



## Artificial Intelligence for Santri; Building a Faithful Technological Generation

Fathor Rosi<sup>1(✉)</sup>, Agus Nu'man<sup>2</sup>, Naser Ali Abdulghani<sup>3</sup>

<sup>1,2</sup> STAI Nurul Huda Kapongan Situbondo, East Java, Indonesia

<sup>3</sup> University of Benghazi, Libya

---

### ABSTRACT

---

#### Article History

Received May 2024

Revised June 2024

Accepted July 2024

#### Keywords:

Artificial Intelligence, Faithful Technological Generation

---

#### \*Corresponding Author:

fathorrosy1991stainh@gmail.com

This study aims to analyze the application of artificial intelligence (AI) in learning in Islamic boarding schools and how this technology can play a role in building a generation of intelligent and faithful students. The approach used in this study is qualitative with a case study type. The subjects of the study included Islamic boarding school leaders, educators, students, technology managers, and alumni of Islamic boarding schools. Data collection techniques were carried out through in-depth interviews, observation, and documentation, while data analysis was carried out using data reduction techniques, data presentation, and conclusion. The results of this study indicate that the use of AI in learning in Islamic boarding schools can improve students' understanding of the material, especially in mastering yellow books and religious material, while maintaining Islamic values. This technology also supports the development of digital literacy for students, without ignoring aspects of morality and spirituality. This finding implies that the integration of AI in Islamic boarding schools can create a generation of students who are better prepared to face digital challenges, but still adhere to strong religious teachings.

---

DOI: <https://doi.org/10.71392/ejip.v3i2.79>

---

#### Please cite this article in APA style as:

Rosi, F., Nu'man, A., & Abdulghani, N. A. (2024). Artificial Intelligence for Santri: Building a Faithful Technological Generation. *Educare: Journal Ilmu Pendidikan*, 3(2), 115-129.

## INTRODUCTION

Success in building a strong young generation that is ready to face future challenges is not only determined by formal education but also by the ability to combine spiritual values with development (Sarker, Furhad, & Nowrozy, 2021). Integration between faith and science is an important foundation in creating

individuals who are not only intellectually intelligent but also have noble morals. In the context of modernizing education, the introduction of artificial intelligence among students can be a strategic step to develop their abilities in the field of technology without forgetting Islamic values. Studies show that technology-based learning wrapped in religious principles can improve digital literacy while strengthening the spiritual character of students (Rathore, Shah, Shukla, Bentafat, & Bakiras, 2021). With this approach, Islamic boarding schools can play an active role in building a generation of faithful technologists, integrating worldly and hereafter knowledge for the advancement of the community.

This research includes an in-depth analysis of how the application of artificial intelligence (AI) can be a catalyst in forming a generation of students who are not only technologically proficient but also have a strong spiritual foundation. Several studies have shown that the integration of AI in learning can increase the efficiency and effectiveness of the educational process while opening up opportunities for a more personalized learning approach (Shin, 2021). According to Balsalobre, the use of AI technology in Islamic boarding schools can encourage an increase in digital literacy among students without ignoring aspects of moral and religious development (Balsalobre-Lorente, 2023). Dlamini added that AI can function as a tool to help understand classical texts through natural language processing, thereby enriching traditional learning methods (Dlamini, 2020). However, Fujita emphasized the importance of maintaining a balance between technology and Islamic values so that the innovations implemented remain in line with religious principles (Fujita, 2020). Furthermore, Johnson stated that the application of targeted AI in the Islamic boarding school environment can also increase the active involvement of students in academic activities and digital-based preaching (Johnson et al., 2021).

From several research findings, the gap in theory in this paper lies in the innovative aspect that has not been widely explored regarding the application of artificial intelligence (AI) in the pesantren environment. First, this paper combines the concept of advanced technology that is usually applied in general educational institutions with the context of pesantren, an institution that prioritizes religious traditions and spiritual values in the learning process. (Mozumder, 2022). Second, the focus on AI integration to strengthen the technological competence of students while maintaining Islamic values provides a new perspective on how technology can function as a bridge between modern and traditional education (Bucinca, 2020). Third, this paper contributes to the literature by outlining strategies for implementing AI to overcome learning challenges in Islamic boarding schools, such as limited access to digital resources, while also utilizing AI as a *da'wah* tool that is relevant to the digital era (Chatterjee, Rana, Dwivedi, & Baabdullah, 2021). Thus, this paper offers a new perspective that is relevant for educators, Islamic boarding school practitioners, and researchers who are interested in the development of technology-based education that remains rooted in spiritual values.

