

# THE UTILIZATION OF ARTIFICIAL INTELLIGENCE (AI) TECHNOLOGY IN LEARNING: A SYSTEMATIC REVIEW

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## Abstract:

This article examines the utilization of Artificial Intelligence (AI) technology in learning, focusing on six main aspects: adaptive learning personalization, real-time student performance analysis, interactive automated learning, language learning assistance, development of critical analytical skills, and enhancement of flexible learning resource availability. The study was conducted through a systematic review, synthesizing selected studies from 2013–2025, including UNESCO reports and implementations in Indonesia and other countries. Findings reveal that AI positions students at the center of the learning process, optimizing individual potential through instant feedback, innovative content such as chatbots and simulations, and early detection of learning issues. Although over 70% of global institutions have adopted AI since 2023, challenges like dependency, ethical usage, and reduced independence necessitate teacher supervision and responsible integration. These findings affirm that AI revolutionizes education to be more personalized, inclusive, and effective, with recommendations for teacher competency training to achieve optimal human-machine collaboration.

**Keyword:** Artificial Intelligence, Learning, Educational Technology, Systematic Review

## 1. Introduction

In the modern education era, Artificial Intelligence has taken on an important role. This technology is present as an innovative solution to various problems often faced by students and teachers. With the ability to personalize learning, AI can tailor material to the needs of each student. In addition, the evaluation process becomes more efficient because AI can automate assessment (Nuryani, 2025). The utilization of AI in various countries to improve the quality of learning in schools has become the main focus of education development in 2025. According to a UNESCO report in 2023, more than 70% of educational institutions in the world have begun to adopt AI technology in their learning systems. UNESCO highlights the importance of implementing AI ethically and responsibly with the aim of complementing, not replacing, the role of teachers and the human aspects of learning. Member countries are encouraged to invest in teacher training so that they can use AI technology effectively and safely in the context of education. Some real examples of AI implementation in global schools include China, which has made AI a compulsory subject starting in 2025, and South Korea, which is developing AI-based digital textbooks that adjust the difficulty level of the material according to students' abilities. Australia and Estonia are examples of countries that emphasize the ethical aspects and supervision of the use of AI in schools to ensure that this technology provides maximum benefits without causing detrimental risks (Audrey Azoulay, 2025).

In addition, in Indonesia, AI has begun to be integrated into the 2025 Curriculum as an elective subject at various levels of schools, with a focus on personalizing learning and developing digital competencies from an early age. AI helps teachers control and evaluate student progress in real-time so that teaching is more adaptive and inclusive. Programs such as the Indonesia Future of Learning Summit (IFLS) 2025 affirm the importance of the younger generation not only having digital skills but also understanding the use of AI in education responsibly and ethically (Yayasan Bangun Kecerdasan Bangsa, 2025).

Education is the main foundation of a nation's development, and the introduction of AI in learning and assessment has brought revolutionary changes in the modern education process (Supangat, 2021). Assessment and learning are integrated because the quality of good assessment is created from a good learning process, and vice versa (Rosnaeni, 2021). AI enables personalization of learning by adjusting

materials and learning methods according to the needs and characteristics of individual students, so that the learning process becomes more effective and efficient than conventional methods. The AI system can analyze student learning outcome data in real-time to provide fast and accurate feedback, accelerate the identification of learning difficulties, and support the development of adaptive assessments that are tailored to the abilities of each student. This creates a more responsive and interactive learning cycle, while helping teachers make more targeted pedagogical decisions. Thus, the integration of AI in education brings significant changes in the way learning and evaluation are carried out, improving the learning experience and learning outcomes of students as a whole (Nende and Sulasmi, 2024). From here, it can be understood that AI has become an integral part of modern education, offering innovative solutions to the challenges faced by students and teachers. AI can be used to personalize learning, automate evaluations, and improve the learning experience of students.

