



Introducing Artificial Intelligence for Digital Learning Enhancement in an Islamic Boarding School Context

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ABSTRACT

The rapid development of Artificial Intelligence (AI) has created new opportunities for enhancing digital learning across educational contexts. However, the adoption of AI in religious-based educational institutions, such as Islamic boarding schools, remains limited due to traditional pedagogical practices and uneven digital literacy. This community service program aimed to introduce AI as a supportive tool for digital learning enhancement among Grade XII students in an Islamic boarding school in Riau, Indonesia. The program employed a participatory training approach consisting of preparation, implementation, and evaluation stages, emphasizing practical AI applications, ethical awareness, and contextual relevance aligned with Islamic educational values. Data were collected through observations, student reflections, and feedback discussions, and analyzed using descriptive and thematic analysis. The results indicate improved student awareness, understanding, and confidence in using AI for academic purposes, including information retrieval, academic writing assistance, and critical evaluation of digital content. The findings suggest that AI literacy can be effectively introduced in Islamic boarding schools through community-based initiatives that integrate ethical considerations and student-centered learning. This program provides a practical model for bridging traditional Islamic education with digital innovation to support students' academic readiness and responsible technology use.

Keywords: Artificial Intelligence in Education; Digital Learning Enhancement; Islamic Boarding School; AI Literacy; Community Service Program

Fields: Educational Technology; Digital Learning and Innovation; Artificial Intelligence in Education; Community Engagement and Service Learning; Islamic Education Studies

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INTRODUCTION

The rapid advancement of digital technology has significantly transformed (Yenni et al., 2025) the landscape of education, particularly through the emergence of Artificial Intelligence (AI) (Renaldo, Tanjung, et al., 2025). AI has become a strategic tool in enhancing learning effectiveness, personalization, and accessibility across various educational levels. However, the integration of AI in learning environments remains uneven, especially in religious-based educational institutions such as Islamic boarding schools, where traditional pedagogical approaches still dominate instructional practices.

Islamic boarding schools (*pesantren*) play a vital role in shaping students' moral character, religious values, and intellectual development (Junaedi et al., 2023). In the contemporary digital era, these institutions face

the challenge of maintaining their strong traditional foundations while simultaneously preparing students with essential digital competencies required in higher education and the future workforce. AI literacy is increasingly recognized as a critical component of 21st-century skills (Suhardjo et al., 2023), enabling students to develop analytical thinking, problem-solving abilities, and responsible digital awareness.

Despite its potential benefits, many students in Islamic boarding schools have limited exposure to AI-based learning tools and lack an understanding of how AI can be used ethically and productively to support academic activities (Simba et al., 2016). This gap may hinder students' readiness to compete in a technology-driven society and adapt to evolving learning ecosystems (Yusrizal et al., 2021). Therefore, introducing AI in a contextual, culturally sensitive, and pedagogically appropriate manner is essential to ensure meaningful adoption without undermining the core values of Islamic education.

This community service program aims to introduce Artificial Intelligence as a supportive tool for digital learning enhancement among Grade XII students at an Islamic boarding school. The program focuses on increasing students' awareness, basic understanding, and practical use of AI applications for learning purposes, such as information retrieval, academic writing assistance, and critical evaluation of digital content. Through interactive training sessions and guided discussions, this initiative seeks to bridge the gap between traditional Islamic education and modern digital innovation, fostering technologically literate students who are ethically grounded and academically prepared for future challenges.

LITERATURE REVIEW

Artificial Intelligence in Education

Artificial Intelligence (AI) has increasingly been adopted in educational settings to improve learning efficiency, personalization, and student engagement (Nyoto et al., 2024). AI-based educational tools, such as intelligent tutoring systems, adaptive learning platforms, and AI-assisted content generation, enable learners to access customized learning experiences based on their individual needs and learning pace. Previous studies indicate that AI integration can enhance students' academic performance, critical thinking skills, and learning motivation when implemented appropriately within pedagogical frameworks.

Moreover, AI supports teachers by automating administrative tasks, providing learning analytics, and assisting in instructional planning. In digital learning environments, AI contributes to more interactive and data-driven learning processes, allowing educators to identify students' learning gaps and adjust instructional strategies accordingly. However, the effectiveness of AI in education depends largely on digital literacy, infrastructure readiness, and ethical awareness among users.

Digital Learning and Student Competency Development

Digital learning has become an essential component of modern education, emphasizing the use of technology to support flexible, collaborative, and self-directed learning (Renaldo et al., 2023). Research suggests that digital learning environments foster higher-order thinking skills, including problem-solving, creativity, and information literacy. For senior high school students, digital learning plays a critical role in preparing them for higher education and the digital economy (Renaldo et al., 2022).

