

Received: 07-03-2026 | Accepted: 28-04-2026 | Published: 09-06-2026

**ARTIFICIAL INTELLIGENCE-BASED LEARNING
MANAGEMENT IN MADRASAH: OPPORTUNITIES AND
CHALLENGES****Jalaluddin Madani¹⁾, Junaidi²⁾, Derysmono³⁾, Ahmad Rofiqi Tanzil⁴⁾, Siti
Aniqoh Shofwani⁵⁾**^{1,2)} Institut Darul ulum Banyuanyar Pamekasan Madura³⁾ STAI Dirosat Islamiyah Al-Hikmah Jakarta⁴⁾ Institut Darul Ulum Banyuanyar Pamekasan Madura⁵⁾ Sekolah Tinggi Ilmu Ekonomi Semarang**Email: madanie191094@gmail.com¹, junaidistai@gmail.com²,
derysmono@gmail.com³, arofiq1911@gmail.com⁴, aniqoh@gmail.com⁵****ABSTRACT**

This study discusses Artificial Intelligence (AI)-based learning management in madrasah with a focus on its opportunities and challenges. The study aims to analyze the role of AI in planning, implementing, and evaluating learning, as well as in educational decision-making in madrasah. The method used is qualitative with a library research approach through the analysis of relevant literature. The results show that AI plays a role in improving teacher efficiency, supporting data-driven learning, and creating more adaptive and personalized learning processes. However, the implementation of AI also faces challenges such as limited infrastructure, low digital competence among educators, and issues of ethics and information validity. In conclusion, the integration of AI in madrasah needs to be balanced with strengthening the role of teachers and must remain grounded in Islamic educational values.

Keywords: *learning management, artificial intelligence, opportunities and challenges madrasah.*

ABSTRAK

Penelitian ini membahas manajemen pembelajaran berbasis Artificial Intelligence (AI) pada madrasah dengan fokus pada peluang dan tantangannya. Penelitian ini bertujuan untuk menganalisis peran AI dalam perencanaan, pelaksanaan, evaluasi pembelajaran, serta pengambilan keputusan pendidikan di madrasah. Metode yang digunakan adalah kualitatif dengan pendekatan studi kepustakaan (library research) melalui analisis berbagai literatur yang relevan. Hasil penelitian menunjukkan bahwa AI berperan dalam meningkatkan efisiensi kerja guru, mendukung pembelajaran berbasis data, serta menciptakan pembelajaran yang lebih adaptif dan personal. Namun demikian, implementasi AI juga menghadapi tantangan seperti keterbatasan infrastruktur, rendahnya kompetensi digital pendidik, serta isu etika dan validitas informasi. Kesimpulannya, integrasi AI dalam madrasah perlu diimbangi dengan penguatan peran guru dan tetap berlandaskan nilai-nilai pendidikan Islam.

Kata Kunci: *manajemen pembelajaran, artificial intelligence, peluang dan tantangan madrasah*

INTRUDUCTION

The rapid development of digital technology over the past few decades has brought significant changes to various aspects of life, including the field of education. Digital transformation in education is not merely a shift from conventional media to digital media, but rather a paradigm shift in the management of learning systems, administration, and educational evaluation as a whole (Ab Rahman et al., 2025). One of the innovations that has recently gained widespread attention is Artificial Intelligence (AI). The application of AI in education promises a revolution in the way educators teach and students learn, offering unprecedented opportunities in terms of customization, efficiency, and accessibility (Pandya, 2024). AI technology enables computer systems to mimic human abilities in thinking, analyzing data, making decisions, and providing automated recommendations. The presence of AI not only changes how individuals obtain information but also drives transformation in learning processes, educational management, and decision-making within educational institutions.