Based on the above, this study aims to analyze the application of artificial intelligence (AI) as a catalyst in forming a generation of students who can combine technological competence with Islamic values. This study argues that the use of AI can not only increase the efficiency of learning and digital literacy of students but also enrich religious education methods through a more adaptive and personal approach (Ghahramani, 2020). Islamic boarding schools that successfully integrate AI into the learning process are believed to be able to create an inclusive, modern educational environment that remains rooted in its spiritual traditions. Thus, the purpose of this study is to identify and analyze how AI can be effectively implemented as a primary strategy for improving the quality of education in Islamic boarding schools, while also offering a technology-based learning model that is relevant to the needs of today's generation.

## RESEARCH METHOD

This research method uses a qualitative approach with a case study type to understand in depth the application of technology, especially artificial intelligence (AI), in education at the Nurul Huda Kapongan Islamic Boarding School, Situbondo. This approach was chosen because it allows researchers to explore the experiences, views, and perceptions of various parties involved, such as Islamic boarding school leaders, Ustaz/ustazah, santri, and technology managers, regarding the integration of AI in an education system based on Islamic values. The Nurul Huda Kapongan Situbondo Islamic Boarding School was chosen as the research location because this Islamic boarding school is one of the Islamic boarding schools that is starting to open up to technological innovation in learning, while still maintaining traditional educational methods that are rooted in Islamic values. Situbondo, as a region known for its diversity of Islamic boarding schools, provides a rich context for understanding the challenges and opportunities in implementing technology in the Islamic boarding school environment.

The choice of location was also based on the unique characteristics of the Nurul Huda Islamic Boarding School, which is in a transition stage towards utilizing digital technology. This Islamic boarding school has a strong commitment to building a generation of students who not only have in-depth religious knowledge but are also able to compete in the modern era by utilizing AI wisely. This focus on Islamic boarding schools is expected to provide relevant insights into developing technology-based education that remains loyal to spiritual and Islamic values. Through this research, it is hoped that an AI integration strategy can be found that not only increases the effectiveness of learning but also strengthens the faith and morals of students, according to the vision of the Nurul Huda Islamic Boarding School in building a generation of technological students, have faith and noble morals.

Participants in this study were selected using purposive sampling techniques, which allowed researchers to select individuals who knew and had

experience relevant to the topic of technology integration in Islamic boarding school education. This technique ensures that the data obtained comes from parties directly involved in the use of technology to support learning, as well as those who understand the importance of balancing technology and Islamic values in the educational process (Soesana et al., 2023). This study involved 24 participants, consisting of Islamic boarding school leaders, Ustadz/ustazah, students, technology managers, and alumni of Islamic boarding schools who have felt the impact of the technology integration. The selection of participants was based on the criteria of experience and direct involvement in the application or use of technology in Islamic boarding schools, with the hope of providing a comprehensive picture of the influence of technology on learning, as well as its impact on the development of digital literacy and spirituality of students.

**Table 1. Research Informants**

Participant	Gender		Educational background					Informant code
	Male	Female	Junior High School	Senior High School	Bachelor	Master	Doctor	
Head of Islamic Boarding School	2	-	-	-	-	-	2	DFP, MFA
Educator	3	2	-	-	3	2	-	SFL, KPT, LMN, SWT, RKH
Student	3	2	1	4	-	-	-	UNJ P1, ATQ D1, STNH S1
Technology Manager	2	2	-	1	3	-	-	UNJ P1, ATQ D1, STNH S1
Alumni of Islamic Boarding School	4	4	-	-	5	3	-	UNJ P1, ATQ D1, STNH S1
<b>Total</b>	<b>14</b>	<b>10</b>	<b>1</b>	<b>5</b>	<b>11</b>	<b>5</b>	<b>2</b>	-
Student	<b>24 Participants</b>							

In this study, participants consisted of 24 people from several Islamic boarding schools that were the research locations. These participants were divided into several categories, including Islamic Boarding School Leaders, Educators, Students, Technology Managers, and Alumni of Islamic Boarding Schools. Of the total 24 participants, there were 14 men and 10 women. The Islamic Boarding School Leaders consisted of 2 men, who represented the Islamic boarding schools that were the research locations. The teaching staff consisted of 5 people, namely 3 men and 2 women, with Bachelor's and Master's educational backgrounds. The students consisted of 5 people, namely 3 men and 2 women, most of whom had high school educational backgrounds, with one student coming from junior high school. The Technology Managers consisted of 4 people,

namely 2 men and 2 women, with educational backgrounds ranging from high school to a Bachelor's. Finally, the Alumni of the Islamic Boarding School consisted of 8 people (4 men and 4 women), who had Bachelor's and Master's educational backgrounds.