Nevertheless, disparities in digital access and literacy persist, particularly in non-urban and religious-based educational institutions. Students in such contexts often rely on conventional learning methods and have limited exposure to emerging technologies. This digital divide may negatively affect students' readiness to engage with advanced learning tools and adapt to technology-driven academic environments (Purnama et al., 2025).

Artificial Intelligence in Islamic Boarding School Education

Islamic boarding schools (*pesantren*) are traditionally characterized by face-to-face instruction, teacher-centered learning, and strong moral and religious orientations (Deivita et al., 2025). While these institutions have successfully preserved Islamic values and character education, the adoption of digital technologies, including AI, remains relatively limited. Existing literature highlights that technological integration in *pesantren* education must consider cultural, ethical, and religious contexts to ensure acceptance and sustainability (Suhardjo et al., 2024).

Studies on technology-enhanced learning in Islamic education emphasize the importance of aligning digital tools with Islamic ethics, such as responsibility, honesty, and critical reflection. AI, when introduced as a supportive rather than substitutive tool, can enhance learning without diminishing the role of teachers or traditional learning values. Therefore, AI literacy programs in Islamic boarding schools should focus not only on technical skills but also on ethical awareness and responsible use.

Community Service Programs for AI Literacy

Community service initiatives in education play a crucial role in bridging knowledge gaps and improving digital literacy among underserved groups (Renaldo, Suhardjo, et al., 2025). Previous community-based programs focusing on technology literacy demonstrate positive impacts on students' awareness, confidence, and willingness to adopt new technologies. AI-focused community service activities, particularly those involving hands-on training and contextualized learning, are effective in introducing complex technological concepts in accessible ways.

In the context of Islamic boarding schools, community service programs serve as an appropriate approach to introducing AI, as they emphasize collaboration, capacity building, and contextual relevance. Such programs allow students to experience AI applications directly while receiving guidance on ethical and academic use. Consequently, community-based AI literacy initiatives contribute to sustainable digital learning enhancement and support students' holistic development.

METHODOLOGY

Program Design

This community service program employed a participatory and educational training approach aimed at introducing Artificial Intelligence (AI) to enhance digital learning among students in an Islamic boarding school (Arlia et al., 2025). The program was designed to emphasize practical understanding, ethical awareness, and contextual relevance, ensuring that AI was presented as a supportive learning tool rather than a replacement for traditional teaching methods.

Participants and Location

The program was conducted at an Islamic boarding school in Riau, Indonesia, involving Grade XII students on 27 July 2025. The participants were selected based on their academic level and readiness to engage with digital learning tools. Teachers and school administrators were also involved to support the implementation and sustainability of the program.

Program Stages

The community service activities were implemented in three main stages:

1. Preparation Stage. This stage involved conducting an initial needs assessment through informal discussions with teachers and students to identify students' digital literacy levels and familiarity with AI concepts. Learning materials and training modules were then developed, focusing on basic AI concepts, educational applications of AI, and ethical considerations aligned with Islamic values.
2. Implementation Stage. The implementation stage consisted of interactive training sessions delivered through lectures, demonstrations, and hands-on practice. Students were introduced to AI-based tools for learning enhancement, such as AI-assisted information searching, academic writing support, and critical evaluation of digital content. Guided discussions were conducted to encourage students to reflect on responsible and ethical AI use in academic and daily life contexts.
3. Evaluation Stage. The evaluation stage aimed to assess the effectiveness of the program in improving students' understanding and awareness of AI. Simple pre- and post-activity reflections, observation of student participation, and informal feedback were used to evaluate changes in students' knowledge, attitudes, and engagement toward AI-supported learning.

Data Collection Techniques

Data were collected using observations, student reflections, and feedback discussions. These qualitative techniques were selected to capture students' learning experiences, perceptions, and responses to AI-based learning activities. Field notes were used to document student engagement and interaction during the training sessions.

Data Analysis

The collected qualitative data were analyzed using a descriptive and thematic analysis approach. Student reflections and feedback were categorized into key themes, such as understanding of AI concepts, perceived usefulness of AI in learning, and ethical awareness. The analysis focused on identifying patterns that indicate improvements in digital learning readiness and AI literacy among participants.

Ethical Considerations

Ethical considerations were prioritized throughout the program. Students participated voluntarily and were informed about the purpose of the activity (Renaldo et al., 2024). The use of AI tools was introduced with an emphasis on responsible, ethical, and academically appropriate practices, in line with Islamic educational values and institutional guidelines.