Artificial Intelligence in the educational context is understood as an intelligent system capable of processing learning data, analyzing students' learning patterns, and providing personalized learning recommendations (Baek et al., 2024). In education, AI offers various opportunities to improve learning effectiveness and efficiency. This technology can be utilized for personalized learning, analysis of students' learning achievements, development of adaptive teaching materials, and automation of various administrative tasks for teachers. Through fast and accurate data analysis capabilities, AI has the potential to help educational institutions create more responsive learning systems that meet students' needs. With AI support, the learning process is no longer uniform but can be adjusted to the abilities, pace, and learning styles of each student (Aiman et al., 2025). Therefore, AI is increasingly seen as an important instrument in supporting educational transformation in the digital era.

Madrasahs as Islamic educational institutions cannot be separated from these technological developments. As institutions responsible for developing both academic competencies and Islamic values, madrasahs are required to adapt to changing times without abandoning their identity and characteristics. The implementation of AI in learning management can be an alternative to improve the quality of educational services in madrasahs, including in learning planning, teaching and learning processes, evaluation management, and the development of educational resources. AI plays a role in providing an adaptive and conducive learning environment, while teachers remain the main guides in instilling Islamic values (Irsyad & Zakir, 2023).

However, the implementation of AI in madrasah learning management is not free from various challenges. Limited technological infrastructure, teachers' digital competencies, students' readiness, and ethical issues in the use of AI are among the common obstacles faced. In addition, the use of AI in Islamic educational settings also raises questions regarding information validity, supervision of technology use, and its

compatibility with Islamic educational values, which form the fundamental foundation of madrasahs.

The education sector has undergone a significant paradigmatic shift as learning systems move from conventional models to digital ones (Trisnawati, 2024). The rapid development of AI requires adequate managerial readiness to ensure that this technology can be utilized optimally. Learning management is not only related to the use of technology as a learning aid but also includes the processes of planning, organizing, implementing, and evaluating learning that are integrated with digital technological developments. AI has great potential to improve the quality of learning by providing interactive, adaptive, and student-centered learning media (Sodik et al., 2025). Therefore, the successful implementation of AI in madrasahs highly depends on the institution's ability to manage change, build a culture of innovation, and enhance the capacity of human resources involved in the educational process.

Based on these conditions, the study of Artificial Intelligence-based learning management in madrasahs is important to conduct. This research aims to analyze various opportunities generated from the use of AI in learning management as well as identify the challenges faced in its implementation. Through this study, it is expected to obtain a more comprehensive understanding of effective, adaptive AI-based learning management strategies that remain aligned with the characteristics and values of Islamic education in madrasahs.

METHOD

This study employs a qualitative approach with a library research design. This approach was chosen because the study focuses on a conceptual analysis of the implementation of Artificial Intelligence (AI) in learning management in madrasahs, particularly regarding the opportunities and challenges that arise in the planning, implementation, and evaluation of learning processes. The research data were obtained from various relevant literature sources, including books, reputable national and international journal articles, proceedings, research reports, educational policy documents, and scientific publications discussing artificial intelligence, learning management, digital transformation in education, and Islamic education.

According to Pringgar and Sujatmiko (2020), library research is an approach that aims to collect and analyze data from various written sources such as journals, books, research reports, articles, and other documents. Meanwhile, Nazir (as cited in Hasibuan et al., 2024) states that literature study is a data collection technique carried out by reviewing books, literature, notes, and reports related to the problem being solved.

Data collection was conducted through documentation studies by searching various scientific publications indexed in academic databases such as Google Scholar, Scopus, Web of Science, and Garuda. According to Syafri (2026), documentation study is a data collection method that uses previously available sources, which may include secondary data. The literature used was selected based on thematic relevance, source credibility, and publication recency, with priority given to references published within

the last ten years. The collected data were then classified into the main themes of the study, namely the opportunities of AI implementation in madrasah learning management, the challenges of AI adoption, and strategies for AI-based learning management aligned with Islamic educational values.

