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AI-Based Learning System for Real-Time Analysis of Student Progress

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Abstract

This study aims to analyze the usage of AI in the learning system to analyze student progress in real-time. The method utilized is a narrative literature review, which is divided into two stages: collecting and analyzing data. Data was collected by examining 25 articles from various sources. Data analysis through topic-based categorization in AI-driven learning systems is employed to monitor and evaluate student progress in real time. The results of the narrative literature review reveal that AI has great potential in increasing the effectiveness and personalization of learning. However, it also poses challenges like the digital divide and ethical issues. In conclusion, implementing AI in education requires a holistic and sustainable approach to maximize its benefits and address its challenges.

Keywords: *AI, Learning Systems, Real-time Analysis*

INTRODUCTION

Education as the foundation of community development has undergone a significant revolution by integrating artificial intelligence into learning. The positive impact of its application in education is especially apparent when focusing on the benefits obtained by students. An in-depth analysis of aspects of curriculum adaptation, personalization of learning, critical skills development, improved accessibility, and preparation of students for global challenges are the main highlights, explaining how artificial intelligence is driving change towards a more dynamic and practical educational experience (Apriadi & Sihotang, 2023).

Technology is critical in designing more interactive, personalized, and adaptive learning in the digital age. The blended learning approach has also been shown to increase engagement and provide flexibility in the learning process. Additionally, technology supports competency-based learning that allows for real-time evaluation of

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student progress through learning analytics (Sirait & Dewi, 2024). AI can analyze large-scale data on each student's learning patterns, strengths, weaknesses, and preferences and utilize this information to adjust instructional content, pacing, and teaching strategies in real time. The goal is to optimize the learning process by providing each individual with the most relevant and practical material (Arnadi et al., 2024).

However, the use of AI can be harmful if it is not applied appropriately. One of the key advantages of AI lies in its ability to replicate certain human activities. With this capacity, AI can support tasks traditionally carried out by humans, including implementing learning processes and assessments. Therefore, teachers must utilize artificial intelligence in learning and assessment in the ever-evolving digital era (Oktavianus et al., 2023). AI can improve critical and analytical thinking skills and encourage students to develop a more open and adaptive mindset. Overreliance on AI can inhibit the development of deep thinking and creativity among students, who seek quick solutions instead of engaging in exploratory thinking (Faisal, 2024).

The main challenges faced in its implementation are the digital divide between urban and rural areas and the readiness of teachers to use technology. Improving technology infrastructure and training for educators is urgently needed to maximize the potential of adaptive learning (Al Fadillah & Akbar, 2024). New yearning lies in Artificial Intelligence (AI) as a modern outlook on reforming evaluation methods to meet these challenges. At its core, AI-powered adaptive assessments can dynamically customize the test-taker experience based on highly unique student profile attributes (Yuldashev et al., 2024). This AI-driven system uses real-time physiological feeling monitoring to provide adaptive and individualized tutoring support to guide learners toward deep understanding (Woodruff, 2024).

For artificial intelligence (AI) to make an optimal contribution to learning in Indonesia, strategic steps must be taken. First, it is necessary to insert AI technology into the educational curriculum, introducing students to the basic principles of AI from an early age. Intensive training for teachers is also crucial to utilize AI in the teaching process. Investment in technology infrastructure, such as equitable internet access and the availability of digital devices, is key for every student to access AI-based learning. Adaptive and interactive learning platforms, which can tailor materials to individual needs and encourage student engagement, are also indispensable. Using artificial intelligence to

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analyze learning data and provide timely feedback will support adjusting learning approaches. Cooperation between governments, educational institutions, and the private sector in developing AI technology will accelerate innovation and more effective integration in the education system (Muthmainnah et al., 2024).

METHOD

The study used the Narrative Literature Review method. *Narrative literature review* focuses on conveying the story of human life through experience, waw ancara, photography, biography, and other narrative methods (Hikmawati et al., 2023). In this context, a *Narrative literature review* is conducted to review and analyze writings that discuss Artificial Intelligence in student progress in *real-time*. Literature review is the activity of looking for written sources, such as books, archives, magazines, journals, and other documents related to the problems of the topic being studied (Uriawan et al., 2024).

