

Program Evaluation Study on Islamic Religious Education in Pesantren: Addressing Educational Degradation in the Digital Era

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ABSTRACT

Purpose – This study aims to evaluate the forms and underlying causes of educational degradation in *pesantren* (Islamic boarding schools) within the context of the digital era. It is to identify Islamic Boarding schools which are prepared to adopt technology in their teaching systems

Design/methodology/approach – The study employed a program evaluation method using a formative evaluation model. Data collection and analysis were conducted through a mixed-methods approach. Quantitative data were gathered through questionnaires and analyzed using descriptive statistics, while qualitative data were collected through in-depth interviews and analyzed thematically.

Findings – The evaluation results revealed that the average scores for the aspects related to educational degradation and its contributing factors were extremely low, at only 16.4% and 19.5%, respectively. These findings suggest that the limited use of technology in *pesantren* teaching reflects an institutional decline. This condition is attributed to inadequate infrastructure, low digital literacy, resistance to cultural change, and the absence of curricula and policies aligned with contemporary developments. The study highlights the urgent need for strategic interventions to enhance infrastructure, digital competence, and curriculum reform to prevent *pesantren* from falling further behind in the digital era.

Research implications/limitations – The study implies that the low level of digital adoption necessitates strategic planning for infrastructure provision and teacher training to improve digital literacy. However, the study is limited in scope to the analysis of Islamic education degradation within *pesantren*. Future research should consider broader investigations using inferential statistical analysis to measure the impact of technology adoption across different *pesantren* contexts.

Originality/value – This research offers a novel contribution by proposing a data-driven approach, the use of digital platforms, and innovation in teaching methods as practical solutions to ensure the continuity of Islamic education in *pesantren* without compromising its core spiritual values.

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Introduction

The digital era has brought profound changes across multiple aspects of life, including the academic setting or education (Reis-Andersson, 2024; Wiseman, 2022). The transformation of information and communication technologies presents both challenges and opportunities for traditional educational institutions such as *pesantren* (Islamic boarding schools) (Boskovic et al., 2023; Ilin, 2022). On one hand, digitalization can be harnessed to expand the reach of religious outreach (*dakwah*), enrich pedagogical methods, and strengthen knowledge networks (Zhang & Wu, 2025). On the other hand, many *pesantren* continue to experience significant gaps in adapting to these changes ranging from limitations in human resources and geographic constraints (Darwanto et al., 2024), to low technological literacy among teachers and students (Maulidati & Abbott, 2024), and even cultural and educational priorities that hinder transformation (Zainal et al., 2022). These challenges raise concerns over potential degradation in the *pesantren* education system if not addressed through strategic and systematic interventions.

Previous studies highlighted the critical role of *pesantren* in shaping national character and promoting interreligious tolerance (Huda, Widodo, & Aseri, 2024), as well as in safeguarding the values of moderate Islam (Azizah et al., 2023). Islamic education scholars have also identified *pesantren* as moral strongholds in society, institutions that not only teach religious knowledge but also instill values of social ethics, nationalism, and environmental awareness (Ma'arif et al., 2025). In the context of counter-radicalization, *pesantren* are often positioned as strategic partners of the state in disseminating peaceful and inclusive interpretations of Islam (Mukhlis et al., 2024; Saleh, 2025). However, this significant contribution is at risk of decline if *pesantren* are unable to modernize and align their teaching systems with contemporary developments (Ma'arif et al., 2025).

Despite its importance, there is a lack of in-depth research specifically evaluating the degradation of *pesantren* education systems in response to digital change. Most existing studies tend to focus on historical trajectories, human resource constraints, geographical challenges (Darwanto et al., 2024), traditional curricula (Zainal et al., 2022), or the social role of *pesantren* (Azizah et al., 2023). Meanwhile, the institutional response of *pesantren* to the digital era particularly in terms of educational systems remains underexplored. Yet, evaluating existing or ongoing educational programs is crucial to assessing institutional readiness, measuring adaptation success (Al-Rikabi & Montazer, 2024; Tran & Nguyen, 2021), and formulating appropriate strategies to address the decline in teaching quality in a rapidly digitizing world.