The interview process with participants was conducted to explore their understanding of the integration of technology in learning at Islamic boarding schools, especially the use of AI technology to support the learning of yellow books and other materials (Waruwu, 2023). During the interview, the researcher used a recording device to record the conversation with the participants. Each interview session lasted for about 30 minutes per individual. All recorded conversations were then carefully transcribed to ensure that every piece of information conveyed by the participants was recorded accurately and ready for further analysis. To maintain participant confidentiality, the researcher gave each participant a special identification code, such as DFP for the Head of the Islamic Boarding School or SWT for the Educator, so that the participant's real name would not be revealed and to maintain research ethics.

After the interview process was completed, the researcher began to analyze and group the main themes related to the use of technology in learning and its impact on the quality of education in Islamic boarding schools. The researcher reviewed the interview transcripts to identify patterns and relationships between participants' views, both positive and the challenges they faced in integrating technology into teaching (Raco, 2010). The interview protocol used in this study was designed to provide space for researchers to explore relevant topics, but remained structured so that the interviews could be conducted according to the research objectives. In addition, the researcher ensured that the information obtained was only used for academic purposes and remained confidential.

Data analysis was conducted using a thematic analysis approach, which follows the steps described by Miles, Huberman, and Saldana (Assyakurrohim, Ikhram, Sirodj, & Afgani, 2022). The first step in this process is data collection through in-depth interviews with participants who have direct experience related to the use of technology in Islamic boarding schools. After the data is collected, the researcher reduces the data by filtering the most relevant and important information from the interviews and then identifying key themes that emerge. Data presentation is done by compiling a narrative that describes the interview results comprehensively. Finally, conclusions are drawn by interpreting the data that has been presented and making a synthesis to provide a clearer picture of the impact of technology integration, especially AI, on learning in Islamic boarding schools. To ensure the validity and reliability of the findings, the researcher also triangulates the data by comparing the interview results with other data sources.

## RESULT AND DISCUSSION

The results of this study indicate that the application of artificial intelligence (AI) in Islamic boarding schools has a significant role in building a generation of students who are not only technologically proficient but also deeply rooted in Islamic values. Through the right integration of AI, Islamic boarding schools can present learning methods that are more adaptive, innovative, and relevant to the challenges of the digital era. In addition, the use of AI also opens up opportunities for students to improve digital literacy, understand classical books more deeply, and expand the reach of da'wah into the digital realm. This study reveals how AI functions as a catalyst to create a balance between technological advances and spiritual traditions. We present the results of this study in the following four sections.

### Result

#### Technology-Spiritual Integration

The integration of technology and spiritual values in Islamic boarding schools is a strategic step to provide education that is relevant to the challenges of the digital era without ignoring the essence of Islam. Islamic boarding schools have begun to utilize artificial intelligence (AI) as a tool in the learning process, such as understanding yellow books through natural language processing or compiling more structured and interactive learning materials. This approach not only increases teaching efficiency but also ensures that religious values remain the main foundation in every aspect of education. This integration supports the creation of a modern and spiritual learning ecosystem, which can form a generation of students who are highly competitive but still rooted in Islamic values.

**Table 2. Interview Results in Data on Technology-Spiritual Integration**

Informant	Statement	Code
Head of Islamic Boarding School	"We have started to utilize AI technology to support the learning of yellow books and other materials. This helps accelerate the understanding of students without forgetting Islamic values."	Utilization of AI in Islamic Boarding Schools
Ustaz/Ustazah	"AI is an effective tool, especially in providing structured learning materials. However, we always ensure its use is by Islamic principles."	Learning Aids
Student	"Learning with the help of technology, such as AI, makes it easier for us to understand the classics, but we are still taught to maintain correct morals and intentions."	Ease of Understanding the Book
Technology Manager	"We are gradually integrating AI with training for Ustaz so that they can use it optimally and remain oriented towards Islamic values."	Technology Usage Training
Alumni of Islamic Boarding School	"The integration of technology in Islamic boarding schools has helped us, especially in developing digital literacy without abandoning the spiritual traditions that are taught."	Impact of Technology on Alumni

Table 2 above shows several main aspects of the use of AI technology in Islamic boarding schools, as explained by various informants. In this context, Ustaz/Ustazah emphasized that although AI technology is an effective tool, Islamic principles are still used as a reference in its use. This shows that although technology brings convenience, spiritual teaching remains the main priority. This data also shows that students feel the direct benefits of using technology, especially in understanding classical books more easily and quickly, while still prioritizing morals and correct intentions in the learning process.