Searches were conducted in February-March 2025 to collect relevant journal publications using the Publish or Perish application, focusing on Google Scholar search. The journals studied have a publication span between 2020 and the present. The word search strategy uses keywords such as "Artificial Intelligence," "learning system," "AI for students," and "progress in *real-time*." Thus, this study aims to collect in-depth information about the application of AI in the learning system among students in *real-time*.

The data collection technique in this study involved 25 articles from various journal publications. The researcher carried out two phases. First, the data collection method involved the article filtering process by considering the title and content of the article. Second, the data analysis method considers the research theme and assesses and analyzes the article's content. Next, the data is extracted by putting the data into predefined categories (Nurhakim et al., 2024).

This *literature review method* is beneficial for the data obtained to be analyzed through these several stages to produce conclusions, so that they can provide ideas or descriptions about the topics discussed (Tuginem, 2023). In the *narrative literature review* carried out, the focus is on studying AI-based learning systems in analyzing student progress in *real-time*. The Theme Mapping and the articles studied in this study are presented in Table 1.

Table 1. Theme Mapping and Article Sources

No	Theme	Article Source (Author Name and Year of

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		Publication of Article)
1	AI-Based Learning System to Analyze Student Progress in *Real-Time*	(Sudrajat et al., 2023), (Yulianti et al., 2023), (Sunarti, 2024), (Apriadi & Sihotang, 2023), (Fajriati et al., 2024), (Dewi et al., 2025), (Fahrudin et al., 2024), (Ali et al., 2025), (Trabelsi et al., 2023), (Ikhsan et al., 2025), (Yang & Xia, 2023), (Rohit et al., 2024), (Sarnato et al., 2024)
2	AI-Based Learning System to Analyze Student Progress in *Real-Time*	(Sajja et al., 2023), (Tejawiani et al., 2023), (Meiliawati et al., 2024), (JASMINE, 2014), (Barus et al., 2023), (Aulia Gusli et al., 2023), (Suariqi Diantama, 2023), (Chris, 2025), (Manuel et al., 2023), (Chandra et al., 2023), (Zabeta & Sholeha, 2025)

This study uses the *Narrative Literature Review* method by examining 25 article reviews to collect data. The researcher compared several article reviews on AI-based learning systems in analyzing student progress in *real-time*. The data taken from the reference sources that have been studied are then recorded and managed to obtain accurate conclusions. The data analysis technique of this study takes into account the topic and theme of the research, which is then extracted by dividing it into categories and discussing it according to the theme.

RESULT

This result presents the results of a *narrative literature review* study, which focuses on the theme of AI-based learning systems in analyzing student progress in *real-time*. The study's results are presented in Table 2.

Table 2. AI-Based Learning System to Analyze Student Progress in *Real-Time*.

No	Developer/Year	Research Methods (Types, Samples, and Research Instruments) Used	Research Results
1	(Sudrajat et al., 2023)	This study uses a qualitative descriptive research method to analyze primary and secondary data. Primary data was obtained from the observation of several educators, while secondary data was obtained from literature studies in the form of scientific literature references. This research is an observational	Artificial intelligence provides the idea that the learning process is limited in space and time, and information can be extracted independently from various sources, one of which is ChatGPT. Chat GPT can help educators determine the content of learning media according to the theme determined by the educator. ChatGPT is a form of artificial intelligence that can assist educators in creating presentation

