



Utilizing Digital Technology to Enhance Learning Quality in Salafiyah Pesantren: A Qualitative Case Study

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ABSTRACT

Pesantren as a traditional Islamic educational institution in Indonesia, plays a strategic role in shaping the character and intellectual development of its students (santri). However, the dynamics of globalization and advancements in digital technology demand that pesantren innovate their learning models to remain relevant to contemporary needs. The integration of digital technology in pesantren education has become an imperative to improve educational quality, broaden access to learning resources, and strengthen the integration between Islamic values and 21st-century skills. This study aims to explore the role of digital technology in enhancing the quality of learning in pesantren, which have long been known for their conventional teaching methods. The use of digital tools and platforms such as e-learning, educational apps, and social media has demonstrated significant potential in enriching students' learning experiences. This research employs a qualitative approach using case studies of several pesantren that have adopted digital technologies in their learning systems. Data were collected through in-depth interviews, participatory observations, and document analysis related to the learning process. Thematic analysis was used to identify patterns in technology utilization, supporting and inhibiting factors, and its impact on the learning process and outcomes. The findings indicate that digital technology integration enhances student engagement, facilitates access to learning materials, and enriches teaching methods. In conclusion, digitalization in pesantren education offers great potential to improve learning quality, provided it remains aligned with Islamic values and local cultural contexts.

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INTRODUCTION

Pesantren are the oldest and most influential Islamic educational institutions in Indonesia, proven to have successfully nurtured generations with strong moral character and deep religious knowledge. Traditionally, pesantren education is based on methods such as *sorogan*, *wetonan*, and *bandongan*, which heavily rely on direct interaction between *kiai* (Islamic clerics) and *santri* (students). However, amid the rapid pace of global digital transformation and the demands of the Fourth Industrial Revolution (Industry 4.0), pesantren face significant challenges in adapting to information technology in order to remain competitive with other educational institutions. This transformation is no longer an option but a necessity to ensure that pesantren education remains relevant, inclusive, and competitive in the digital era [1][2].

In the era of Industry 4.0, the use of digital technology in education has become indispensable for improving learning quality. Globally, educational institutions have integrated information and communication technologies (ICT) into teaching and learning processes to enrich methods, expand access to information, and accelerate knowledge transfer [3][4].

However, in the context of pesantren—traditional Islamic institutions deeply rooted in classical learning practices—the adoption of digital technology still faces numerous challenges.

In recent years, some pesantren have begun to adopt digital technology for both learning and administrative purposes. The use of Learning Management Systems (LMS), video conferencing applications such as Zoom or Google Meet, and even social media platforms has emerged as new tools for delivering lessons and fostering communication between teachers and students. Bahri and Wahid argue that *kyai* leadership plays a strategic role in encouraging digital adoption within pesantren, including the modernization of administrative services and online learning [5]. Similarly, Nugroho and Astutik found that the use of digital learning applications in *tahfidz al-Qur'an* education significantly increases student motivation and engagement, especially in hybrid learning contexts [6].

Nevertheless, the adoption of digital technology in pesantren has not been without difficulties. Many pesantren continue to face serious obstacles, such as limited internet access, low levels of digital literacy among teachers, a lack of technical support, and concerns that digitalization may erode the traditional values that pesantren have carefully preserved [7]. Moreover, most pesantren still rely on independent initiatives without standardized digital curriculum guidelines. Barid et al., highlight that the main challenge in integrating digital technology into pesantren is striking a balance between educational modernization and the preservation of Islamic values deeply embedded in local culture [8].

Field observations and educational reports indicate that many pesantren experience gaps in fully utilizing technology to improve learning quality [9]. This is largely due to infrastructural limitations [10], insufficient training for educators in technology use [11], and concerns about the degradation of traditional values [12]. Of approximately 42,000 pesantren in Indonesia, only about 250 have received digitalization support from the Ministry of Religious Affairs as of 2025. This reflects a significant empirical gap in the uneven application of digital technology in pesantren, which contributes to disparities in learning quality compared to other educational institutions.

