



ARTIFICIAL INTELLIGENCE-BASED SMART LEARNING MANAGEMENT IN STRENGTHENING ENGLISH LANGUAGE COMPETENCIES OF MADRASAH STUDENTS

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Abstract:

The rapid development of Artificial Intelligence (AI) has transformed education toward more adaptive, personalized, and technology-driven learning systems. This study aims to analyze the concepts, implementation, opportunities, and challenges of AI-based smart learning management in strengthening the English language competence of madrasah students. This research employed a qualitative approach using a library research method. Data were collected from national and international journal articles, books, and other relevant scholarly sources. Data were analyzed through content analysis, including data reduction, categorization, interpretation, and conclusion drawing. The findings indicate that AI-based smart learning management enhances English language learning through personalized instruction, instant feedback, adaptive learning, and broader access to digital learning resources. AI technologies such as ChatGPT, speech recognition systems, intelligent tutoring systems, and adaptive learning platforms support the improvement of listening, speaking, reading, and writing skills. Effective implementation requires the integration of educational management functions, including planning, organizing, actuating, and controlling, supported by teacher competence, digital infrastructure, and institutional policies. Despite challenges related to digital literacy, human resource readiness, and ethical concerns, AI has significant potential as an innovative instrument for improving English language learning in madrasahs.

Keywords: *Artificial Intelligence; Smart Learning; Islamic Educational Management; English Language Competence; Madrasah.*

INTRODUCTION

Digital transformation in the 21st century has driven fundamental changes in educational systems, including learning processes, classroom management, and the development of students' competencies. One rapidly growing innovation is the use of Artificial Intelligence (AI) in education. AI is no longer merely a supporting technology but has evolved into a strategic instrument capable of

delivering personalized, adaptive, and data-driven learning. In the context of English language learning, AI offers broad opportunities to enhance language skills through access to diverse learning resources, instant feedback, and learning experiences tailored to individual students' needs. (Iskandar et al., 2024) state that AI technology enables students to access various learning resources, ranging from translation applications to interactive learning platforms that can improve English speaking, listening, reading, and writing skills. In addition, AI systems can provide immediate feedback on grammatical and pronunciation errors, making the learning process more effective and personalized.

The development of AI has also brought a paradigm shift toward the concept of smart learning, namely a learning system that utilizes intelligent technology to create flexible, adaptive, and learner-centered learning experiences. Smart learning enables the integration of artificial intelligence, data analytics, and digital learning environments to support the achievement of educational goals. (Kowalska & Kosina, 2025) explain that smart learning is a modern educational paradigm that leverages AI technology to provide real-time feedback, optimize learning pathways, and enhance learner engagement through interactive technologies. In this context, ChatGPT and various other AI applications function as learning assistants that can help learners obtain learning recommendations, answer questions, and develop critical thinking skills through dialogue-based interactions.

At the same time, proficiency in English has become an important necessity for madrasa students in facing the challenges of globalization and the development of information technology. English not only functions as a tool for international communication but also as a means of accessing knowledge, technology, and global networks. (Al-smadi, 2024) emphasizes that English proficiency is a highly important skill in an interconnected world because it serves as the primary language in business, science, diplomacy, and digital technology. Therefore, improving English competence has become one of the strategic agendas of Islamic educational institutions to produce graduates who are capable of competing at the global level.

However, various studies indicate that English language learning in madrasahs still faces several challenges, such as limited learning resources, low opportunities for language practice, and the suboptimal use of educational technology. (Nehru & Sari, 2025) found that the implementation of AI in English language learning in madrasahs has great potential to improve vocabulary, reading, writing, and pronunciation skills through the use of chatbots, intelligent tutoring systems, speech recognition technology, and adaptive learning. Nevertheless, its implementation is still constrained by limited infrastructure, teachers' readiness, low digital literacy, and the need to align with the cultural and religious values that are upheld within the madrasah environment.

In addition to supporting academic aspects, AI has also been proven to enhance students' English communication skills through more intensive speaking practice with minimal anxiety. (Ericsson & Johansson, 2023) explain that conversational AI enables learners to practice speaking in the target language continuously while receiving individualized feedback in a comfortable, low-pressure learning environment. This technology provides broader opportunities for students to develop speaking skills, which have long been one of the most challenging aspects of second-language learning.

From the perspective of Islamic educational management, the successful implementation of AI-based smart learning depends not only on the availability of technology but also on the effectiveness of management functions, including planning, organizing, implementation, and evaluation. (Aiman et al., 2025) emphasize that AI-based learning management can support data-driven planning, adaptive learning, and continuous evaluation, thereby enhancing learning effectiveness when managed systematically and aligned with Islamic values. Therefore, management strategies are needed to integrate AI technology with the vision of madrasah education so that technology functions as a tool to strengthen the learning process rather than replace the role of teachers.

