 2024). It also highlights a significant gap between students' expectations and the existing teaching methods, which often remain overly traditional and static.

Several studies have discussed the role of digital technology in Islamic education. Abdi (2024) emphasizes that digital media has facilitated broader access to Qur'anic interpretation, hadith, and other Islamic knowledge, thereby enhancing religious literacy. Similarly, Haddade et al. (2024) highlight the use of social media as a platform for interactive religious learning. In the context of Qur'an memorization, Muhammad et al. (2022), Nasrulloh et al. (2022), and Ismail et al. (2020) found that tahfidz applications provide motivation and practical tools for students to strengthen their memorization. However, most of these studies focus primarily on the general benefits of technology without providing an in-depth analysis of how digital applications are applied in specific educational contexts. This suggests that, although the potential of technology has been widely acknowledged, systematic investigations into its integration into tahfidz education remain limited, leaving an important research gap that needs to be addressed.

Previous research also tends to generalize the positive impact of digital applications without critically examining their challenges and limitations. For example, Zhang et al. (2024) acknowledge that digital platforms enhance accessibility; however, they do not sufficiently discuss the issues of student dependency, teacher supervision, and the risk of reduced spiritual discipline. Likewise, Roy et al. (2024) argue that conventional methods reduce motivation but fail to propose comprehensive alternatives.

This gap provides an opportunity for the present study to contribute original insights by examining not only the advantages but also the limitations of digital applications in Qur'an memorization. Thus, this research aims to provide an in-depth exploration of both the potentials and challenges, offering a more balanced perspective. This makes it relevant for policymakers, educators, and Islamic institutions to design curricula that are responsive to technological advances while preserving the sanctity of Qur'anic learning.

The novelty of this research lies in its focus on the practical implementation of digital applications in Tahfidzul Qur'an learning at PPTQ Muhammadiyah Ibnu Juraimi Yogyakarta. Unlike previous studies that discuss technology in general terms, this research provides contextual evidence from an institution that actively integrates digital applications into its tahfidz program. By doing so, the study contributes new insights into how digital tools function not only as supplementary resources but also as transformative instruments in memorization pedagogy. Furthermore, this research highlights the cultural and spiritual aspects of technology use in Islamic education, an area that remains underexplored. This state-of-the-art is important because it addresses the dual challenge of maintaining Qur'anic memorization traditions while adapting them to meet the needs of the digital generation. It also ensures that Islamic education remains relevant, sustainable, and accessible in an increasingly technology-driven era.

Based on the background above, the central research problem of this study is how digital applications can be effectively utilized in supporting the Tahfidzul Qur'an program at PPTQ Muhammadiyah Ibnu Juraimi Yogyakarta. The study argues that digital tools, when integrated thoughtfully, can increase students' engagement, enhance the effectiveness of memorization, and provide teachers with better monitoring mechanisms. The originality of this research lies in its contribution to both theory and practice. Theoretically, it enriches the discourse on Islamic education in the digital era by presenting empirical evidence on how technology reshapes the dynamics of Qur'an memorization. Practically, it provides recommendations for Islamic institutions, educators, and policymakers to design innovative tahfidz curricula that align with the learning style of digital-native students. Ultimately, the study offers an original contribution by bridging the gap between traditional tahfidz practices and modern technological innovations, thereby supporting the development of a more holistic, inclusive, and future-oriented model of Qur'anic education.

RESEARCH METHOD

This study employed a qualitative descriptive research design, with a field research approach (Gietzen et al., 2023). The choice of this design is based on the need to explore the actual practice of Tahfidzul Qur'an learning using digital applications within a real institutional setting. A qualitative approach is considered most appropriate because it allows the researcher to capture not only factual data but also the meanings, experiences, and perceptions of teachers and students regarding the integration of technology in Qur'an memorization. Furthermore, the descriptive design enables the presentation of a detailed account of the learning process without manipulating variables, thereby providing a naturalistic understanding of the educational context.