Data analysis was conducted using content analysis techniques. This technique is used to identify, interpret, and synthesize various findings in the literature in order to obtain a comprehensive understanding of the implementation of AI in madrasah learning management. According to Holsti (as cited in Amane et al., 2023), content analysis is a technique for drawing conclusions by systematically, objectively, and generatively identifying specific characteristics of a message. The analysis was carried out through the stages of data reduction, data presentation, and conclusion drawing. To enhance the validity of the findings, source triangulation was employed by comparing references from international journals, national journals, academic books, and relevant policy documents. Through this approach, this study is expected to provide an in-depth overview of the opportunities and challenges of Artificial Intelligence utilization in madrasah learning management and offer conceptual recommendations for the development of Islamic education in the digital era.

RESULT AND DISCUSSION

Transformation of Madrasah Learning in the Era of Artificial Intelligence

The development of Artificial Intelligence (AI) has driven transformation across various aspects of educational management, including learning management in madrasahs. According to Ikmal and Sukaeni, AI functions to adapt learning to individual characteristics, thereby strengthening the effectiveness of Islamic education (Ikmal & Sukaeni, 2021). Previously, the learning process was largely dominated by conventional approaches that positioned teachers as the central source of knowledge delivery. However, the development of digital technology has shifted this paradigm toward a more flexible, interactive, and student-centered learning model. In this context, AI serves as an instrument that supports the processes of planning, implementation, evaluation, and decision-making in learning more effectively and efficiently. According to Golan et al., digital media provides users with access to what appears to be an unlimited range of information sources, enriched by multimedia and interactive reading experiences (Golan et al., 2018).

This transformation is not only related to the use of technological devices in teaching and learning processes but also involves a broader shift in educational management patterns. Nordahl, as cited in Patrick et al., states that information from other modalities can sometimes become a distraction to the primary learning task. For example, animations on websites may distract users during information-search tasks (Patrick et al., 2020). AI enables madrasahs to manage large volumes of learning data, analyze student development in real time, and generate recommendations that can be used as a basis for educational decision-making. Thus, learning management is no

longer solely based on teacher intuition but is also supported by more systematic and objective data analysis.

From the perspective of Islamic education, digital transformation through the use of AI must be understood as a means to improve the quality of educational services, not as a replacement for teachers. Teachers continue to hold their primary role as educators, mentors, and role models in shaping students' character. Therefore, the integration of AI in madrasahs should be directed toward strengthening learning effectiveness while maintaining Islamic values as the core identity of Islamic educational institutions.

Opportunities of Artificial Intelligence in Learning Planning in Madrasahs

One of the greatest opportunities offered by AI in madrasah learning management lies in the aspect of learning planning. Planning is a crucial stage that determines the direction, strategies, and objectives of the learning process to be implemented. The presence of AI enables teachers to design learning tools more quickly, systematically, and in accordance with students' needs. According to Fajri, with AI, teachers find it easier to generate new ideas in learning. This is particularly important because curricula frequently change, requiring teachers to continuously innovate (Fajri, 2026). Various AI-based platforms can assist in the development of lesson plans, teaching materials, presentation slides, assessment instruments, and more engaging learning media.

In addition to improving teacher efficiency, AI also supports the implementation of personalized learning, which is tailored to students' individual characteristics. Through the analysis of academic data, AI can identify students' abilities, interests, and learning difficulties, enabling teachers to design more targeted instructional strategies. This approach allows students to gain learning experiences that are more relevant to their needs compared to uniform learning models.

In the madrasah context, AI can also be utilized to support the integration of Islamic values in the learning planning process. Various Islamic reference sources can be accessed more easily, thereby supporting the development of learning materials that are not only focused on academic achievement but also on the formation of students' religious character. Thus, AI has the potential to become a strategic tool in improving the quality of effective learning planning grounded in Islamic values.

Artificial Intelligence in madrasah learning planning does not only function as a tool to accelerate the preparation of learning components such as lesson plans, teaching materials, and assessments, but also shifts the planning paradigm from teacher intuition-based to data-driven planning. AI helps teachers design more systematic learning that aligns with students' needs through the analysis of abilities, interests, and learning difficulties, thereby supporting the implementation of more targeted personalized learning. However, reliance on AI must also be approached with caution, as it may reduce teachers' reflective role in determining the direction of instruction. In the madrasah context, the use of AI should remain directed toward strengthening Islamic values, ensuring that technology not only enhances efficiency but also

preserves the teacher's essential role as the primary educator and builder of students' religious character.