The use of AI in education has received significant attention in recent years as many educational institutions and organizations utilize AI-based technology (Su & Yang, 2023). The role of educators in this very rapid digital era must be able to adapt to the times through the use of AI to facilitate teachers' tasks in the teaching and learning process. In this era of rapid digital development, a teacher's ability must continue to be improved in order to adjust the way of educating to the current conditions. Therefore, according to Adi et al., (2023), a teacher must have 8 competencies in utilizing technology, namely: 1) adapting to internet development trends, 2) mastering main and additional knowledge, 3) being innovative and creative in presenting material, 4) being able to motivate students, 5) designing interesting learning, 6) managing an effective learning system, 7) suitability in the selection of teaching materials, 8) ability in managing the learning process. In addition, teachers must also understand the ethics of using AI (M.A.K. Harahap et al., 2023). Having these competencies will help teachers to streamline their tasks in learning and assessment.

Discussions regarding the utilization of AI technology in education, especially related to learning, are strategic to study. Studies on the utilization of AI technology for learning have been implemented, whether the implementation is more on personalization and learning platforms, or also aspects of adaptation, specific contexts of AI utilization in learning that have not been explored in detail. This study tries to conduct a systematic review related to the utilization of AI technology in education, especially related to learning in schools. This systematic review aims to collect the latest evidence on the utilization of AI technology in learning in the modern education era. Peer-reviewed articles and reports published describe efforts to explore the utilization of AI technology for learning. These findings offer a current source of evidence that AI technology has become an integral part of modern education and offers innovative solutions to the challenges faced by teachers and students in schools.

## 2. Research Method

This study applies a systematic literature review approach to examine the innovation of artificial intelligence (AI) applications in the field of education, with a special emphasis on efforts to use AI for learning and evaluation processes. A systematic review is a disciplined and methodical research technique for filtering, reviewing, and integrating the latest literature sources that are relevant to specific study issues. This approach allows for an organized analysis of various study results, providing comprehensive insights for education actors regarding the theme.

## 3. Results and Discussion

This systematic review discusses the utilization of AI technology, with a focus on learning and the challenges associated with its implementation. The synthesis of findings from selected studies explains the key aspects of implementing the utilization of AI technology in learning. One of the main findings of this review is the important role of AI technology in education for its practical application in learning.

The utilization of AI technology in learning has several main meanings, including personalized learning that adjusts to individual needs, analysis of student progress and performance, automated learning, assistance in language learning, development of analytical skills, and availability of learning resources. This approach places students at the center of the learning process, where AI functions as a support tool to optimize each individual's potential (Alliya Fajriati et al, 2025). First, the utilization of AI for personalized learning. This AI learning personalization allows for the personalization of teaching materials based on individual data analysis. Including allowing students to learn independently and adaptively, such as through content recommendations or rescheduling difficult topics. According to Fitri & Dilia (2024), AI technology provides

a more personal learning experience and supports more effective learning. Furthermore, Coates, et al., (2013), AI enables personalization of learning, where the learning system can be adjusted to the needs and abilities of each student automatically. Therefore, each student can learn at a pace and style that suits their abilities, improving overall understanding and learning achievement. From this study, it can be understood that AI technology can support the personalization of learning by automatically adjusting teaching materials based on individual data, allowing students to learn independently and adaptively according to their pace and style.

Second, Analysis of Student Performance. By utilizing AI, teachers can access in-depth analysis of student progress and performance. According to Wibowo (2023), AI enables early detection of problems faced by students, so that appropriate interventions can be carried out. This shows that with the help of AI, educators are able to obtain detailed insights into the development and learning performance of students. Furthermore, AICI (2025), AI technology can process large data to identify student performance patterns accurately and in real-time, so that teachers can act quickly. From this study, it can be understood that AI technology allows teachers to detect student problems early through accurate real-time data analysis, thus facilitating appropriate interventions and effective learning personalization.

Third, Automated Learning. AI technology can be used to support independent learning. According to Feldman & Amandi (2015), educators can provide timely interventions to improve the quality of learning. With AI, it is possible to develop interactive and engaging learning content, such as game-based learning, simulations, and virtual learning experiences, which make the learning process more interesting and entertaining for students. Features such as simulations and games make learning more entertaining, while educator interventions ensure effectiveness. According to Anas & Zakir (2024), the use of AI-based chatbots in education can increase student interaction with content and provide a more interactive learning experience. Ameliyana et al (2025), stated that the utilization of AI can increase active student interaction with learning materials. This can be done through various innovative features designed for learning in the digital era. AI chatbots can increase student interaction with learning materials actively and engagingly (Ameliyana et al., 2025). From this study, it can be understood that AI technology supports interactive independent learning through chatbots, innovative content such as games and virtual simulations, and timely interventions, thus improving the quality and attractiveness of the student learning process.