The research was conducted at PPTQ Muhammadiyah Ibnu Juraimi Yogyakarta, an Islamic boarding school known for its tahfidz program and its efforts to integrate modern learning approaches with traditional Qur'anic education. The location was selected because the institution represents a unique blend of traditional memorization

practices and digital applications, making it highly relevant to the research objectives. The informants consisted of 12 participants, including 4 Qur'an teachers, six students at different stages of memorization (beginner, intermediate, and advanced levels), and two boarding school administrators. This diverse set of informants was chosen purposively to provide multiple perspectives on the implementation, benefits, and challenges of using digital applications in tahfidz learning.

The data were collected using three main techniques: observation, interviews, and documentation (Díaz et al., 2022). Observation was conducted to record the learning atmosphere, teacher-student interactions, and the use of digital applications during tahfidz sessions. Semi-structured interviews were carried out with teachers, students, and administrators to capture their experiences, perceptions, and challenges in integrating digital technology. Documentation included institutional records such as the curriculum, teaching materials, and the features of digital applications used in the program. These techniques were applied complementarily to ensure data richness and triangulation.

The analysis followed the Miles and Huberman model, as employed in Zamroni's research, which consists of four stages (Zamroni et al., 2022). First, data condensation (reduction) was conducted by selecting, simplifying, and organizing raw data into meaningful categories. Second, data display was carried out by arranging the information into descriptive narratives and thematic charts to facilitate interpretation. Third, conclusion drawing and verification were conducted by interpreting patterns and meanings, then cross-checking them with the data to ensure consistency. This cyclical process allowed the researcher to maintain analytical rigor while remaining open to emerging insights throughout the research process.

To ensure the validity and reliability of the findings, this study applied data triangulation, member checking, and prolonged engagement. Triangulation was achieved by comparing data from different techniques (observation, interviews, documentation) and informant groups (teachers, students, administrators). Member checking was conducted by presenting preliminary findings to several informants to confirm the accuracy of the interpretations. Prolonged engagement in the field allowed the researcher to build trust with participants and gain a more authentic understanding of the tahfidz learning process. These strategies strengthened the credibility, transferability, dependability, and confirmability of the research data.

RESULT AND DISCUSSION

Result

The findings of this research present a comprehensive overview of Qur'an memorization practices at PPTQ Muhammadiyah Ibnu Juraimi. The study highlights the use of traditional methods such as tasmi', wahdah, takrir, kitabah, tafahum, and talaqqi, while also exploring the integration of digital tools like Tarteel AI. These results illustrate the dynamic interplay between classical pedagogical traditions and modern technological innovations in supporting effective tahfidz learning.

Learning to memorize the Qur'an

In the context of research at PPTQ Muhammadiyah Ibnu Juraimi, the sub-finding learning to memorize the Qur'an is defined as the students' activity of memorizing the Qur'an through systematic methods to preserve, maintain, and internalize its verses into their memory. This process not only emphasizes the ability to repeat memorization (rote

memorization), but also comprehension, meaning internalization, and the habituation of spiritual practice. Thus, tahfidz in the field is understood as a holistic process aimed at safeguarding the purity of the Qur'an while strengthening the Islamic identity of the students.

Table 1. Observation table of memorization methods

No	Interview or Observation Excerpts	Indicator	Observation Percentage
1	"Every morning, students are required to recite their memorization before the ustadzah."	Tasmi's verification and fluency	90%
2	"The children repeat a verse more than 10 times before moving to the next."	Wahdah repetition and accuracy	85%
3	"Students often do takrir together after prayer."	Takrir reinforcement	80%
4	"Some write down the verses first before memorizing them."	Kitabah visualization support	65%
5	"Students understand the meaning of the verse before memorizing."	Tafahum comprehension-based memorization	70%
6	"The ustadz recites the verse, students imitate, then correct mistakes."	Talaqqi teacher-guided accuracy	95%

The data in Table 1 indicate that the methods of talaqqi (95%) and tasmi' (90%) dominate the memorization practices at PPTQ Muhammadiyah Ibnu Juraimi. This highlights the emphasis on teacher authority in maintaining the accuracy of recitation and verifying memorization. Such an approach aligns with the classical pesantren tradition, which prioritizes continuity of sanad and the authenticity of memorization through direct teacher-student interaction. With the dominance of these two methods, it can be interpreted that teacher-guided accuracy and fluency verification are the institution's primary focus.