Other research also shows that the integration of AI in the madrasah environment can enhance conceptual understanding, communication skills, creativity, and student engagement in the learning process. (Raehang et al., 2025) found that AI-based learning media significantly improve conceptual understanding, verbal and nonverbal communication skills, as well as the creative expression of madrasah students, while simultaneously reducing teachers' instructional burden and increasing students' participation in learning.

Although various studies have discussed the use of AI in English language learning and Islamic education separately, research that specifically examines how AI-based smart learning management can be used as a strategy to strengthen the English language competence of madrasah students remains relatively limited. Most studies focus on the effectiveness of AI technology or the implementation of digital learning media, while the managerial aspects that govern the planning, implementation, monitoring, and evaluation of smart learning have not been comprehensively examined in the madrasah context.

Based on these conditions, this study aims to analyze the concept and implementation of Artificial Intelligence-based smart learning management in strengthening the English language competencies of madrasah students. This study is expected to provide a theoretical contribution to the development of Islamic education management in the digital era while also offering an innovative, adaptive, and relevant learning management model that meets the needs of the 21st century.

This research is reinforced by management theory (Terry, 2020), which explains that management consists of the functions of planning, organizing, actuating, and controlling (POAC). In the context of Artificial Intelligence-based smart learning, these four functions serve as the foundation for managing learning activities, ranging from digital policy planning, resource organization, and AI-based learning implementation to the continuous evaluation of learning outcomes.

The concept of smart learning refers to a learning environment that is adaptive, personalized, contextual, and supported by intelligent technology. (Zhu et al., 2016) explain that smart learning enables learners to obtain learning experiences that match their individual needs and characteristics through the use of digital technology and data analytics.

From the perspective of Artificial Intelligence in Education (AIEd), (Holmes et al., 2019) state that AI plays a role in supporting learners, assisting teachers in making instructional decisions, and improving the effectiveness of data-driven education systems. Therefore, the use of AI in madrasahs functions not only as a learning medium but also as an instrument for strengthening

learning governance.

The English language competencies referred to in this study encompass the skills of listening, speaking, reading, and writing, as proposed by (Brown & Abeywickrama, 2010). The strengthening of these four skills serves as a key indicator of the successful implementation of Artificial Intelligence-based smart learning management in madrasahs.

Previous studies have generally focused on the effectiveness of AI use in English language learning or on the partial implementation of AI in Islamic education. However, studies that integrate the perspectives of Islamic educational management, the concept of smart learning, and Artificial Intelligence as a strategy to strengthen the English language competence of madrasah students remain relatively limited. Therefore, this study offers a conceptual synthesis of an AI-based smart learning management model integrated with the functions of Islamic educational management.

RESEARCH METHODS

This study employs a qualitative approach using the library research method. This method was selected to examine in depth the concept of smart learning management based on Artificial Intelligence (AI) in strengthening the English language competence of madrasah students through the analysis of various relevant literature sources.

The research data were obtained from secondary sources in the form of reputable national and international journal articles, conference proceedings, academic books, and scientific documents published between 2021 and 2025. The literature reviewed focused on three main themes: (1) educational management and AI-based learning management; (2) the concept of smart learning in education; and (3) the use of AI in English language learning in madrasahs and Islamic educational institutions.

Data collection was conducted through a literature review using scientific databases such as Google Scholar, Scopus, ERIC, and Garuda with the following keywords: Artificial Intelligence in Education, Smart Learning, AI-Based Learning Management, English Language Learning, English Competency, Madrasah Education, Islamic Education Management, and AI in Language Learning. The selected literature was then screened based on thematic relevance, publication recency, and the quality of the scientific sources.

Data analysis was conducted using the content analysis technique as proposed by (Krippendorff, 2019), which includes the stages of data reduction, theme categorization, meaning interpretation, and conclusion drawing. The analysis focused on identifying concepts, management strategies, the implementation of AI-based smart learning, and its contribution to strengthening the English language competencies of madrasa students. To enhance the validity of the study, source triangulation was carried out by comparing various research findings and relevant theories, resulting in a comprehensive synthesis of AI-based smart learning management models within the context of madrasa education.