This study is positioned as an evaluative inquiry focusing on the degradation of *pesantren* in teaching systems within the digital era, an aspect that remains underexplored in Islamic education research. Whereas most previous studies examined *pesantren* through the lens of limited human resources and geographical constraints (Darwanto et al., 2024), traditional curricula (Zainal et al., 2022), or the social role of *pesantren* (Azizah et al., 2023), this research contributes a new perspective by investigating how Islamic education in *pesantren* responds to the challenges of digitalization in everyday teaching practices. The significance of this study lies in the fact that *pesantren* one of the principal pillars of Islamic

education in Indonesia (Sirojuddin & Ghoni, 2025) risks falling behind if it fails to adapt to technological developments. The evaluation conducted in this study not only provides a factual account of the forms and factors contributing to such degradation but also offers both theoretical and practical foundations for formulating strategies to strengthen Islamic education in *pesantren* so that it remains relevant, competitive, and contributive to national educational development in the digital era.

Methods

Research Design

This study employed an evaluative research design with a mixed-methods approach, combining both quantitative and qualitative strategies to ensure a comprehensive understanding of the phenomenon under investigation (Brooks et al., 2023; Prosek, 2020). The research was positioned as an evaluative case study, focusing on Islamic boarding schools (*pesantren*) as unique educational institutions that are simultaneously rooted in tradition and confronted with the challenges of digital transformation.

The evaluative framework adopted in this study was the Responsive Evaluation Model developed by Stake (Abma, 2006; Abma & Stake, 2001) used by Arifin (2019) and Ambiyar and Dewi (2019). This model was adopted because it provides critical insights into the strengths and weaknesses of educational programs while also generating actionable recommendations for institutional improvement. In line with previous studies, the evaluation integrated both quantitative and qualitative approaches to strengthen validity and capture the multidimensional nature of the phenomenon (Ambiyar & Dewi, 2019; Brooks et al., 2023; Elwy et al., 2020; Prosek, 2020).

Participants

The participants of this study consisted of a *Kyai* (senior religious teacher), *Mudabbir* (junior teachers), and *murid* (students) from a *pesantren* (Islamic boarding school) located in Jambi, Indonesia. Participants were selected using purposive sampling, resulting in 64 respondents completing the questionnaire (21 male and 43 female). Additionally, seven individuals were selected for in-depth interviews: one *Kiyai*, two *Mudabbir*, and four *murid*. Selection criteria included: active teaching experience of at least three years, age representation across two cohorts (18–50 years and 51–76 years), and willingness to participate openly. To ensure confidentiality, participant names were anonymized and replaced with codes: P1 through P7.

Data Collection

To ensure its appropriateness, this study used content validity which was assessed by expert judgement. There were two experts on Islamic education evaluation and instructional technology. They provided feedback on the alignment of the items with the research indicators. The expert review confirmed the overall feasibility of the instrument,

with only minor editorial revisions required. Subsequently, reliability testing was conducted using Cronbach's Alpha with the assistance of SPSS version 27. Second, in-depth interviews were conducted through direct interaction with participants to explore their detailed perspectives and experiences regarding the forms of instructional degradation and the underlying factors contributing to such degradation in *pesantren* during the digital era. The collection of both quantitative and qualitative data in this program evaluation study was conducted in a flexible manner (Bragstad et al., 2019; Tomei, 2023). Third, a literature review was undertaken by systematically searching scholarly articles from online databases such as Scopus, which involved initial exploration, source selection, and the organization of information to ensure its relevance to the research objectives.

Data Analysis

Data analysis in this study employed both quantitative and qualitative approaches. Quantitative analysis was conducted using SPSS Statistics version 27 and involved several systematic steps. First, data were collected from the research instruments. Second, the data were cleaned to ensure accuracy and to remove errors such as duplicate entries and incomplete responses. Third, the data were organized in tabular form. Fourth, descriptive statistics, including percentages, means, and standard deviations, were computed. The responses were scored using a binary model, where "yes" answers were coded as 1 and "no" answers as 0, following Naga (1992). Fifth, the evaluation results were presented in tables for clarity. In addition, the quantitative analysis was guided by predetermined evaluation criteria (Teasdale, 2022). To establish these criteria, a classification table was constructed, dividing the 100-point scale into five interpretative levels of evaluation outcomes (Dogan, 2018; Kuznetsova, 2019). The determination of interval groupings followed Arifin (2019), as outlined in Table 1.