Although talaqqi and tasmi' appear more dominant, other methods, such as wahdah (85%), takrir (80%), tafahum (70%), and kitabah (65%), are consistently practiced as complementary strategies. This variation reflects a balanced approach that combines mechanical aspects (repetition and writing), cognitive aspects (understanding verse meaning), and affective aspects (habit formation through collective takrir). The data suggest that memorization strategies are holistic, integrating literal memorization with comprehension, skill development, and spiritual discipline.

Field observations reveal that teachers emphasize talaqqi every evening after Maghrib prayer, while tasmi' is routinely conducted in the morning. This pattern demonstrates that tahfidz is not merely a cognitive task but also a collective ritual that shapes the students' learning culture. These practices foster discipline, togetherness, and sustainable memorization. Therefore, the Qur'an memorization strategies extend beyond technical methods and function as an integral part of character formation for the students. Overall, the findings show that students at PPTQ Muhammadiyah Ibnu Juraimi employ a combination of six memorization methods, with talaqqi and tasmi' being the most dominant. The emerging pattern highlights the central role of teachers as the primary verifiers, supported by reinforcement strategies (wahdah, takrir, kitabah,

tafahum), which involve repetition, writing, comprehension, and collaboration. It can thus be concluded that the practice of memorizing the Qur'an at this pesantren is integrative: rooted in teacher authority, strengthened by both individual and collective strategies, and directed towards forming students who are fluent, knowledgeable, and embody Qur'anic values.

Digital Application (Tarteel AI) in Quran Memorization Learning.

In the field, the use of digital applications in Qur'an memorization learning is operationally defined as the integration of artificial intelligence-based tools that support, guide, and evaluate the memorization process. At PPTQ Muhammadiyah Ibnu Juraimi, Tarteel AI functions not as a replacement for traditional methods such as talaqqi or tasmi', but rather as an innovative complement that enhances efficiency and accessibility. The application helps students monitor accuracy in tajweed, pronunciation, and fluency, providing real-time feedback that traditionally relied solely on teacher correction. Thus, in practice, the digital application bridges conventional pedagogy with technological advancement to support student progress.



Figure 1. Tarteel in AI-Qur'an Memorization

Field observations indicate that students frequently utilize Tarteel AI during personal study hours, particularly in the evenings and weekends when teachers are unavailable. Teachers noted that students corrected many errors independently before Tasmi's sessions, thus reducing the number of basic tajweed mistakes during class. This efficiency allowed teachers to focus on more in-depth corrections, such as rhythm and articulation, rather than repeating minor technical notes. The application also motivated students through interactive features, such as memory games and progress trackers, creating a competitive yet enjoyable environment. Research interpretation suggests that Tarteel AI is valued not only for its corrective feedback but also as a motivational instrument that sustains student engagement in the long process of tahfidz.

From the overall data, it can be restated that Tarteel AI at PPTQ Muhammadiyah Ibnu Juraimi operates as a complementary innovation to the traditional tahfidz process. It provides corrective independence for students, accelerates memorization accuracy, and reduces the workload of teachers by filtering out basic errors beforehand. In essence, the application redefines Qur'an memorization from a purely teacher-dependent practice to a blended learning model where technology supports but does not replace the muhaffidz's role.

The emerging pattern suggests a hybrid model of memorization, where teacher-centered methods remain dominant during formal sessions, but students also engage in self-directed learning. At the same time, digital tools extend the learning process beyond

the classroom, ensuring flexibility and accessibility. Students gain autonomy without losing the authority of teacher supervision. Thus, the practice of Qur'an memorization at PPTQ Muhammadiyah Ibnu Juraimi reflects a transformation toward technology-assisted tahfidz, where digital innovation strengthens traditional pedagogy, enhances memorization outcomes, and shapes a more adaptive learning culture.