RESULTS AND DISCUSSION

Smart Learning Management Based on Artificial Intelligence in Madrasah Education

The literature review results indicate that AI-based smart learning is a learning approach that integrates intelligent technology, data analytics, and personalized learning to create a more effective, flexible, and learner-centered learning experience. AI enables learning systems to adapt materials, methods, and assessments according to the needs and abilities of each student. (Aiman et al., 2025) explain that AI-based learning management supports data-driven planning, adaptive learning implementation, and continuous evaluation, thereby enhancing the effectiveness of the learning process.

From the perspective of Islamic educational management, the implementation of smart learning requires the integration of management functions that include planning, organizing, actuating, and controlling. (Akromusyuhada et al., 2023) emphasize that Islamic educational management remains grounded in general management functions; however, all of its processes must be oriented toward the values of the Qur'an and Hadith so that the goals of Islamic education can be achieved effectively and efficiently.

This finding indicates that AI-based smart learning functions not only as a technological innovation but also as a managerial strategy that can improve the quality of madrasah educational services through more systematic and adaptive learning management.

Implementation of AI-Based Smart Learning in Strengthening English Language Competencies

Based on the analysis of various studies, AI has made a significant contribution to strengthening English language competencies, particularly in the areas of listening, speaking, reading, and writing. Technologies such as ChatGPT, speech recognition, chatbots, and intelligent tutoring systems enable students to gain more personalized and interactive learning experiences.

(Iskandar et al., 2024) found that ChatGPT is widely used in English language learning because it helps students find references, compose academic writing, and receive rapid feedback on their learning outcomes.

Similarly, (Al-smadi, 2024) revealed that AI contributes to: (1) the personalization of learning, (2) the improvement of speaking, listening, reading, and writing skills, (3) increased learning motivation, (4) the enhancement of self-directed learning, (5) the reduction of educational access gaps, and (6) the development of educators' professionalism.

In the context of speaking instruction, (Ericsson & Johansson, 2023) demonstrated that conversational AI provides students with opportunities to practice speaking intensively in a low-anxiety environment, thereby increasing their confidence and engagement in using English.

These findings indicate that AI can address the limitations of language practice, which have long been one of the main challenges in English language learning in madrasahs.

AI-Based Smart Learning Management Strategies in Madrasahs

The study results indicate that the success of implementing AI-based smart learning in madrasahs is highly influenced by the quality of management

practices applied. Management strategies that can be implemented include: (1) planning, where madrasahs need to develop learning digitalization policies that incorporate the use of AI as part of a strategy to improve English language competencies. Planning includes providing infrastructure, teacher training, selecting AI platforms, and designing an adaptive curriculum; (2) organizing, where madrasahs need to establish a digital learning development team responsible for managing AI implementation, including developing teaching materials, supervising technology use, and supporting teachers; (3) actuating, where implementation is carried out through the integration of various AI applications such as ChatGPT, Grammarly, Duolingo AI, SpeechAce, and adaptive learning platforms into the English language learning process. Research by (Ainol Mardhiah et al., 2025) show that the use of AI-based SpeechAce significantly improves users' pronunciation, fluency, grammar, and vocabulary. In addition, AI helps create more independent learning and increases confidence in communicating in English; (4) controlling and evaluation, where evaluation is conducted continuously through the analysis of learning outcome data generated by AI systems. Teachers can monitor students' competency development individually and provide interventions according to the needs of each learner.

Opportunities and Challenges of Implementing AI-Based Smart Learning in Madrasahs

A literature review shows that the implementation of AI in madrasahs offers various opportunities, including: (1) improving learning effectiveness; (2) supporting personalized learning; (3) increasing students' learning motivation; (4) expanding access to English learning resources; and (5) assisting teachers in administration and learning assessment.

However, there are several challenges that need to be anticipated, namely: limited technological infrastructure, low digital literacy among teachers and students, excessive dependence on technology, the risk of AI misuse in academic assignments, and issues related to ethics and data security.

In addition, the implementation of AI in madrasahs must continue to uphold Islamic educational values. AI should be positioned as a learning support tool, not as a substitute for the role of teachers. Teachers still have the primary function of being educators, mentors, role models, and instillers of Islamic values in students.

Based on the overall findings, it can be concluded that Artificial Intelligence-based smart learning management has great potential to strengthen the English language competence of madrasah students through adaptive, personalized, and data-driven learning management. Effective implementation requires the integration of Islamic education management functions, human resource readiness, digital infrastructure support, and the reinforcement of Islamic values. Therefore, AI-based smart learning can become an innovative model for madrasahs in addressing the challenges of 21st-century education while enhancing the global competitiveness of their graduates.