Table 1. Evaluation criteria

No	criteria	category
1	80 – 100%	Very high/very good
2	70 – 79%	high/good
3	60 – 69%	sufficient
4	50 – 59%	Low/less
5	< 50 %	Very low/least

Subsequently, qualitative data analysis was carried out through the following stages. First, interview results were grouped and organized based on their relevance to the quantitative findings. Second, thematic analysis (Lochmiller, 2021) was conducted to trace recurring themes or patterns that could explain and enrich the interpretation of the quantitative evaluation results. Third, qualitative findings were integrated to deepen the understanding of phenomena reflected in the numerical data. Fourth, triangulation was performed by comparing and cross-verifying the qualitative and quantitative data to ensure consistency and validate the research results. In the final stage, the findings were

compiled into a report that presented both quantitative data and qualitative narratives in a cohesive and integrated manner.

Result and Discussion

1. Forms of Educational Degradation in *Pesantren*

The evaluation of educational degradation in *pesantren* was based on the following eight indicators: (1) the availability of access and technological infrastructure, (2) the level of digital literacy among teachers (*guru*) and students (*santri*), (3) the degree of acceptance of technology and efforts to integrate it with classical teaching traditions, (4) the extent to which the curriculum accommodates the use of digital learning resources, (5) the adaptability and optimism of a senior religious leader (*Kiyai*), teachers, and administrators toward digital learning, (6) the presence of clear institutional guidelines, regulations, or policy directions, (7) the development of partnerships with external stakeholders to enhance digital capacity, and (8) the implementation of a technology-based system for evaluating learning. The results of this evaluation are presented in Table 2.

Table 2. The evaluation results regarding the forms of degradation in the *pesantren*

No	Quantitative Data				Std. Dev.
	Statements	N	<i>n_{yes}</i> %	<i>n_{no}</i> %	
1	<i>Pesantren</i> are equipped with technological access and infrastructure, including computers, projectors, and internet connectivity.	64	17.2	82.8	.380
2	Teachers and students demonstrate adequate levels of digital literacy, enabling effective implementation of technology-enhanced learning processes.	64	10.9	89.1	.315
3	<i>Pesantren</i> exhibit openness to the use of technology and strive to integrate it with traditional instructional methods, such as <i>halaqah</i> and <i>sorogan</i>	64	28.1	71.9	.453
4	The <i>pesantren</i> curriculum accommodates the use of digital learning resources and fosters the development of critical thinking, collaboration, and digital skills.	64	34.4	65.6	.479
5	Kyai (spiritual leaders), teachers, and administrators exhibit adaptive and optimistic attitudes toward the digitalization of education	64	12.5	87.5	.333
6	<i>Pesantren</i> have clear guidelines, regulations, or policy frameworks to support the integration of technology into teaching and learning practices	64	9.4	90.6	.294
7	Collaborative partnerships are established between <i>pesantren</i> and external entities, including government bodies, higher education institutions, and technology organizations, to enhance digital capacity.	64	10.9	89.1	.315
8	<i>Pesantren</i> implement evaluation systems that leverage technology, allowing for modern and accurate assessment of student learning outcomes.	64	7.8	92.2	.270
			16.4	83.6	

Table 2 presents the evaluation results regarding the forms of degradation in the *pesantren* teaching system in relation to digital adoption, revealing a very low average score of 16.4%. This figure reflects the weak structural, cultural, and pedagogical readiness of *pesantren* in responding to the challenges of the digital era. The detailed evaluation outcomes concerning the forms of degradation in the *pesantren* teaching system are described below.