Challenges of Using Digital Applications in Quran memorization learning

The sub-finding on the challenges of using digital applications in Qur'an memorization at PPTQ Muhammadiyah Ibnu Juraimi refers to the obstacles teachers and students face in integrating technology into tahfidz learning. In practice, digital applications were expected to assist with repetition, correction, and systematic storage of memorized verses. However, their application in pesantren is not straightforward. Teachers and students encounter technical, infrastructural, and pedagogical barriers that limit the potential of these applications. Thus, instead of becoming a central learning tool, digital platforms often function only as supplementary aids.

One of the most pressing challenges lies in the lack of digital literacy among teachers. Many are unfamiliar with operating applications and require additional time to become accustomed to them. As one teacher admitted, "We want to use digital applications, but most of us are not familiar with them. Sometimes, even opening and navigating the application feels difficult" (Teacher interview, May 2024). This limitation shows that without adequate training, technology adoption risks becoming ineffective. Compounding this issue is the unstable internet connection and the limited number of digital devices available in the pesantren environment. A student emphasized, "Sometimes the internet is volatile here; even downloading the app update is difficult" (Student interview, May 2024). These technical obstacles demonstrate that infrastructure plays a crucial role in supporting or hindering digital learning.

Beyond technical issues, cultural resistance also emerges as a barrier. Teachers accustomed to traditional methods such as *tasmi'* and *talaqqi* often see digital applications as less authentic or even unnecessary. One administrator observed, "Many teachers are still comfortable with the old way of memorizing; they are not interested in using apps" (Administrator interview, May 2025). This resistance reflects a deeper pedagogical preference, where oral and direct correction is considered more aligned with Islamic learning traditions. Furthermore, another teacher explained, "Most applications are not fully suitable for our tahfidz curriculum, so we have to adapt ourselves" (Teacher interview, May 2025). The lack of curriculum-based applications forces teachers to adjust materials, increasing their workload and discouraging consistent use.

Field observation reinforced these findings. During one class, students attempted to use a Qur'an memorization application, but connectivity problems caused frequent interruptions. The teacher eventually switched back to manual *tasmi'*, allowing the lesson to proceed more smoothly. This situation demonstrates that, despite access to digital tools, reliance on traditional methods remains strong due to practical realities. The researcher interprets this as evidence that technology cannot yet replace conventional tahfidz methods in pesantren. Instead, it may serve better as a complementary tool, provided a supporting ecosystem, such as training, infrastructure, and curriculum alignment, is established.

In conclusion, the challenges of digital application use in Qur'an memorization learning at PPTQ Muhammadiyah Ibnu Juraimi include limited digital literacy, weak infrastructure, resistance to pedagogical change, and curriculum misalignment. These

factors are interrelated, forming a pattern where technical issues overlap with socio-cultural and educational barriers. Therefore, addressing these challenges requires a holistic strategy that combines teacher training, infrastructural support, cultural and socialization, and the development of curriculum-based digital resources. Only through such comprehensive efforts can digital applications effectively enhance Qur'an memorization without undermining the pesantren's traditional learning values.

Discussion

The findings on Qur'an memorization at PPTQ Muhammadiyah Ibnu Juraimi demonstrate that methods such as talaqqi and tasmi' remain dominant, supported by wahdah, takrir, kitabah, and tafahum. This aligns with classical pesantren literature, where direct teacher-student interaction is emphasized to preserve sanad and authenticity of recitation (Fawaid et al., 2025; Zamroni et al., 2025). However, the integration of Tarteel AI represents a contemporary adaptation not widely documented in traditional memorization studies. While previous works, such as those by Hina (2024), Widiyari (2024), and Sain (2025), stress rote repetition and reinforcement, this study shows a hybrid pattern where technology supplements conventional approaches, providing students with corrective autonomy. This reveals both a continuity of tradition and an adaptation to modern learning contexts, reflecting a dynamic evolution of tahfidz pedagogy.