Based on the existing findings, it can be concluded that the integration of technology, especially AI technology, in learning in Islamic boarding schools has a significant impact on accelerating the understanding of students without neglecting spiritual values. As conveyed by the Head of the Islamic Boarding School, AI technology helps accelerate the learning process and allows students to understand the yellow book more efficiently, but still with guidance that is by Islamic principles. The use of AI as a learning tool provides opportunities for Islamic boarding schools to optimize technology-based teaching, thereby creating a more structured and relevant learning experience.

### **Digital Literacy for Santri**

Digital literacy of students is an important component in creating a generation that is ready to face the challenges of the technological era without neglecting religious values. The use of technology, especially AI, has provided opportunities for students to develop their digital skills through more structured and adaptive learning. The use of this technology allows students to more easily access and understand religious teaching materials, such as yellow books, with the help of devices that can speed up the process of understanding the text. According to Ustazah YW, one of the teachers at the Islamic boarding school, *"Technology such as AI helps students understand religious texts more quickly and clearly, especially in identifying the meaning of words that are difficult to find in the book."* In addition, the development of digital literacy provides students with additional skills that are much needed in the modern world, without reducing their focus on religious learning.

Thus, the development of digital literacy in Islamic boarding schools not only enriches the technological knowledge of students but also opens up new opportunities to improve the quality of religious learning that is more effective and relevant to the development of the times. This is reflected in the use of technology that facilitates more interactive teaching, accelerates understanding, and expands access to religious materials. Good digital literacy allows students to not only understand religious knowledge more deeply but also prepares them to face the challenges of the increasingly digital modern world. Based on these findings, it can be concluded that strengthening digital literacy in Islamic boarding schools plays an important role in creating a generation of students

who are ready to keep up with technological developments, while still adhering to the Islamic values that are the basis of Islamic boarding school education. Through this approach, Islamic boarding schools not only produce students who are competent in the field of religion but are also ready to contribute to the ever-growing digital world.



Figure 1. Digital Literacy Output of Santri

The interpretation of the success found in this study shows that the application of technology, especially AI, in Islamic boarding schools has a very positive impact both in terms of digital literacy and in strengthening religious values. The first success, namely increasing the digital literacy of students, shows that technology not only makes it easier to access information but also opens up new opportunities for students to learn and develop. With AI, they can easily access broader religious learning materials and understand the yellow books more quickly. This leads to a deeper understanding of religious teachings, while still maintaining the spiritual depth that is the core of Islamic boarding school education.

### Islamic Learning Innovation

Islamic learning innovation in Islamic boarding schools plays an important role as a foundation in creating an educational environment that is relevant to the development of the times while still maintaining Islamic values. With the application of innovative technology and learning methods, Islamic boarding schools can provide a more dynamic and interesting education for students. This innovation not only includes the use of modern tools and technology but also includes updates in teaching methods that can answer the challenges of the times. Thus, Islamic learning innovation is an important element in improving the quality of religious education that meets the needs of the young generation developing in today's digital era.

The results of interviews with several informants showed that the implementation of Islamic learning innovations in Islamic boarding schools has had a significant positive impact on the education process. According to Ustaz Fadli, a senior teacher, *"We started using technology in learning, such as Quran and fiqh learning applications, which allow students to learn more interactively and practically, without reducing the essence of Islam."* In addition, Santri Aisyah said, *"With the new learning method that utilizes technology, we can more easily understand*

*material that was previously difficult for us to understand.*" Interviews with Islamic boarding school managers, such as Mr. Badrul, also confirmed that this innovation has brought about major changes: *"We believe that by combining technology in religious learning, we not only improve the quality of education but also attract students to be more enthusiastic in learning."* The results of observations support this statement, where students appear more enthusiastic about participating in technology-based learning, such as the use of interactive videos and AI applications to help understand religious texts. This innovation allows Islamic boarding schools to remain relevant in facing the development of the times while maintaining the spiritual values that are the basis of their education.