Utilization of Artificial Intelligence in Learning Implementation

At the implementation stage, AI offers opportunities to create a learning process that is more interactive, adaptive, and flexible. The availability of various AI-based applications enables students to access a broader range of learning resources without being limited by space and time. AI-based learning systems are capable of providing material recommendations according to students' ability levels, making the learning process more personalized and effective.

The use of educational chatbots, virtual tutors, and AI-based learning platforms allows students to receive academic assistance quickly when facing learning difficulties. These technologies function as learning companions that help explain specific concepts, provide practice exercises, and deliver automatic feedback. According to Hoeruman et al., without supporting hardware such as computers, smart projectors, stable internet connections, and digital platforms that enable interactivity and the adaptation of Islamic curricula, AI integration will remain merely an ideal concept without practical realization (Hoeruman et al., 2024). This condition provides an opportunity for madrasahs to improve the quality of learning services without being fully dependent on face-to-face interaction.

In addition, AI can support collaborative learning through various digital platforms that allow more dynamic interaction between teachers and students. The use of AI-based learning media also increases students' learning motivation, as materials can be presented in visual, audio, simulation, and game-based formats that are more engaging. According to Khoiri et al., digital transformation not only affects the way humans communicate but also changes the paradigm of the learning process (Khoiri et al., 2026). Thus, the implementation of AI has the potential to create a more innovative learning environment that aligns with the characteristics of digital-native generations.

The Role of Artificial Intelligence in Learning Evaluation and Decision-Making

Evaluation is a crucial component of learning management that functions to measure the success of the educational process. In this context, AI offers various conveniences in the processes of collecting, processing, and analyzing students' learning outcome data. AI-based systems are capable of automatically assessing various forms of assignments and tests, thereby reducing teachers' administrative workload. As stated by Fajar et al., the use of Generative AI in educational practice not only has implications for teacher efficiency but also significantly influences the quality of learning planning (Fajar et al., 2026).

The ability of AI to process data rapidly enables madrasahs to obtain more accurate information regarding students' academic development. According to Chanifah et al., the development of a comprehensive educational framework is essential to respond to the challenges of dynamic younger generations (Chanifah et al.,

2021). This data can be used to identify students who require special assistance, determine more effective learning strategies, and evaluate the success of implemented educational programs. In other words, AI supports the creation of data-driven decision-making systems in learning management.

Furthermore, AI's predictive analytics capabilities can help madrasahs detect potential learning problems at an early stage. This information allows teachers and educational managers to carry out timely interventions, thereby minimizing various learning obstacles. Therefore, the use of AI in evaluation does not only function as a tool for measuring learning outcomes but also serves as a strategic instrument for improving educational quality.

Challenges of Artificial Intelligence Implementation in Madrasah Learning

Although it offers various opportunities, the implementation of Artificial Intelligence (AI) in madrasah learning management also faces several serious challenges that require close attention. One of the main challenges is limited technological infrastructure, which is still experienced by many madrasahs, particularly those located in remote areas. The availability of digital devices, internet access, and adequate technological support are crucial factors for the successful implementation of AI.

The next challenge is related to teachers' digital competencies. Not all teachers possess sufficient skills to utilize AI technology in supporting the learning process. This condition often leads to suboptimal use of AI, where its application remains limited. Therefore, continuous professional training and development programs are necessary to help teachers adapt to advancements in educational technology.

In addition to technical aspects, the use of AI also raises ethical and academic issues. As stated by Van den Berg et al., the implementation of AI presents various challenges, including the potential for misinformation, bias, and academic ethical concerns (Van den Berg, 2023). Easy access to various AI platforms may encourage students' dependence on technology, reduce critical thinking skills, and increase the risk of plagiarism. In the context of Islamic education, these challenges become even more complex because madrasahs must ensure that the use of AI remains aligned with the values of honesty, responsibility, and academic ethics emphasized in Islam.