On the other hand, although many studies have addressed technology integration in general education and madrasah [13][14][15][16][17][18][19]. Research specifically focusing on digital technology adoption in pesantren remains limited. Most existing literature has concentrated on pesantren management or curriculum implementation of classical Islamic texts (*kitab kuning*), without thoroughly examining strategies, models, and the concrete impact of digital technology on learning quality in pesantren. Furthermore, few studies have explored integrative approaches that consider the unique characteristics of pesantren, such as the *kyai-santri* relationship, the tradition of *sanad* transmission, and the *halaqah* system. This lack of research indicates a significant research gap, particularly concerning the adaptation of digital technologies aligned with pesantren's local values. Accordingly, this research goes beyond a merely descriptive account by offering a critical examination of digitalization strategies tailored to the unique characteristics of pesantren, while simultaneously seeking to improve learning quality with a particular focus on Salafiyah institutions. This addition strengthens the novelty and academic positioning of the study.

Several previous studies illustrate both opportunities and challenges in this area. Musa et al., in his study titled *Integration of Digital Technology in the Learning of Classical Islamic Texts at Traditional Pesantren*, employed Rogers' theory of technology adoption and blended learning concepts. Using a qualitative case study with an ethnographic educational approach, data were collected through in-depth interviews, participant observation, and documentation [20]. The study found that digital tools such as Zoom, Google Classroom, and digital *kitab* applications addressed time and space limitations in learning. Both students and teachers demonstrated

high enthusiasm, given the ease of access to materials. However, the study emphasized that digital integration is effective only when accompanied by proper training and infrastructure.

Hasanah and Putri, in their collaborative study *Digitalization of Islamic Education in Traditional Institutions: An Analysis of Learning Transformation in Salafiyah Pesantren*, drew upon Bates' theory of digital transformation in education, concepts of digital literacy, and transformative education. Using a descriptive qualitative approach with semi-structured interviews (15 respondents, including teachers, students, and *kyai*) and non-participant observation, the study found that digitalization remains uneven due to gaps in digital literacy [21]. However, in some pesantren, the use of visual media and online learning increased interactivity and expanded access to global knowledge. The study emphasized that digital technology can transform Islamic education if implemented inclusively and contextually.

Imjai et al., in his study *The Use of Digital Media in the Learning Process of Santri: A Case Study of Salafiyah Pesantren in East Java*, applied social constructivism theory (Vygotsky) and technology-based learning models. Using a phenomenological qualitative approach with data collected through in-depth interviews and three months of field observation, the study demonstrated that digital media such as instructional videos, recorded lectures, and pesantren-based educational applications enhanced student participation, particularly in independent learning [22]. Digital media served as a bridge between pesantren's traditional methods and the demands of the digital era. The study recommended that pesantren develop locally-based digital content and involve students as content creators to increase active participation and digital awareness. These additions not only enrich the literature review but also provide a stronger foundation for the research gap and justify the study's objectives.

Collectively, these studies indicate that digital technology has significant potential to improve learning quality in *Salafiyah pesantren*, despite persistent challenges such as infrastructural constraints and limited digital literacy. They consistently highlight the importance of teacher training, cultural adaptation, and systemic support in the digitalization of learning within traditional pesantren.

Against this backdrop, there is a clear need for more comprehensive studies on the use of digital technology in pesantren education. Previous research has often focused narrowly on technical aspects or isolated case studies, without offering integrative approaches that can be applied systematically across different pesantren models. Therefore, this article seeks to fill this gap by critically exploring the extent to which digital technology has been, and can be, utilized to improve learning quality in pesantren, what challenges are faced, and what strategies and recommendations can be proposed to promote effective and context-sensitive digitalization.

Accordingly, this study is relevant both empirically and conceptually in addressing gaps in the literature while proposing strategies for digital technology adoption in pesantren education. The article aims to explore the use of digital technology in improving learning quality in pesantren, highlight best practices, analyze implementation challenges, and provide strategic recommendations to support digital transformation that remains consistent with the traditional values that form the core identity of pesantren.

METHOD

This study employs a descriptive qualitative approach with a case study design. Such an approach enables an in-depth exploration of the use of digital technology in the teaching and learning processes within the pesantren context in a natural and contextual manner [23]. The primary focus is to describe the strategies, challenges, and impacts of technology use on teaching and learning activities in pesantren.