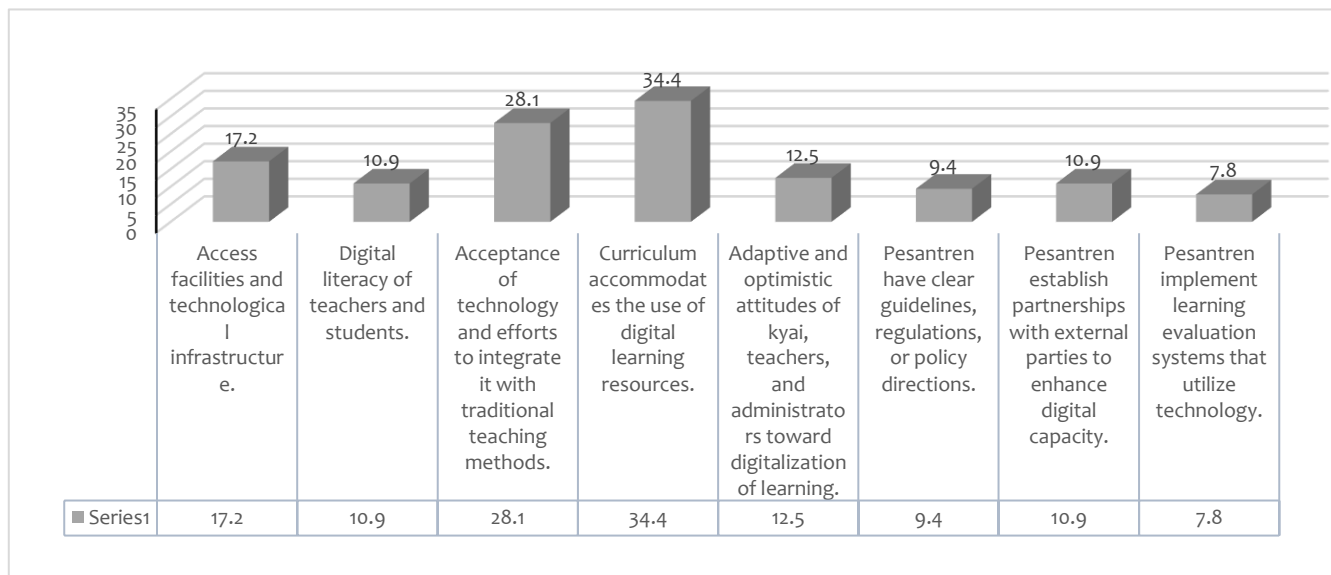


Figure 1. Evaluation Results of *Pesantren* Educational Degradation

Figure 1 presents the evaluation results for each indicator of *pesantren* educational degradation in relation to digital adoption. The first indicator, technological infrastructure and access, received a score of only 17.2%, reflecting the limited availability of essential tools such as computers, projectors, and internet access. This deficiency directly hinders digital engagement in the teaching and learning process. Supporting this, participant P1 stated,

“...we don’t have computers or digital devices for learning. Even for administrative tasks, we still use handwriting. We have no internet access.”

The second indicator, digital literacy among teachers and students, was evaluated at just 10.9%, indicating low competency in using digital platforms or tools for educational purposes. As P3 explained

“...most teachers have never attended training on technology or digital teaching. They are used to traditional methods and lack confidence in using devices like laptops or projectors. Many cannot even create basic presentations. So, when it comes to e-learning or online education, it is still far from practice in this *pesantren*.” P5 further added

“...we learn using *sorogan* and *halaqah* models daily, and that has long been the tradition. We’ve never used learning apps or digital platforms like Google Classroom or Moodle. Even WhatsApp is rarely used for coordination because many students don’t own mobile phones.”

The third indicator, integration of technology with classical teaching traditions, scored 28.1%, revealing both skepticism and resistance toward blending traditional and modern pedagogies. According to P1

“...we don’t reject technology outright, but we are concerned it may reduce the spiritual focus during Qur’anic recitation. If students use gadgets or laptops too often, their concentration might suffer, which affects the blessings of learning. Therefore, we remain cautious and limit technology use within the *pesantren* environment.”

The fourth indicator, curriculum responsiveness to digital challenges, received a score of 34.4%, indicating that the *pesantren* curriculum has not yet embraced digital learning resources or fostered critical thinking, collaboration, and technological literacy. P5 stated

“...our curriculum mainly emphasizes memorization. We don’t have any subjects dedicated to digital skills, critical thinking, or collaboration. Even textbooks or teaching materials are limited mostly classical *kitab salaf*, without digital or multimedia support.”