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		study supported by library research.	slides for learning media.
2	(Yulianti et al., 2023)	This study uses a descriptive qualitative method by taking notes because the data source was obtained by listening to an oral narrative from the MetroTV YouTube Channel entitled "Indonesian Schools Ready to Adapt AI Technology?". The subject of this research is Iwan Syahril, the Director General of GTK of the Ministry of Education and Culture. The instrument used is for observation.	The use of AI in curriculum development, personalized learning, teacher-student interaction, and addressing education gaps in remote areas. Privacy, data security, and ethical issues are also highlighted. AI offers a promising path to creating Indonesia's more inclusive and equitable education system.
3	(Sunarti, 2024)	This study uses a literature study method by collecting several scientific references about artificial intelligence as a digital learning transformation. Search for information and review any online applications or artificial intelligence (AI)-based platforms. The instrument reads several references in texts or writings, either in the form of books, articles, or journals, and can also be from the mass media and the internet, which are used as a source of reference for a writing to be compiled.	Artificial intelligence can complete tasks like humans, such as language, images, sounds, animations, and text. Artificial intelligence can even make text into a video or a video with text, and type someone's statement. The working concept of artificial intelligence is to utilize a database processed with algorithms to generate new information quickly. AI can be leveraged to solve complex problems and accelerate data processes, business, health analytics, and intelligent applications. Artificial intelligence in digital learning is a solution to complete work efficiently and quickly, so that it can be better and maximize results. Utilizing artificial intelligence in learning has an excellent impact on learning development.
4	(Apriadi & Sihotang, 2023)	This research method is carried out by identifying, studying, and synthesizing literature. The instruments used include scientific journals, books, and related articles.	Integrating artificial intelligence (AI) creates a phase of transformation in education, changing traditional teaching methods and curriculum structures. The application of AI makes it easier for the education system to become more dynamic and responsive. AI's ability to analyze data and trends enables continuous refinement of educational content, ensuring relevance and responsiveness to the challenges of the digital age.
5	(Fajriati et al., 2024)	The method used by a literature review combines findings from various sources to connect theory with practice and provide practical recommendations. The instruments used are journals, books, and scientific articles.	Technology in learner-based learning in the digital age has significantly changed how teaching and learning are conducted, allowing students to be more active and independent with flexible access to materials anytime and anywhere. Digital learning platforms such as Google Classroom and Moodle support formal and informal learning, and facilitate educational personalization through adaptive features and

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			artificial intelligence (AI). Additionally, gamification and interactive tools boost student motivation with fun play elements, while collaborative learning strengthens teamwork skills and creativity.
6	(Hermawan et al., 2024)	The method used in this study is a literature review The instruments used are journals, books, and scientific articles.	By leveraging AI technology, educators can create dynamic and engaging learning environments that meet students' unique needs and preferences, resulting in improved student learning outcomes. Integrating AI in education offers a range of benefits that enhance the student learning experience.
7	(Dewi et al., 2025)	Methods used in literature studies Instruments used in journals, books, and scientific articles.	Artificial intelligence can improve the efficiency and effectiveness of the education system by accelerating and facilitating the learning process, providing personalized recommendations, predicting student behavior, and improving data management. With technologies such as chatbots, intelligent tutoring systems, and student data analysis, AI provides solutions that can overcome various challenges in the modern world of education. AI has an important role in creating more adaptive and interactive learning systems. AI enables real-time analysis of student behavior and provides recommendations tailored to individual learning needs. AI can also increase student engagement through more engaging learning platforms, such as gamification and artificial intelligence-based simulations, designed to improve in-depth understanding of concepts.
8	(Fahrudin et al., 2024)	The method used is a qualitative approach Instruments used for literature studies and interviews	Through AI, Islamic religious learning can be tailored to individual needs, improve student-teacher interaction, and provide more flexible and adaptive learning. AI also enables wider access to learning, especially for students in remote areas or with physical limitations, and assists teachers in improving teaching quality and monitoring student development. AI can significantly improve the quality of Islamic religious education in this digital era.
9	(Ali et al., 2025)	The R&D approach combines research and development approaches to create innovative products. The instruments used were questionnaires, interviews, and observations.	The application of artificial intelligence (AI)-based learning media has a significant impact on increasing students' understanding of concepts, increasing learning motivation, and strengthening interaction between teachers and students. AI allows for more adaptive and personalized