The type of research applied is exploratory qualitative research, which aims to gain a comprehensive understanding of the actual practices of digital technology integration as well as the perceptions of educational stakeholders toward this process.

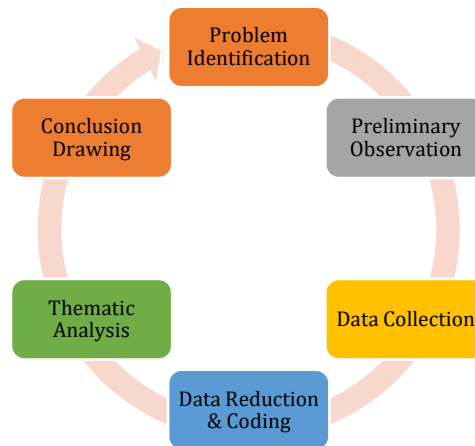


Figure 1. Research Design and Procedures

The research subject is Pondok Pesantren Mambaul Ulum, located in Paiton, Probolinggo, East Java. The selection of this site is based on the fact that the pesantren has adopted digital technology in both formal and non-formal learning activities. The research informants consist of 75 teachers/instructors actively using digital platforms in their teaching practices and 520 students involved in the use of digital learning applications.

Data collection techniques include semi-structured interviews with teachers and students, direct observation of technology-based learning activities, and document analysis of digital teaching materials, platforms used, and internal pesantren policies related to digital learning. Additional data are also obtained from institutional documents such as curricula and instructional materials. This approach allows for a holistic exploration of how digital technology is integrated into the learning process.

The research instruments consist of an interview guide and observation sheets, designed based on the framework of the Technology Acceptance Model (TAM) and Technological Pedagogical Content Knowledge (TPACK), which emphasize the relationship between pedagogy, content, and technology [24][25]. Data analysis is conducted using the Miles and Huberman thematic analysis model, which comprises three stages: data reduction, data display, and conclusion drawing/verification. Source and methodological triangulation are employed to enhance the validity of the findings [26].

RESULTS AND DISCUSSION

RESULTS

Based on data collected through observation, interviews, and documentation at Pondok Pesantren Mambaul Ulum, Paiton, Probolinggo, five key findings were identified regarding the utilization of digital technology in learning:

Adoption of Digital Technology in the Pesantren Learning Environment

Pondok Pesantren Mambaul Ulum has utilized digital technology in several aspects of education. In formal education settings, such as *madrrasah aliyah* and higher education institutions under the pesantren's management, Learning Management Systems (LMS) such as Moodle and Google Classroom serve as the primary tools for managing teaching materials,

assignments, and online examinations. In addition, applications such as WhatsApp and Telegram are widely used as informal communication channels between teachers and students to share announcements or engage in light discussions. Some teachers also use platforms like YouTube to upload video-based learning materials that can be revisited by students.

User Segmentation and Adaptation Patterns

Different patterns of technology adoption were observed across teacher groups. Younger teachers (aged 25–40) tend to be more open and proactive in integrating technology into the teaching and learning process. They are also more skilled in designing interactive, digitally based materials. In contrast, senior teachers generally show resistance, either due to limited technological skills or concerns about the potential degradation of traditional learning values. On the students' side, most active users are from the *Aliyah* level and higher, with a high frequency of technology use, particularly during project-based learning sessions.

Enhanced Engagement and Accessibility in Learning

Students demonstrated greater engagement in digital learning. They reported finding it easier to understand material delivered in visual and interactive formats. The use of instructional videos, online quizzes, and discussion forums reinforced conceptual understanding and increased participation, especially among students who are typically passive in face-to-face learning [27]. Moreover, accessibility became more flexible, as students were able to review materials at any time via smartphones or pesantren-owned computers.

Structural and Cultural Challenges

The challenges identified include limited internet connectivity in some areas of the pesantren, insufficient digital devices (with some students lacking personal gadgets), and a lack of intensive and systematic training programs for teachers. From a cultural perspective, there remains a perception that digital learning is less “blessed” (*kurang berkah*), as it reduces direct interaction between teacher and student, which has traditionally been regarded as a transmission of values and ethics (*adab*), not merely the transfer of knowledge.