The fifth indicator, adaptive attitudes of school leaders and teachers toward digitalization, scored only 12.5%, reflecting a generally passive or even skeptical stance from administrators. As P7 explained

“...many teachers think technology is for urban youth. They feel content with the methods taught by their own teachers in the past, and don’t see the need to learn new technologies or build digital competence. Some even believe that technology could negatively affect students’ morals if left unchecked.”

The sixth indicator, policy and regulatory support for digital learning, had the second-lowest score at 9.4%, indicating an absence of official documents or institutional guidelines promoting digital integration. P6 shared,

“...as far as I know, I’ve never seen any rules or announcements from the *pesantren* specifically regulating or encouraging the use of technology in teaching. There’s no Standard Operating Procedure (SOP), no internal training, and no internet usage policy. Everything is informal and relies on individual teacher initiative.”

The seventh indicator, external partnerships for digital development, received a score of 10.9%, signaling that *pesantren* rarely, if ever, collaborate with external institutions to support digital transformation. According to P4

“...to my knowledge, there has never been any formal collaboration with universities, education departments, or technology training institutions.”

Finally, the eighth indicator, technology-based learning evaluation systems, recorded the lowest score at 7.8%, showing that student assessments are still conducted entirely through conventional means without digital tools. Participants P2 and P3 explained

“...we usually conduct oral exams. We’ve never used testing apps, Google Forms, or online assessment systems to evaluate student performance. There are no devices available, and teachers are not yet familiar with using computers to create or analyze test results.”

2. Factors Contributing to the Decline of *Pesantren* Institutions

The decline of *pesantren* institutions can be attributed to several interrelated factors, which have been evaluated based on four primary indicators (1), many *pesantren* face challenges in fulfilling the basic technological infrastructure necessary to support modern educational practices. (2), there are insufficient efforts to improve foundational

digital literacy skills among both educators and students. (3), *pesantren* often struggle to effectively integrate technology with their classical teaching traditions, resulting in a disconnection between traditional values and contemporary methods. (4), the development of a curriculum that enhances critical thinking, collaboration, creativity, and the effective use of technology remains limited. These combined factors illustrate the complexity of *pesantrens* degradation in the face of educational modernization. The results of this evaluation are summarized in Table 3.

Table 3. Evaluation Results of the Factors Contributing to the Decline of *Pesantren* Institutions

No	Quantitative Data				
	Statements	N	<i>n_{yes}</i> %	<i>n_{no}</i> %	Std. Dev.
1	<i>Pesantren</i> are making efforts to provide basic technological facilities, such as computers, projectors, internet networks, and technology-based learning spaces	64	34.4	65.6	.479
2	Teachers and students are striving to enhance their basic digital skills, including the use of computers or laptops and the operation of educational applications	64	20.3	79.7	.406
3	Efforts are being made by teachers and students to integrate technology use with traditional instructional methods commonly practiced in <i>pesantren</i> , such as <i>sorogan</i> and <i>halaqah</i> .	64	17.2	82.8	.380
4	<i>Pesantren</i> are working to develop curricula that strengthen 21st-century competencies, particularly critical thinking, collaboration, creativity, and the effective use of technology in the learning process.	64	6.2	93.8	.244
Average			19.5	80.5	

Table 3 indicates that the factors contributing to the decline of *pesantren* in terms of their instructional systems and the adoption of digital technology are at a critically low level, with an average score of only 19.5%.

This result reflects the weak internal preparedness of *pesantren* in responding to the challenges of educational digitalization. The detailed evaluation of these contributing factors is presented as follows.