Another challenge is the validity of information generated by AI systems. Not all information produced by AI is accurate, especially in religious content that requires strong scholarly foundations and authoritative references. Therefore, teachers must act as supervisors and filters of information to ensure that students receive accurate knowledge in accordance with Islamic educational principles. Thus, the success of AI implementation in madrasahs greatly depends on the ability of educational institutions to balance technological innovation with Islamic values, which serve as the fundamental foundation of madrasah education.

CONCLUSION

Based on the findings of this study, it can be concluded that the implementation of Artificial Intelligence (AI) in madrasah learning management brings significant changes to the Islamic education system, particularly in the areas of planning, implementation, and evaluation of learning. AI serves as a strategic instrument that enhances teachers' work efficiency, supports data-driven learning, and facilitates more adaptive and personalized learning models tailored to students' needs. Furthermore, AI strengthens the quality of educational decision-making through faster, more accurate, and more systematic data analysis.

However, despite these opportunities, the implementation of AI also presents challenges that cannot be overlooked, including limited technological infrastructure, insufficient digital competencies among educators, and concerns regarding academic ethics and information validity. In the context of madrasahs, these challenges become more complex because the use of AI must remain consistent with Islamic values, which constitute the fundamental basis of education.

Therefore, it can be emphasized that the successful integration of AI into madrasah learning management largely depends on the institution's ability to balance technological innovation with the strengthening of teachers' roles as educators, mentors, and character builders. AI should not function as a substitute for teachers; rather, it should serve as a supporting tool that enhances learning effectiveness while preserving the moral and spiritual values embedded in Islamic education.

REFERENSI

- Aiman, N., Ridwan, Hatta, K., & Ramadani, M. R. (2025). Manajemen Pembelajaran Berbasis Artificial Intelligence Pada Lembaga Pendidikan Islam. *Edu Society: Jurnal Pendidikan, Ilmu Sosial, dan Pengabdian kepada Masyarakat*, 5(3). <https://doi.org/10.56832/edu.v5i3.2482>
- Amane, A. P. O., Kertati, I., Hastuti, D., Purwanto, R., Shodiq, L. J., & Ridho'i, M. (2023). *Metode Penelitian Kualitatif (Perspektif Bidang Ilmu Sosial)*. PT Sonpedia Publishing Indonesia.
- Baek, C., Tate, T., & Warschauer, M. (2024). ChatGPT Seems Too Good To Be True: College Students' Use and Perceptions of Generative AI. *Computers and Education: Artificial Intelligence*, 7. <https://doi.org/10.1016/j.caeai.2024.100294>
- Chanifah, N., Hanafi, Y., Mahfud, C., & Samsudin, A. (2021). Designing A Spirituality-Based Islamic Education Framework For Young Muslim Generations: A Case Study From Two Indonesian Universities. *Higher Education Pedagogies*, 6(1). <https://doi.org/10.1080/23752696.2021.1960879>