Impact on the Quality and Process of Learning

Although a total transformation has not yet occurred, the integration of technology has brought about changes in classroom dynamics: students have become more active and independent, teachers are better facilitated in distributing materials, and a variety of teaching methods have emerged that were previously unavailable. These changes have contributed to improving the quality of the learning process, particularly in terms of time efficiency, flexibility of learning resources, and monitoring of learning outcomes.

DISCUSSION

The findings of this study generally support the initial hypothesis that digital technology can enhance the quality of learning in pesantren, provided that its implementation is carried out gradually, contextually, and with careful consideration of the balance between innovation and the pesantren's traditional values.

Teachers at the pesantren reported that the use of digital technology, such as projectors and online learning platforms, has improved teaching effectiveness. As stated by teacher AD, with the use of projectors, students became more engaged in learning, as they could view images and videos that made the material more appealing. Likewise, teacher MQ explained that online platforms facilitated easier access to teaching materials and assignments, enabling students to retrieve them at any time.

Nevertheless, several challenges were also expressed by teachers in the implementation of online learning. Teacher AM highlighted that many instructors lacked sufficient training, making it difficult for them to operate digital devices effectively. This underscores the need for continuous and structured training to maximize the potential of these technologies [28]. Additionally, reliance on technology poses a challenge when not synergized with teachers' digital competencies; if devices malfunction, the learning process may be disrupted.

Students demonstrated varied responses to the use of technology in learning. In terms of learning motivation, student DT reported that the use of multimedia in teaching made learning more motivating, as videos and images facilitated better understanding of the material. Regarding active participation, observational data indicated that students felt more confident in asking questions during class. As student VP explained, the presence of technology reduced their hesitation to speak up; when they did not understand certain materials, they could immediately search for additional information online.

Concerning limited access, observations revealed that some students complained about the lack of internet access at home, which hindered their ability to study independently. In contrast, internet access at the pesantren, though regulated by institutional policies, provided better opportunities compared to the absence of internet at home. Student BT pointed out the difficulty of using online platforms, as some students were unfamiliar with these applications and often felt confused when navigating them.

Table 1. Synthesis of Research Findings, Scientific Interpretations, and Pesantren Context

Field Findings	Scientific Interpretation	Implications in the Pesantren Context
The use of LMS, Google Classroom, and social media as learning tools.	The emergence of a blended learning ecosystem based on the TPACK framework.	Pesantren have begun adopting modern pedagogical approaches without abandoning classical systems.
Younger teachers are more adaptive, while senior teachers show resistance.	Technology adoption is influenced by age, digital literacy, and cognitive flexibility (based on the TAM framework).	There is a need for cross-generational and contextual training programs.
Students actively participate in digital discussions and use supplementary learning applications.	As digital natives, students drive cultural change in learning.	A culture of independent learning is emerging, which was previously less developed in the pesantren environment.
Barriers: limited internet, limited devices, and lack of comprehensive training.	Structural and systemic issues in managing digital transformation within tradition-based educational institutions.	Pesantren need policies to strengthen infrastructure and provide sustainable support for digital transformation.
The perception among some groups that digital learning is less "blessed" (<i>kurang berkah</i>).	A value dissonance exists between technological modernization and spiritual-pedagogical traditions.	Technology integration must be aligned with religious narratives and the ethical-adab values unique to pesantren, not merely technical aspects.

Relevance to Research Objectives

The main objective of this study was to explore the extent to which the use of digital technology can support improvements in the quality of learning in pesantren. The findings indicate that technology has made a tangible contribution to easier access to materials, more

effective learning interactions, and increased student participation. Thus, the research questions are addressed by empirical evidence showing that digital integration in pesantren learning is not only feasible but also has a positive impact.

The findings of this study are consistent with the literature emphasizing the potential of digital technology to enhance the quality of learning, particularly within Islamic educational institutions. Setiawan and Rachma demonstrated that the use of digital media fosters students' participation in independent learning [29], a phenomenon also observed in this study through increased activeness and confidence among santri when using LMS platforms and video-based applications. Similarly, the study by Saini, which highlights the importance of digital literacy and teacher training, is relevant to the challenges identified in the field [30], namely the limited digital competence among senior teachers.