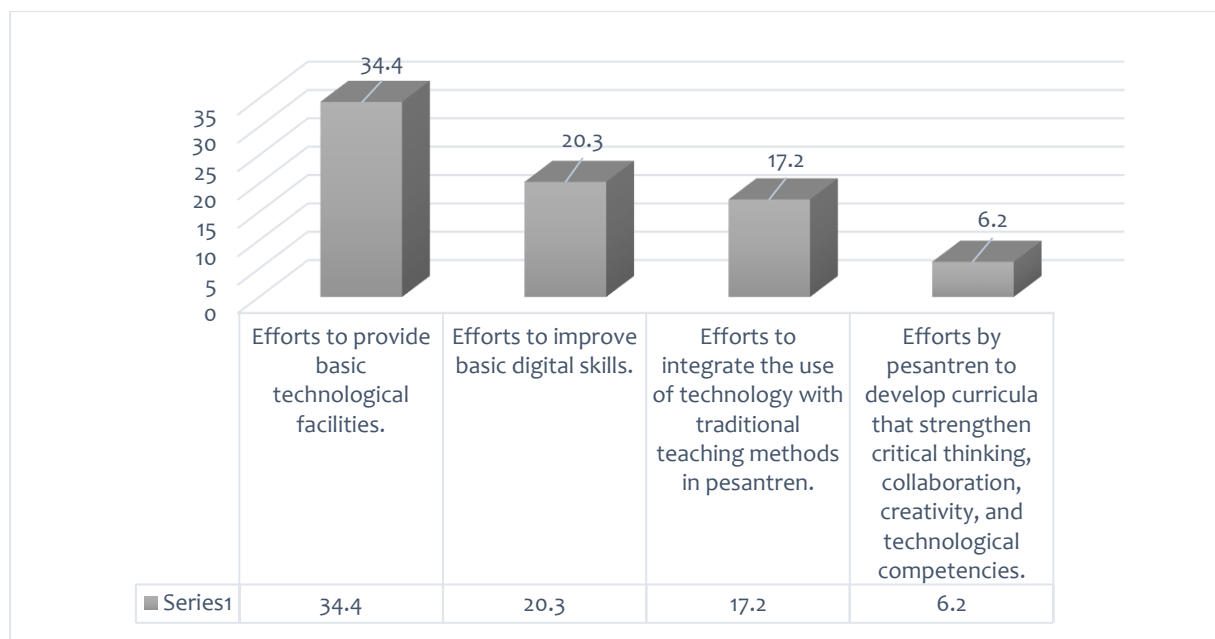


Figure 2. Evaluation Results of the Factors Contributing to the Decline of *Pesantren*

The first indicator, which assesses *pesantren* efforts in providing basic technological infrastructure such as computers, projectors, internet connectivity, and technology-based learning spaces, recorded a score of only 34.4%. This figure highlights that the lack of digital infrastructure remains a major obstacle to technology-enhanced learning. This condition was affirmed by Participant 1 (P1), who stated:

“... Facilities like computers or projectors are not yet available here. We only have a few fans in the classroom. There is also no internet. So, if students want to access materials online, they usually use their own phones if they even have one and have enough data.”

The second indicator reflects the low initiative among teachers and students to improve basic digital skills, with a score of 20.3%. This suggests a serious lack of training and support in technological mastery. Participant 3 (P3) reinforced this condition:

“... I only recently learned how to create PowerPoint slides, and that was because a friend from outside helped me. Most of the senior teachers still rely on traditional methods like writing on the board. The students, too, are not accustomed to using laptops or digital learning applications.”

For the third indicator, *pesantrens* capacity to integrate technology with classical teaching traditions was found to be extremely low, with a score of 17.2%. This indicates the presence of cultural resistance to digital learning approaches. Participants 4 and 7 (P4 and P7), expressed:

“... Reciting the Qur'an requires concentration and tranquility. Using a phone or laptop changes the atmosphere. Many teachers feel that digital methods disrupt focus, so they prefer traditional ways instead.”

Finally, the fourth indicator, which evaluates the development of a curriculum based on 21st-century skills such as critical thinking, collaboration, creativity, and technological utilization, recorded the lowest score of all, at just 6.2%. This finding reveals

that *pesantren* curricula have not been oriented toward meeting the demands of digital competency. Participants 6 and 5 (P6 and P5) confirmed this:

“... Most of what we study focuses on memorizing classical texts and strengthening Islamic creed. While that is important, we’ve never learned how to think critically, engage in collaborative discussions, or use the internet for learning. The curriculum has not evolved in that direction yet.”

The findings of this study reveal that the low adoption of technology within *pesantrens* instructional systems constitutes a form of institutional degradation. This condition is primarily driven by four factors: limited infrastructure, low digital literacy, cultural resistance to innovation, and the absence of curriculum and policy integration aligned with the demands of the digital era. These limitations stem from *pesantrens* weak internal preparedness to respond to global educational transformations that increasingly demand comprehensive digital integration. The data show alarmingly low average scores in both forms of degradation (16.4%) and their contributing factors (19.5%). This suggests that without strategic interventions to strengthen infrastructure, digital competencies, and curricular reform, *pesantren* risk falling further behind in the digital age.