RESULTS AND DISCUSSION

Results

The implementation of the community service program demonstrated positive outcomes in enhancing students' awareness, understanding, and readiness to use Artificial Intelligence (AI) as a digital learning support tool. Prior to the program, most Grade XII students had limited knowledge of AI and tended to associate it solely with advanced technology or social media applications. Their use of digital tools was largely passive, focusing on information consumption rather than analytical or academic purposes.

Following the training sessions, students showed a noticeable improvement in their conceptual understanding of AI, particularly regarding its functions and potential applications in learning activities. Students were able to identify various AI-based tools that could support academic tasks, such as searching for reliable information, organizing learning materials, and assisting in structured academic writing. Observational data indicated increased student engagement during hands-on practice sessions, with students actively asking questions and participating in guided discussions.

In terms of digital learning enhancement, students demonstrated improved confidence in using AI responsibly to support their studies. Reflections collected after the program revealed that students became more aware of the importance of verifying information, avoiding plagiarism, and using AI as a learning aid rather than a shortcut. This indicates a shift from superficial technology use toward more purposeful and ethical digital learning practices.

Discussion

The results of this community service program align with previous studies that emphasize the role of AI in supporting personalized and effective learning experiences when accompanied by adequate digital literacy. The increased student engagement observed during the training sessions supports the argument that interactive and hands-on approaches are effective in introducing complex technologies such as AI, particularly in secondary education settings.



Figure 1. Community Service Activity

Within the context of an Islamic boarding school, the findings highlight that AI integration can be successfully introduced without undermining traditional educational values. By framing AI as a supportive and ethical learning tool, students were able to reconcile technological innovation with religious and moral principles (Mukhsin et al., 2025). This supports existing literature suggesting that technology adoption in Islamic education is more effective when aligned with institutional culture and values.

Furthermore, the community-based approach proved effective in bridging the digital literacy gap among students in religious-based educational institutions. The program not only enhanced technical awareness but also strengthened students' critical thinking and ethical judgment regarding digital content. These outcomes

demonstrate that AI literacy initiatives, when delivered through community service programs, can contribute to holistic student development and future academic readiness.

Overall, the findings suggest that introducing AI for digital learning enhancement in an Islamic boarding school context is both feasible and beneficial. The program provides a practical model for integrating AI literacy into religious education settings through community engagement, emphasizing ethical use, contextual relevance, and student-centered learning.

CONCLUSION

Conclusion

This community service program successfully introduced Artificial Intelligence (AI) as a supportive tool for digital learning enhancement in an Islamic boarding school context. The findings indicate that Grade XII students demonstrated improved awareness, understanding, and confidence in using AI for academic purposes after participating in the program. By integrating ethical considerations and aligning AI applications with Islamic educational values, the program effectively bridged traditional learning approaches with modern digital innovation. Overall, the initiative highlights that AI literacy can be meaningfully developed in religious-based educational institutions through contextualized and community-oriented engagement.

Implications

The results of this program have several important implications. For students, AI literacy contributes to improved digital readiness, critical thinking, and responsible technology use, which are essential for higher education and future careers. For Islamic boarding schools, the program demonstrates that AI can be integrated into learning environments without compromising moral and religious values. For educators and higher education institutions, this initiative provides a practical model for community service programs that promote digital inclusion (Junaedi et al., 2025) and technological competence in underserved educational settings.

Limitations

Despite its positive outcomes, this community service program has certain limitations. The activities were conducted within a relatively short time frame, which may limit the depth of skill mastery achieved by participants. Additionally, the evaluation relied primarily on qualitative observations and student reflections, without extensive quantitative measurement. The program was also limited to one Islamic boarding school, which may affect the generalizability of the findings to other educational contexts.

Recommendations

Based on the findings, several recommendations can be proposed. First, Islamic boarding schools are encouraged to incorporate basic AI literacy into their learning activities as a complementary component of digital education. Second, future programs should involve teachers more intensively through training-of-trainers models to ensure sustainability. Third, the use of mixed evaluation methods, combining qualitative and simple quantitative measures, is recommended to provide more comprehensive assessments of program effectiveness.

Future Community Service

Future community service initiatives should expand the scope of AI training to include advanced applications such as data literacy, problem-solving, and AI-assisted project-based learning. Long-term mentoring programs and collaborations between universities and Islamic boarding schools can further strengthen digital learning ecosystems. Additionally, future initiatives may explore the integration of AI with Islamic studies, ethics, and character education to foster students who are not only technologically competent but also morally grounded and socially responsible.

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