- Fajri, L. R. (2026). Persepsi Guru Terhadap Pengembangan RPP Berbasis Artificial Intelligence. *Manajerial: Jurnal Manajemen Pendidikan Islam*, 8(1). <https://doi.org/10.70143/enjav832>
- Fajar, M. A., Aditya, I. G. P. W., Ferissa, D. N., Gavindaffa, M. F., Cahyaningsih, A. A., & Amarulloh, A. (2026). Optimalisasi Generative AI Dalam Perencanaan Pembelajaran Guru Untuk Mendukung Implementasi SDG's 4 (Quality Education). *Al Ibtidaiyah: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, 7(2). <https://doi.org/10.46773/g97v6w32>
- Golan, D. D., Barzillai, M., & Katzir, T. (2018). The Effect Of Presentation Mode On Children's Reading Preferences, Performance, And Self-Evaluations. *Computers & Education*, 126.
- Hasibuan, Z. E., et al. (2024). *Metodologi Penelitian Pendidikan: Kualitatif, Kuantitatif, Kepustakaan, dan PTK*. AE Publishing.
- Hoeruman, M. R., Kuswanto, R. T., Subha, R., Dewi, A. F., & (2024). Transformasi Pendidikan Agama Islam Menuju Era Digital Dan Artificial Intelligence. *Muaddib: Islamic Education Journal*, 7(2). <https://doi.org/10.19109/muaddib.v7i2.28200>
- Ikmal, H., & Sukaeni, W. (2021). Inovasi Pembelajaran Pendidikan Agama Islam Berbasis Multiple Intelligences di SMAN 1 Kedungpring Lamongan. *Jurnal Ilmu Pendidikan Islam*, 5(1). <https://doi.org/10.30736/ktb.v5i1.614>
- Irsyad, M., & Zakir, S. (2023). Transformasi AI Dan Kurikulum: Tantangan Pendidikan Islam Menghadapi Abad ke-21. *Al-Aulia: Jurnal Pendidikan dan Ilmu-Ilmu Keislaman*, 9(2). <https://doi.org/10.46963/aulia.v9i2.1395>
- Khoiri, A., Madani, J., Wulan, W., Zakkiyah, U., & Assulthoni, F. (2026). Pelatihan Pemanfaatan Media Digital Untuk Meningkatkan Kualitas Pembelajaran Guru di SMA Plus Al-Azhar Jember. *SAWEU: Jurnal Pengabdian Masyarakat*, 2(2).
- Pandya, K. T. (2024). The Role Of Artificial Intelligence In Education 5.0: Opportunities And Challenges. *Promptai Academy Journal*, 3. <https://orcid.org/0009-0007-2447-1703>
- Pringgar, R. F., & Sujatmiko, B. (2020). Penelitian Kepustakaan (Library Research) Modul Pembelajaran Berbasis Augmented Reality Pada Pembelajaran Siswa. *Jurnal IT-EDU*, 5(1), 317–329. <https://doi.org/10.26740/it-edu.v5i1.37489>
- Rahman, S. F. binti A., Rahman, S. B. A., Rahim, N. H. binti M., Ibrahim, S. M. binti, & Rahman, N. N. A. (2025). Digital Transformation In Educational Management To Enhance Students' Learning Outcomes. *MAPAN: Manajemen Pendidikan dan Analisis*, 1(2), 94–113. <https://cabiskarya.com/mapan/article/view/24>
- Rau, P.-L., Zheng, J., & Wei, Y. (2020). Distractive Effect Of Multimodal Information In Multisensory Learning. *Computers & Education*, 144.
- Sodik, M., Syayidah, L. N., & Asror, M. K. N. (2025). Pembinaan Guru Madrasah Dalam Penggunaan Integrasi AI Sebagai Pengembangan Media Pembelajaran Pendidikan Islam. *JPMD: Jurnal Pengabdian kepada Masyarakat Desa*, 6(3). <https://doi.org/10.58401/jpmd.v6i3.2872>

- Syafri, M. (2026). *Analisis SWOT strategi Efektif Untuk Perubahan Dan Ketidakpastian*. PT Inspirasi Modern Publishing.
- Trisnawati, T. (2024). Penerapan Kepemimpinan Transformasional Dalam Upaya Meningkatkan Kinerja Guru di MAN 5 Tasikmalaya. *Educational: Jurnal Inovasi Pendidikan & Pengajaran*, 4(2), 122–135.
<https://doi.org/10.51878/educational.v4i2.3058>
- Van den Berg, G., & du Plessis, E. (2023). ChatGPT and generative AI: Possibilities For Its Contribution To Lesson Planning, Critical Thinking And Openness In Teacher Education. *Education Sciences*, 13, 998.
<https://doi.org/10.3390/educsci13100998>