These findings also reinforce the argument that weak institutional resources hinder digital transformation in *pesantren*. This aligns with studies by Awad et al. (2024) and Cotet et al. (2020), which emphasize that successful educational transformation in the digital age heavily depends on the readiness of human resources, supportive infrastructure, and the institutional willingness to continuously adapt and innovate. The integration of technology into education is not merely about the availability of tools, but also about the competencies and mindsets of educators and administrators (Codina & Estebanell, 2023; Nelson et al., 2019). *Pesantren* that lack digital infrastructure, digital literacy, and cultural openness face significant barriers to adopting technology to enhance teaching and learning processes. Hence, without comprehensive improvements in human capacity, infrastructure, and policy frameworks, digital transformation in *pesantren* will remain an unfulfilled ideal.

Furthermore, the findings corroborate Maulidati and Abbott (2024), who identified the lack of access to digital devices and infrastructure as a major obstacle to digitalization. Similarly, Hefner (2022) reported that cultural attitudes restricting access to digital media, coupled with moral concerns about unfiltered internet content and free communication, are key barriers to integrating technology into *pesantren* education. Unlike Darwanto et al. (2024), who argue that resistance is primarily rooted in preferences for face-to-face learning and concerns over preserving religious values, this study finds that degradation in *pesantren* teaching due to low technology adoption stems not only from cultural factors but also from inadequate curriculum design, the absence of supportive policies, and limited strategic partnerships needed to enhance institutional digital capacity.

The implications of these findings underline the urgent need for holistic management in Islamic education systems within *pesantren* to ensure sustainability. This is consistent with the study by Riski and Chande (2024), which stresses that for *pesantren* to align with technological developments and expand their teaching reach, institutional management must be holistic. Based on this study, several concrete strategies are proposed to address the degradation of *pesantren* teaching in the digital era. First, in the

planning aspect, *pesantren* should develop digitally integrated curricula that blend spiritual teachings with interactive materials via e-learning platforms, including online modules, video lectures, and virtual discussion forums, as supported by Han (2025) and Vanermen et al. (2022). Second, in the organizing aspect, dedicated technology management teams should be established (Montenegro-Rueda & Fernández-Cerero, 2023; Tømte & Wollscheid, 2024), alongside targeted digital literacy training for religious leaders and administrators (Jung et al., 2024). Third, in the implementation aspect, *pesantren* can adopt hybrid learning models and utilize social media and communication apps to disseminate teachings and enhance student interaction through online classes and live-streamed lectures (Fakhri et al., 2023; Hong et al., 2024; Qin & Yu, 2024). Lastly, in the evaluation aspect, data-driven monitoring systems should be introduced to regularly assess learning effectiveness and student engagement (Honson et al., 2024; Khanipoor & Karimian, 2024; Summers et al., 2021), enabling continuous strategic refinement.

With such strategic approaches, *pesantren* can not only preserve their spiritual values but also remain relevant and progressive in the digital age (Mattos et al., 2023; Ramos et al., 2015; Zhao et al., 2023). The analysis affirms that responsive management to digital developments will ensure the sustainability of education, including *pesantren* institutions, without compromising their spiritual foundations (Polupan, 2018). First, digital technology adoption allows for more flexible and accessible learning through online platforms and interactive content (Isaías, 2018; Alshehri et al., 2019), proven to enhance interaction and inclusivity (Gaddis, 2020). Second, digital evaluation systems help teachers monitor student comprehension and adjust teaching methods to remain relevant (Admiraal et al., 2020; Gross et al., 2024; Yildiz & Gonen, 2024). Through these approaches, *pesantren* can uphold their spiritual traditions while adaptively evolving amidst rapid societal changes.