Scientific Interpretation of the Findings

From a scientific perspective, the integration of digital technology in pesantren suggests a pedagogical shift—from one primarily based on oral transmission and repetition to one increasingly shaped by media, multimodality, and interactivity. This aligns with the TPACK framework (Technological Pedagogical Content Knowledge), which emphasizes the importance of integrating technology, content, and pedagogy. Teachers who master all three dimensions are more likely to create meaningful learning experiences.

Furthermore, although blended learning approaches in pesantren are not yet fully systematic, they reveal significant potential to diversify teaching methods. Online quizzes, asynchronous discussions, and instructional videos serve as tools that enable students with visual and kinesthetic learning styles to engage more effectively compared to traditional lecture-based methods. Nevertheless, the success of technology cannot be separated from its socio-cultural context. In pesantren, teacher–student interaction is not limited to the transfer of knowledge but also encompasses the internalization of values, spirituality, and ethics. Therefore, online learning cannot completely replace physical interaction; rather, it functions as a complement.

Consistency and Divergence with Previous Studies

Compared to research conducted in modern formal institutions, such as urban public or private schools, digital integration in pesantren follows a different pattern. In many modern institutions, technology adoption progresses rapidly due to established infrastructure and supportive policies. By contrast, in pesantren settings such as Mambaul Ulum, technology adoption requires compromises between digital efficiency and the preservation of traditional values. Nonetheless, these findings are consistent with those of Widodo and Husni, who reported that students are more receptive to digital learning than senior teachers [31]. This demonstrates that the digital-native generation holds significant potential to drive pesantren's digital transformation, provided that it is accompanied by gradual teacher training.

However, this study also highlights a unique aspect that is rarely discussed in the general educational literature: the perception among some teachers and students that online learning is considered less *berkah* (blessed) because it reduces direct interaction with the *kyai*. This indicates that the adoption of technology in pesantren cannot be separated from the spiritual–pedagogical dimension that characterizes these institutions, distinguishing them from formal schools. Therefore, digitalization in pesantren must be designed not only for technical efficiency but also in alignment with the values of *adab* (ethics) and the tradition of *sanad* (knowledge transmission). On the other hand, there is an important distinction regarding perceptions of “blessing” (*barakah*) and the quality of *adab* (ethics) in online learning—concerns that rarely appear in studies of general educational institutions. This highlights the necessity for digital transformation in pesantren not to be guided solely by technological efficiency but also to remain aligned with the distinctive educational philosophy of pesantren.

Critically, this study has certain limitations. First, the research was conducted in only one pesantren in East Java, making the findings less generalizable to all pesantren across Indonesia, which are characterized by diverse traditions and infrastructural capacities. Second, although the number of informants was relatively large, the sample was dominated by young teachers and *santri aliyah* (upper secondary students), and therefore did not fully represent the experiences of all layers of students and senior teachers. Consequently, further research is recommended to be conducted comparatively across different pesantren—both *Salafiyah* and *Khalafiyah*—in various regions, involving multiple generations of teachers, students, as well as the support of governmental policies. Such cross-site studies would provide a more comprehensive understanding of the patterns of adoption, challenges, and sustainability strategies of pesantren digitalization.

CONCLUSIONS

This study concludes that the use of digital technology at Pondok Pesantren Mambaul Ulum has made a significant contribution to improving the quality of learning, in terms of material accessibility, interaction effectiveness, and active student participation. These findings directly address the research objective, namely to explore the extent to which digital technology can enhance the quality of learning in pesantren. By integrating both traditional and digital pedagogical approaches, pesantren are able to create a contextual hybrid learning model without losing their distinctive values.

From a scientific perspective, this study extends the understanding that integrating technology into tradition-based institutions is not only possible but can serve as a catalyst for change if implemented gradually, accompanied by teacher training, and supported by adequate infrastructure. The scientific justification of this research lies in its emphasis that educational digitalization cannot be treated as a generic solution; rather, it must be developed adaptively in accordance with local culture. For future development, it is recommended to conduct further experiments testing the effectiveness of TPACK-based blended learning models across a greater number of pesantren with different characteristics, as well as involving students in the design of culturally and spiritually relevant learning technologies.

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