CONCLUSION

The development of Artificial Intelligence (AI) has created new opportunities for transforming learning in madrasahs through the implementation of the smart learning concept. Based on the results of the literature review, AI-based smart learning management is a learning approach that integrates intelligent technology, data analytics, and personalized learning to enhance the effectiveness of the teaching and learning process. In the context of madrasah education, the implementation of AI-based smart learning can be carried out through educational management functions that include planning, organizing, implementation, and evaluation in a systematic manner while remaining grounded in Islamic educational values.

The review findings indicate that the use of AI technologies, such as ChatGPT, speech recognition, intelligent tutoring systems, and adaptive learning platforms, can strengthen students' English language competencies in the areas of listening, speaking, reading, and writing. These technologies provide a more interactive, flexible, and individualized learning experience tailored to students' needs. In addition, AI contributes to increasing learning motivation, self-confidence, independent learning, and student engagement in the English language learning process.

Nevertheless, the implementation of AI-based smart learning in madrasahs still faces various challenges, including limited digital infrastructure, low levels of technological literacy, teacher readiness, and ethical issues related to the use of AI. Therefore, supportive institutional policies, improved teacher competencies, strengthened digital literacy, and proper supervision of technology use are needed to ensure that AI can be utilized optimally and responsibly.

Thus, Artificial Intelligence-based smart learning management can serve as an innovative strategy for strengthening the English language competencies of madrasah students while supporting a more adaptive, effective, and relevant transformation of Islamic education in response to the demands of the digital era. The success of its implementation is determined not only by the sophistication of the technology employed but also by the quality of educational management and the commitment of all stakeholders to integrating technology with Islamic values.

REFERENCES

- Aiman, N., Ridwan, Khobi, H., & 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), 1947–1954.
- Ainol Mardhiah, Hajar, I., Purwati, D., Muna, H., & Ariani, R. (2025). Leveraging Artificial Intelligence (AI) to Enhance Teachers' Spoken English at an Islamic Boarding School. *Journal of Educational Sciences*, 9(6), 5163–5176.
- Akromusyuhada, A., Fachrudin, A., & Andriyani, A. (2023). Integration of Information and Communication Technology in Islamic Education Management Overview of Smart Learning and Smart Building Study at Islamic Digital Boarding College (IDBC) Sukoharjo. *Internasional Journal of Integrative Sciences (IJIS)*, 2(10), 1515–1536.

- Al-smadi, O. A. (2024). Artificial Intelligence for English Language Learning and Teaching: Advancing Sustainable Development Goals. *Journal of Language Teaching and Research*, 15(6), 1835–1844.
- Brown, H. D., & Abeywickrama, P. (2010). *Language Assessment Principles and Classroom Practices*. Pearson Education.
- Ericsson, E., & Johansson, S. (2023). Computers and Education : Artificial Intelligence English speaking practice with conversational AI : Lower secondary students ' educational experiences over time. *Computers and Education: Artificial Intelligence*, 5(April), 100164. <https://doi.org/10.1016/j.caeai.2023.100164>
- Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial Intelligence In Education*. Center for Curriculum Redesign.
- Iskandar, Latief, S. A., Muhsin, M. A., & Hasanah, N. I. (2024). Detection of AI Utilization in Language Learning : A Study on the Implementation of Chat Gpt In Academic Writing Among Indonesian Higher Education Students. *Didaktika: Jurnal Kependidikan*, 13(4), 1–10.
- Kowalska, M., & Kosina, D. (2025). *28th European Conference on Artificial Intelligence (ECAI 2025) Smart Learning With Ai : Decision Factors In Generation Z ' S Adoption Of Chatgpt Using The Utaut2 Framework*. *Ecai*. <https://doi.org/10.18276/978-83-8419-028-9-27>
- Krippendorff, K. (2019). *Content Analysis An Introduction to Its Methodology Fourth Edition* (T. Accomazzo (ed.)). SAGE Publications.
- Nehru, N. A., & Sari, H. P. (2025). Smart English Learning: Leveraging Artificial Intelligence To Enhance English Language Instruction In Madrasah Ibtidaiyah. *KNPI: Konferensi Nasional Pendidikan Islam*, 32–43.
- Raehang, Assingkily, M. S., & Ahmad, M. (2025). Integrating Artificial Intelligence into Madrasah Learning : A Mixed- Methods Study of Intelligent Media Development and Implementation. *Cendekiawan: Jurnal Pendidikan Dan Studi Keislaman*, 4(1), 608–618.
- Terry, G. R. (2020). *Dasar Dasar Manajemen Edisi Revisi*. Bumi Aksara.
- Zhu, Z., Yu, M., & Riezebos, P. (2016). A research framework of smart education. *Smart Learning Environments*. <https://doi.org/10.1186/s40561-016-0026-2>