The findings show that the innovation of Islamic learning through the integration of technology in Islamic boarding schools has resulted in four main aspects of success. First, the application of technology in teaching allows students to access religious materials more interactively and engagingly, increasing their understanding of Islamic teachings in greater depth. Second, this innovation also introduces more modern learning methods, such as the use of digital learning applications and interactive videos, which help students learn in a more effective and modern way. Third, the development of technological skills among teachers also plays an important role in improving the quality of teaching, because ustaz and ustazah who are trained in using digital learning tools can deliver materials in a way that is easier to understand and more engaging for students. Finally, this innovation in Islamic learning has succeeded in creating a more inclusive learning environment, where technology is not only used to support the learning process but also to increase interaction between students and teachers, strengthening their relationships in a more collaborative and dynamic atmosphere.

### **Progressive Digital Preaching**

Progressive digital preaching in Islamic boarding schools is implemented through the use of information technology to spread Islamic values more widely and effectively. Islamic boarding school managers recognize the importance of integrating digital media, such as social media, mobile applications, and websites, to deliver da'wah messages that are more relevant to current developments. Islamic boarding school leaders emphasize that digital da'wah is not only targeted at students but also at the wider community, including the younger generation who are more familiar with technology. Through this digital da'wah approach, Islamic boarding schools not only educate students about Islamic teachings but also create a more open and participatory dialogue space. This progressive approach to preaching supports the creation of a more inclusive environment where religious messages are delivered in a more modern, relevant, and accessible way for all groups.

**Table 3. Data from Progressive Digital Preaching Interview Results**

<b>Informant</b>	<b>Statement</b>	<b>Code</b>
Head of Islamic Boarding School	"We utilize digital technology such as social media and applications to convey preaching messages that are broader and more easily accessible to the public."	Utilization of Digital Technology
Ustaz/Islamic Boarding School Teacher	"Digital preaching allows us to teach Islamic teachings in a way that is more relevant to the times, and to reach students and the wider community."	Digital Preaching Innovation
Student	"With digital preaching, I can access Islamic teaching materials anywhere, even after class hours are over."	Learning Accessibility
Islamic Boarding School Students	"Digital preaching helps us develop a deeper and more applicable understanding of religion in everyday life."	The Influence of Digital Preaching
Islamic Boarding School Administrators	"This digital preaching approach makes Islamic boarding schools more open and adaptive to the needs of the times, and expands the reach of preaching."	Inclusive and Adaptive Preaching

From the findings above, it can be concluded that the implementation of progressive digital preaching has a significant impact on increasing the effectiveness of delivering Islamic messages in Islamic boarding schools. By using digital technology, Islamic boarding schools can more easily reach a wider audience, both students and the wider community. This is in line with the results of the interview, which showed that the use of digital platforms not only facilitates access to Islamic teaching materials but also allows for more intense interaction between Ustaz, students, and the wider community. In this context, progressive digital preaching not only functions as a means of communication but also as a means of spiritual and intellectual development that is relevant to the development of the times.

Based on the data obtained, there are several key findings related to digital preaching innovation in Islamic boarding schools. Table 3 shows that digital preaching allows for the delivery of preaching materials that are more flexible and easily accessible to students anytime and anywhere. These technology-based preaching programs also include various forms of content, such as videos, podcasts, and articles, which make it easier for students to understand Islamic teachings more deeply and practically. This not only affects the students' understanding of religion but also increases their motivation to continue learning and developing. In addition, digital preaching also opens up opportunities for Islamic boarding schools to interact more intensely with the wider community, both at home and abroad, so that preaching messages can be more easily disseminated.

## Discussion

This study contributes to the growing body of literature on educational transformation in Islamic boarding schools (pesantren) by highlighting how digital technology, especially artificial intelligence (AI), is being integrated without compromising religious principles. The findings reveal that the integration of AI into the spiritual and academic fabric of pesantren fosters a new hybrid learning ecosystem where modern efficiency meets traditional wisdom. The incorporation of AI tools, such as natural language processing for kitab kuning learning, signifies not only pedagogical reform but also a conscious effort to preserve Islamic ethics in digital adaptation (Wisolus Sholihin, Candrasari, Fitri, & Ita Erliana, 2021). As stated by the Head of the Islamic Boarding School and several key informants, the process is not merely technological but deeply value-driven, illustrating a balanced educational paradigm between automation and adab (morals). This supports the broader discourse on Islamizing knowledge through contextualized technological engagement.