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			learning so students can learn according to their needs and pace.
10	(Trabelsi et al., 2023)	The quantitative method with the dataset is given a pre-trained YOLOv5 weight for training. The instruments used are machine learning approaches, cameras	Artificial intelligence (AI)-based behavioral recognition can help evaluate students' attention and engagement during class sessions. The system can automatically monitor students' behavioral and emotional patterns, which, in turn, assists educators in assessing students' attention levels. Functions as a decision-making assistant, providing strategic information to educators in real-time and offline by detecting student behavior, emotions, attendance, and progress statistics. This technology can bring about significant positive changes in the education system.
11	(Ikhsan et al., 2025)	Metode yang digunakan pendekatan kualitatif dengan metode tinjuan pustaka Instrumen yang digunakan jurnal peer-review, buku, prosiding konferensi, dan repositori online yang kredibel.	AI's ability to analyze real-time data to tailor content delivery allows students to learn at their own pace while improving engagement and retention. The integration of AI in LMS represents a paradigm shift in digital education, offering significant benefits in terms of personalization, scalability, and adaptability. AI-based LMS enhances this process by providing customized learning materials and hands-on feedback, encouraging deeper engagement and understanding.
12	(Yang & Xia, 2023)	Methods used in R&D The instruments used were questionnaires, interviews, and observations.	Students have varying perceptions regarding the status of their learning process, with high satisfaction levels in most items. Data relating to the duration of online learning and module knowledge test scores reveal differences among different learning groups, offering insights for optimising teaching strategies. Collaborative teaching with AI systems has potential. However, to maximize its efficacy, it is crucial to deeply understand specific students' needs and feedback and make strategic adjustments accordingly.
13	(Rohit et al., 2024)	The method combines qualitative input from educators and learners with quantitative data from learning analytics. The instruments used were questionnaires, interviews, and observations.	Significant improvements in academic achievement, retention, and engagement for system users. The study also addresses ethical issues, consequences for scalability, and the role of teachers in an increasingly automated learning environment. AI can help narrow the gap for difficult learners by offering tailored support and guaranteeing equitable access to education. AI can place students in groups according to

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			complementary interests or talents, which promotes cooperative learning.
14	(Sarnato et al., 2024)	The method used for literature studies is a qualitative approach. Instruments used in journals, books, and scientific articles.	The evolution of e-learning has brought significant improvements in the accessibility, interactivity, and personalization of learning. U-learning allows for more flexible access to education. AI-based adaptive learning systems offer a more personalized learning experience by adapting teaching materials and methods according to students' needs and abilities. These findings emphasize the importance of technology in improving learning effectiveness and efficiency.
15	(Sajja et al., 2023)	This method uses R&D development of new LA tools. The research takes place systematically, including the stages of data collection, processing, analysis, and finally, the development and deployment of the tool. Instruments used by educational chatbots and intelligent assistants, such as Instant Expert.	Various metrics and indicators analyze student behavior, including engagement, affective emotional state, and learning progress. *Progression learning metrics* provide insights into academic improvement over time, providing a measure of the effectiveness of the learning experience.
16	(Tejawiani et al., 2023)	Methods and instruments that can be used in teaching are group discussions, presentations, and AI E-Learning, such as the Photomath application.	Introduction to the Photomath Application, where the Photomath application is one of the most advanced applications in solving various problems related to mathematics lessons. Photomath can be a mainstay application for working on math problems, from simple to difficult. Photomath is an application for Android and IOS that functions to read and scan math problems. Students need to understand concepts more deeply to communicate their ideas clearly. They can assist each other in identifying necessary troubleshooting steps, systematically analyzing problems, and finding appropriate solutions.
17	(Meiliawati et al., 2024)	This study uses the literature review Instruments used in journals, books, and scientific articles.	The use of AI-based media in learning in high school has the opportunity to present learning that pays more attention to the needs of each high school student. AI-based media also encourages educational game-based learning, which presents a more challenging and dynamic learning environment, so that it can activate students during learning.
18	(Jasmine, 2014)	The method used was a quasi-experiment with two groups: an experimental group that used AI-based learning and a control group	Implementing AI-driven learning significantly improves the academic scores of students with special needs, with increased engagement and better social interaction than