This study introduces a new paradigm in Islamic education, arguing that technology can be harnessed to reinforce *pesantrens* educational and spiritual values (Boskovic et al., 2023; Ilin, 2022), rather than to replace them. These findings echo Zhang and Wu (2025), who argue that technology is not a threat to tradition but a medium to extend the reach of religious teachings and improve educational effectiveness. For instance, digital platforms allow *pesantren* students in remote areas to access religious knowledge more flexibly (Messina Dahlberg & Bagga-Gupta, 2014). Interactive modules and recorded sermons can further support personalized learning experiences (Tiernan, 2015). Accordingly, this research provides insights for addressing the degradation of Islamic education, showing that integrating technology in *pesantren* can ensure the sustainability of spiritual traditions while enhancing inclusivity and adaptability (Karanth et al., 2024; Veytia Bucheli et al., 2024).

Concrete strategies can be implemented to address these challenges. First, strengthening classical scholarly traditions through methods such as *halaqah* and *sorogan* while integrating them with digital approaches ensures their continued relevance in contemporary contexts (Díaz, 2021; Siregar, Munir, & Fikri, 2025). Second, adopting hybrid learning models that utilize e-learning platforms, digital learning resources, and

communication applications can complement traditional pedagogical methods (Sapiudin et al., 2025; Stanislaus, 2022). Third, establishing continuous digital literacy training programs for both teachers and students is essential to equip them with the fundamental competencies required for educational technology use (Yang, 2024; Zimmer & Matthews, 2022). Fourth, developing institutional policies that promote innovation and openness to technological integration, supported by adequate facilities and clear regulations, is critical for sustainable transformation (Cai, Xu, & Zhou, 2024; Colovic et al., 2025). Through these measures, *pesantren* can preserve their spiritual values while simultaneously transforming into adaptive and competitive Islamic educational institutions in the digital era.

Moreover, this study proposes a data-driven evaluation framework designed to identify the strengths, weaknesses, and challenges faced by *pesantren* in fulfilling their role as spiritual education centers in the digital age. This approach aligns with the findings of Boukrouh et al. (2024) and Li et al. (2022), who argue that data-informed evaluation leads to more objective and measurable decision-making. It also supports long-term strategic planning to enhance instructional effectiveness (Azkiyah, 2017). In conclusion, this study not only offers a critical assessment of current *pesantren* educational practices but also provides practical, data-informed solutions to ensure *pesantren* education remains relevant and thriving in the modern era (Hillman, 2023; Pangrazio et al., 2024).

Conclusion

This study has comprehensively identified various forms of educational degradation in Islamic boarding schools (*pesantren*) within the teaching system in the digital era. These include limited infrastructure, low levels of digital literacy among teachers and students, cultural resistance to technology, and weak integration of curricula and institutional policies with the demands of digitalization. Furthermore, the underlying causes of this degradation were found to stem from inadequate strategic planning, insufficient continuous training, and the absence of external partnerships that could enhance institutional digital capacity. These findings enrich existing theories on the adaptation of Islamic educational institutions in the context of modernization by demonstrating that degradation is not only structural but also cultural and managerial. Practically, this research contributes to the revitalization of Islamic education in *pesantren* by providing an empirical basis for designing strategies to improve infrastructure, strengthen digital competencies, and formulate technology-oriented educational policies that remain aligned with the spiritual values of *pesantren*.

The results of this study carry significant implications for Islamic education policy development, particularly in the context of *pesantren* education in the digital age. At the national level, the findings recommend the formulation of data-driven policies on *pesantren* digitalization to prevent disparities in educational quality across regions and institutions. For *pesantren* administrators, the study underscores the necessity of adopting more systematic internal strategies, such as routine digital literacy training, the integration of technology-based curricula, and the use of digital media to strengthen spiritual practices. Conceptually, this research opens new avenues for further inquiry into how

digitalization can be pursued adaptively without undermining the traditional values of *pesantren*, thereby bridging the gap between technological modernization and Islamic conservatism.

This study is not without limitations, which should be addressed in future research. First, its scope is limited to *pesantren* in Jambi, Indonesia, and therefore does not fully reflect national-level conditions. Second, the evaluation instruments used in this research emphasized structural and institutional aspects, while psychosocial factors such as student perceptions and learning preferences were not explored in depth. Third, given the descriptive-evaluative nature of this study, any generalizations must be made cautiously and contextually. Future studies are encouraged to adopt broader and more in-depth explorations, including longitudinal and comparative regional studies, to produce a more comprehensive mapping of *pesantren* readiness and digital transformation strategies.

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