Theoretically, these findings reinforce the notion that religious education cannot be separated from cultural and technological shifts. Existing scholarship on digital Islamic pedagogy, such as Jali (2025), Nisa' (2024), and Hasanah (2024), highlights the growing role of technology in enhancing accessibility and engagement. However, the field evidence suggests that digital tools are not replacements but rather complementary aids. This nuance underscores the importance of contextualizing theory in practice: the pesantren environment necessitates cultural acceptance, infrastructure readiness, and teacher competence, all of which significantly influence the success of digital innovations (Khoiroh et al., 2024; Zawawi, 2025). The divergence from purely digital models seen in other educational fields suggests that tahfidz learning represents a unique case where pedagogy and tradition intertwine inseparably.

Practically, the adoption of Tarteel AI has significant implications. It reduces teachers' workload by filtering basic tajweed errors, increases student autonomy, and sustains motivation through interactive features. However, challenges such as low digital literacy and weak infrastructure indicate that without systemic support, the application cannot reach its potential. This echoes findings from UNESCO (2021) on digital education in developing contexts, where access and readiness shape effectiveness more than technological sophistication alone. Hence, pesantren require targeted teacher training, improved connectivity, and tailored digital resources to maximize benefits (Aziz & Sain, 2025; Herlina, 2024). The implication is clear: digital innovation in tahfidz is less about replacing human authority and more about extending its reach.

From a theoretical standpoint, the persistence of teacher-centered methods despite technological interventions highlights the centrality of authority in Islamic pedagogy. Unlike secular education models, where technology often shifts learning toward autonomy, Qur'an memorization maintains the teacher as the verifier of accuracy and authenticity (Qushwa, 2024; Munawwaroh, 2024; Putri, 2023). This finding suggests that existing theories of blended learning need adjustment when applied to Islamic

contexts, where tradition and authority remain integral. Theoretically, this advances discourse by proposing a “guided autonomy” model, in which students gain independence in practice but remain anchored to teacher validation (Abdullah, 2024; Heru, 2024; Khaer, 2024).

In conclusion, the research makes both theoretical and practical contributions to the discourse on Qur’an memorization. It affirms literature on the primacy of teacher-guided methods while introducing new insights into the complementary role of digital tools. Theoretically, it extends blended learning concepts to religious education, highlighting cultural specificity. Practically, it offers a roadmap for pesantren: invest in infrastructure, develop curriculum-aligned applications, and provide ongoing digital training for teachers. Ultimately, the findings suggest that the future of tahfidz at institutions like PPTQ Muhammadiyah Ibnu Juraimi lies in a balanced integration of tradition and innovation, ensuring continuity of Qur’anic authenticity while embracing the affordances of technology.

CONCLUSION

This research concludes that the use of digital applications in Qur’an memorization at PPTQ Muhammadiyah Ibnu Juraimi, Yogyakarta, presents both opportunities and challenges. On the one hand, digital tools such as Tarteel AI offer valuable assistance in improving accuracy, efficiency, and learner engagement, while also complementing traditional methods like *tasmi’*, *wahdah*, and *talaqqi*. On the other hand, challenges such as limited technological infrastructure, teachers’ lack of technical skills, and the need for adaptation to the tahfidz curriculum remain significant barriers. The key lesson from these findings is the importance of integrating modern technology with classical pedagogical traditions to maximize the effectiveness of tahfidz learning.

From a scientific perspective, this study contributes to the growing body of literature on digital transformation in Islamic education, particularly in Qur’an memorization, by providing empirical evidence from the pesantren context. It highlights the relevance of balancing technology adoption with cultural and religious values in shaping effective learning models. However, this research has limitations, especially regarding its scope, which focuses only on one pesantren, and the reliance on qualitative interviews, which may not fully capture broader trends. Future research should expand to multiple institutions and apply mixed-method approaches to provide more generalizable insights into the role of digital applications in tahfidz education.

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