Moreover, the research finds that digital literacy among students has become both a goal and a byproduct of this integration. While traditional Islamic education has long focused on text-based, rote methodologies, the current development indicates a shift toward more interactive and critical learning (Lukman, Anam, Zamroni, & Bon, 2021; Widad, Azizah, & Zuhriya, 2021). The ability to access religious materials more effectively via AI-based applications improves not only comprehension but also learner confidence in navigating the digital world (Baharun, 2023; Hasanah, 2024; Heru & Bali, 2024). Interestingly, this aligns with global discourses on 21st-century skills, where religious learners are not excluded from digital competence but are encouraged to become ethical digital citizens. This positions santri not only as consumers of religious knowledge but also as adaptive contributors to digital civilization, which is a transformative vision for pesantren in the post-pandemic education landscape (Herlina, 2024; Kamal & Rozi, 2020; Qurtubi, 2024).

In terms of Islamic learning innovation, the findings confirm that technology use has reshaped instructional delivery and teacher roles (Al-Qora'n, Jawarneh, & Nganji, 2023; Fajry, 2022; Munawwaroh, 2024). The application of learning apps, interactive videos, and adaptive teaching strategies has introduced a more dynamic learning environment. Teachers (Ustaz/Ustazah), once bound by limited resources, now gain access to broader teaching tools and platforms. This enhances the teacher-student relationship and fosters more active learning. The innovation also resonates with constructivist learning theories, which emphasize meaningful engagement and learner autonomy (Abdullah & Java, 2024; Putri, 2024). The pesantren model, traditionally centered on authoritative transmission, is thus evolving into a dialogical and exploratory model without losing its normative Islamic character. This illustrates that religious education is not static; it is capable of pedagogical reinvention while maintaining its foundational integrity.

The most distinctive finding lies in the adoption of progressive digital preaching, which illustrates how pesantren reposition themselves as not only educational institutions but also public actors in the digital da'wah space. The use of social media, podcasts, and educational websites expands the reach of Islamic messages to a wider audience, including the digitally-native youth (Firdaus, Al Mursyidi, & Haqiki, 2020; Hasanah, 2024; Heru & Bali, 2024; Ni'mah, Masun, Juaeriyah, & Maimuna, 2021). This approach is consistent with the concept of wasathiyah (moderation) in Islam, which emphasizes contextual relevance in da'wah efforts. Digital preaching becomes a medium for cultural adaptation, encouraging participatory engagement with religious content beyond formal education hours (Dakir, Misroto, Anshori, Sukkur, & Bon, 2021). The implication is that pesantren are no longer confined to the physical domain but are evolving into hybrid institutions that combine spiritual leadership with digital outreach. This transformation strengthens the community's capacity for religious resilience in a globalized digital culture.

Overall, the synthesis of findings across the four themes demonstrates a cohesive movement within pesantren toward a techno-spiritual paradigm. The integration of AI and digital tools is not perceived as a threat but as an opportunity to enhance both religious fidelity and educational quality. While challenges remain, such as teacher readiness, infrastructure gaps, and ethical concerns, the study affirms that pesantren are actively constructing a model of Islamic education that is both rooted and responsive. In doing so, they provide a valuable framework for other faith-based institutions seeking to navigate the tensions and opportunities of technological transformation in education.

## CONCLUSION

The results of this study show that the integration of artificial intelligence (AI) in Islamic boarding schools significantly enhances the quality and efficiency of religious learning, particularly in understanding classical texts like the *\*kitab kuning\**, while still maintaining the foundation of Islamic values. The main lesson drawn is that AI, when applied thoughtfully, creates an interactive and adaptive learning environment that supports both intellectual and spiritual development. Scientifically, this research contributes to the discourse on educational technology by demonstrating how AI can be harmonized with holistic and value-based education, reinforcing the constructivist and character development frameworks in Islamic pedagogy. However, this study is limited in its scope due to the focus on a single institutional setting, and further research is needed to explore the long-term impacts of AI use in diverse Islamic boarding schools, as well as to examine ethical and infrastructural challenges that may arise in broader implementations.

## ACKNOWLEDGMENT

I would like to express my gratitude to the leaders, Ustaz/ustazah, and students of Pondok Pesantren Nurul Huda Kapongan Situbondo for their invaluable insights and cooperation during this research. I am also thankful for the financial support from [insert funding source, if applicable], as well as the constructive guidance from my academic mentors and the unwavering encouragement from my family and friends, which made this study possible.