Fourth, Assistance in Language Learning. According to Oktavianus et al (2023), AI provides instant and accurate feedback, allowing students to correct errors directly. AI such as chatbots and language learning applications provide real-time error correction, helping students practice speaking and writing accurately without waiting for a teacher. Including AI pattern recognition technology is able to detect nuances of grammar, pronunciation, and vocabulary, providing personal suggestions that improve student fluency quickly. Example Application Tools such as Grammarly AI provide direct feedback on student sentences, similar to a personal tutor. The study by Ibnu Fitrianto (2024), highlights the application of AI in Indonesian language learning which increases student engagement through adaptive and inclusive curriculum approaches. Furthermore, the study by Chen et al (2021) on personalization of language learning with AI where AI adaptively improves students' speaking skills. From this study, it can be understood that AI technology significantly improves language learning, including Indonesian, through instant feedback, personalization, and higher student engagement.

Fifth, Development of Analytical Skills. Based on expert studies, it was found that AI has an effect on critical thinking reaching 56.6% in students, with benefits such as visual data analysis but the risk of dependence which reduces independent reflection. According to Iskandar et al, (2023), AI-guided learning encourages students to be more critical in analyzing information, a skill that is highly needed in today's digital era. Furthermore, Cholvistaria and Gunawan (2025), AI such as ChatGPT and Nearpod increase student engagement by providing instant feedback and adaptive exercises that target analytical, evaluative, and problem-solving abilities. These applications support constructivism and TPACK theories, allowing for learning differentiation according to individual needs, so that students are more motivated and their digital literacy is nurtured. As a challenge according to Farah Fahira et al (2025), over-reliance on AI has the potential to reduce independent analytical abilities, so wise integration with problem-based methods is needed to train student reasoning. Experts recommend that teachers and education policies design adaptive AI strategies, focusing on human-machine collaboration to maximize cognitive development. From this study, it can be understood that AI technology significantly supports the development of students' analytical skills through instant feedback, adaptive exercises, and personalized learning that is aligned with

constructivism and TPACK theories. However, positive influences such as an increase in critical thinking up to 56.6% in students must be balanced with mitigating the risk of dependence which can weaken independent reflection.

Sixth, Availability of Learning Resources. AI enables access to learning resources anytime and anywhere. AI effectively increases the availability of learning resources in learning through content personalization and wider accessibility, although it requires educator supervision. According to Paramita (2023), with an AI-based learning system, students can learn according to the time they choose. This accessibility provides flexibility in the teaching and learning process, which is very important for students with busy schedules. Furthermore, Husna (2025), Adaptive strategies such as AI collaboration with conventional methods are recommended to maximize access to learning resources in the digital era. Library research shows that AI improves the quality of education with great potential on student and teacher academic performance, including big data analysis for curriculum development. Another study found that AI media is very valid (96.7%) and practical (93.3%), effective for learning such as science with attractive realistic illustrations. Kemendikri (2024), AI functions as an adaptive learning resource center, creating innovative materials, personalizing learning, and supporting inclusiveness by understanding individual learning styles and providing real-time feedback. AI-based media such as educational games and chatbots increase the engagement of high school students, presenting a dynamic learning environment that is challenging and pays attention to the unique needs of each student. As a challenge, the use of AI risks reducing learning independence if not done wisely, so experts suggest teacher supervision, responsible integration, and utilization as a tool, not a replacement (Husna, 2025). From this study, it can be understood that AI technology significantly increases the availability of learning resources with flexible access anytime and anywhere, content personalization, and inclusiveness support, although it requires supervision to avoid a decrease in independence.

#### 4. Conclusion

Based on the results of the study above, it can be understood that the utilization of AI technology in learning as a whole transforms education into a more personal, interactive, and adaptive process by placing students at the center. AI functions as a support tool that optimizes individual potential through six key meanings: personalization of material based on student data, real-time analysis of performance for timely intervention, automated learning via chatbots and innovative features, instant assistance in language learning, development of critical analytical skills, and flexible access to learning resources anytime. These findings confirm that AI is revolutionizing education to be more personal, inclusive, and effective, with recommendations for teacher competency training for optimal human-machine collaboration

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