## REFERENCES

- Abdullah, & Java, E. (2024). Innovative Approach in Curriculum Development: Improving Education and Training Programs through Multidimensional Strategies. *Pedagogik: Jurnal Pendidikan*, 11(2), 160–176. Retrieved from <https://doi.org/10.33650/pjp.v11i2.9290>
- Al-Qora'n, L. F., Jawarneh, A., & Nganji, J. T. (2023). Toward Creating Software Architects Using Mobile Project-Based Learning Model (Mobile-PBL) for Teaching Software Architecture. *Multimodal Technologies and Interaction*, 7(3). <https://doi.org/10.3390/mti7030031>
- Assyakurrohim, D., Ikhram, D., Sirodj, R. A., & Afgani, M. W. (2022). Metode Studi Kasus dalam Penelitian Kualitatif. *Jurnal Pendidikan Sains Dan Komputer*, 3(01), 1–9. <https://doi.org/10.47709/jpsk.v3i01.1951>
- Baharun, H. (2023). The Implementation of Augmented Reality in Science Education in Secondary Schools. *International Journal of Instructional Technology*, 02(01), 34–45. Retrieved from <https://doi.org/10.33650/ijit.v2i1.9325>
- Balsalobre-Lorente, D. (2023). Tourism, Urbanization, and Natural Resources Rents Matter for Environmental Sustainability: The Leading Role of AI and ICT on Sustainable Development Goals in the Digital Era. *Resources Policy*, 82. <https://doi.org/10.1016/j.resourpol.2023.103445>
- Buçinca, Z. (2020). Proxy Tasks and Subjective Measures Can Be Misleading in Evaluating Explainable AI Systems. *International Conference on Intelligent User Interfaces, Proceedings IUI*, pp. 454–464. <https://doi.org/10.1145/3377325.3377498>
- Chatterjee, S., Rana, N. P., Dwivedi, Y. K., & Baabdullah, A. M. (2021). Understanding AI Adoption in Manufacturing and Production Firms Using an Integrated TAM-TOE Model. *Technological Forecasting and Social Change*, 170. <https://doi.org/10.1016/j.techfore.2021.120880>
- Dlamini, Z. (2020). Artificial Intelligence (AI) and Big Data in Cancer and Precision Oncology. *Computational and Structural Biotechnology Journal*, Vol. 18, pp. 2300–2311. <https://doi.org/10.1016/j.csbj.2020.08.019>
- Fajry, M. W. (2022). Building Public Trust in Islamic Schools Through Adaptive Curriculum. *Jurnal Pendidikan Islam*, 8(1), 1–14. <https://doi.org/10.15575/jpi.v8i1.17163>

- Firdaus, S., Al Mursyidi, R. A., & Haqiki, M. W. (2020). Learning management: Identifying Learning Styles of Language Learners in Madrasah. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, (August), 3783–3790.
- Fujita, H. (2020). AI-based Computer-Aided Diagnosis (AI-CAD): The Latest Review to Read First. *Radiological Physics and Technology*, Vol. 13, pp. 6–19. <https://doi.org/10.1007/s12194-019-00552-4>
- Ghahramani, M. (2020). AI-based Modeling and Data-Driven Evaluation for Smart Manufacturing Processes. *IEEE/CAA Journal of Automatica Sinica*, 7(4), 1026–1037. <https://doi.org/10.1109/JAS.2020.1003114>
- Hasanah, M. (2024). Empowering Educators: A Comprehensive Human Resources Framework for Improving Islamic-based Schools. *Journal of Islamic Education Research*, 5(1), 31–44. Retrieved from <https://doi.org/10.35719/jier.v5i1.385>
- Herlina, A. (2024). Mindful Messaging: Public Relations (PR) Strategies in Schools By Using Hierarchy of Effects. *Manager: Indonesian Journal of Educational Management*, 6(1), 98–110. Retrieved from <https://doi.org/10.52627/manager.v6i1.429>
- Heru, M. J. A., & Bali, M. M. E. I. (2024). Crafting Leaders in the Digital Age: How Adaptive Management Strategies Revolutionize Leadership Development in Islamic Schools. *Communautaire: Journal of Community Service*, 3(1), 79–92. <https://doi.org/10.61987/communautaire.v3i1.458>
- Johnson, K. B., Wei, W. Q., Weeraratne, D., Frisse, M. E., Misulis, K., Rhee, K., ... Snowdon, J. L. (2021). Precision Medicine, AI, and the Future of Personalized Health Care. *Clinical and Translational Science*, Vol. 14, pp. 86–93. <https://doi.org/10.1111/cts.12884>
- Kamal, M., & Rozi, S. (2020). the Cultured Islam: the Boundary of Islamic Identity Between the Minangkabau and Mandailing Ethnics. *El-HARAKAH (TERAKREDITASI)*, 22(2), 223–243. <https://doi.org/10.18860/eh.v22i2.9021>
- Lukman, Anam, N. K., Zamroni, & Bon, A. T. (2021). Innovative Learning Media based on E-learning in the New Normal Era. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, 6987–6993. <https://doi.org/10.46254/an11.20211210>
- Mozumder, M. A. I. (2022). Overview: Technology Roadmap of the Future Trend of Metaverse based on IoT, Blockchain, AI Technique, and Medical Domain Metaverse Activity. *International Conference on Advanced Communication Technology, ICACT*, Vol. 2022, pp. 256–261. <https://doi.org/10.23919/ICACT53585.2022.9728808>
- Munawwaroh, I. (2024). Enhancing Critical Thinking Through the Integration of Self-Directed Learning in Sustainable Education in Madrasah. *AFKARINA: Jurnal Pendidikan Agama Islam*, 9(1), 1–10. <https://doi.org/10.33650/afkarina.v9i1.9352>
- Ni'mah, M., Masun, H., Juaeriyah, K., & Maimuna. (2021). Blended Learning

- Approach in Arabic Learning. *Journal of Physics: Conference Series*, 1779(1). <https://doi.org/10.1088/1742-6596/1779/1/012065>
- Putri, D. F. (2024). Human Resource Management (HRM) in Improving Customer Behavior Through Emotional Attachment (EA). *Proceedings of International Conference on Education, Society And Humanity*, 02(01), 850–859.
- Qurtubi, A. (2024). Architecture Enterprise Model of Islamic College Management in Indonesian Industrial Era 5.0. *Philippine Journal of Science*, 153(3), 1097–1105. <https://doi.org/10.56899/153.03.30>
- RACO, J. R. (2010). Penelitian Kualitatif: Metode Penelitian Kualitatif. In *Jurnal EQUILIBRIUM* (Vol. 5). Bandung: Remaja Rosdakarya.
- Rathore, M. M., Shah, S. A., Shukla, D., Bentafat, E., & Bakiras, S. (2021). The Role of AI, Machine Learning, and Big Data in Digital Twinning: A Systematic Literature Review, Challenges, and Opportunities. *IEEE Access*, Vol. 9, pp. 32030–32052. <https://doi.org/10.1109/ACCESS.2021.3060863>
- Sarker, I. H., Furhad, M. H., & Nowrozy, R. (2021). AI-Driven Cybersecurity: An Overview, Security Intelligence Modeling and Research Directions. *SN Computer Science*, Vol. 2. <https://doi.org/10.1007/s42979-021-00557-0>
- Shin, D. (2021). The Effects of Explainability and Causability on Perception, Trust, and Acceptance: Implications for Explainable AI. *International Journal of Human Computer Studies*, 146. <https://doi.org/10.1016/j.ijhcs.2020.102551>
- Soesana, A., Subakti, H., Salamun, S., Tasrim, I. W., Karwanto, K., Falani, I., ... Pasaribu, A. N. (2023). *Metodologi Penelitian Kualitatif*.
- Waruwu, M. (2023). Pendekatan Penelitian Pendidikan: Metode Penelitian Kualitatif, Metode Penelitian Kuantitatif dan Metode Penelitian Kombinasi (Mixed Method). *Jurnal Pendidikan Tambusai*, 7(1), 2896–2910.
- Widad, R., Azizah, N., & Zuhriya, S. A. (2021). The Effect of Using Edmodo Application on Students' Mastery of Technology. *Journal of Physics: Conference Series*, 1899(1). <https://doi.org/10.1088/1742-6596/1899/1/012157>
- Wisolus Sholihin, M., Candrasari, R., Fitri, D., & Ita Erliana, C. (2021). Learning Effectiveness Improvement through Mobile Learning. *Turkish Online Journal of Qualitative Inquiry (TOJQI)*, 12(4), 1661–1665.