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		that followed conventional learning.	regular students.
19	(Barus et al., 2023)	Using interactive methods and actively engaging the students	Students are interested in AI topics, and exceptionally high school students actively ask questions. Students gain information about the role of AI in human daily life and its advantages and disadvantages.
20	(Aulia Gusli et al., 2023)	The method in this study is qualitative research, namely: observation, interview, Observations in the field and obtaining research data from previous research journals, as per the title that the researcher raised.	Educators or institutions have experienced and utilized the development of technology and AI in learning and teaching. Utilizing AI has many conveniences and benefits, including making it easier for teachers and improving the quality of education. The development of technology and AI helps education personnel in the learning and teaching process so that the quality of education increases effectively and efficiently.
21	(Suariqi Diantama, 2023)	This research was conducted using a qualitative approach and a literature study method. Instruments used are journals, books, and scientific articles.	ChatGPT's ability to understand questions in natural language and generate human-like responses has made it a popular tool for getting quick answers to various questions, from common ones to complex topics. ChatGPT is quickly becoming a valuable resource for students and professionals alike. His ability to reason and understand commands from various domains makes him more adaptable and allows him to handle challenging tasks.
22	(Chris, 2025)	Methods used: Qualitative and quantitative methods The instruments used were questionnaires, interviews, and observations.	Integrating Artificial Intelligence (AI) into education has shown transformative potential in personalizing learning experiences and improving assessment methodologies. Students who use AI-based systems show significant improvements in academic performance, retention rates, and engagement compared to those in traditional learning environments. The efficiency of adaptive assessments in identifying and addressing knowledge gaps underscores the value of AI in fostering more profound understanding and learning efficiency.
23	(Manuel et al., 2023)	This study uses a quantitative approach with a survey method The instruments used were questionnaires, interviews, and observations.	Students can discuss and answer questions with the help of AI, such as ChatGPT. However, when asked to explain again without using the help of AI, students struggle to give the same explanation as they had previously delivered. Concerns about the authenticity of works arise because these technologies can blur the line between individual creativity and technological contribution, which can ultimately pose a risk

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			of plagiarism, where the submitted work is not entirely the result of students' thinking.
24	(Chandra et al., 2023)	Methods used: Socialization Method The instruments used are the preparation, implementation, and evaluation stages. By doing community service	99% of students know and utilize AI daily to support learning activities. Students are delighted with the implementation of socialization activities because it positively impacts their lives. Increased students' knowledge and understanding of AI in daily life can be seen from students' knowledge and understanding of AI before and after participating in socialization.
25	(Zabeta & Sholeha, 2025)	This study uses a qualitative method that includes a literature analysis. Instruments used in journals, books, and scientific articles.	Artificial Intelligence (AI) has a significant role in developing students' critical thinking skills. Some key findings include the ease AI provides in accessing a wide range of learning resources broadly and quickly, helping students expand their knowledge and understanding of various topics.

DISCUSSION

The study's results show several articles that describe AI-based learning systems in analyzing student progress in *real-time*. Artificial intelligence can complete tasks like humans, such as language, images, sounds, animations, and text. Artificial intelligence can even make text into a video or a video with text, and type someone*'s statement. The literature review* results reveal that the working concept of artificial intelligence is to utilize a database processed with algorithms to produce new information quickly. AI can be leveraged to solve complex problems and accelerate data processes, business, health analytics, and intelligent applications utilizing artificial intelligence (Sunarti, 2024). According to Apriadi & Sihotang (2023), integrating artificial intelligence (AI) creates a phase of transformation in education, changing traditional teaching methods and curriculum structures. The application of AI also makes it easier for the education system to be more dynamic and responsive.

Learning technology in the digital age has significantly changed how teaching and learning are conducted, allowing students to be more active and independent with flexible access to materials anytime and anywhere (Fajriati et al., 2024). By utilizing AI technology, educators can create dynamic and engaging learning environments that meet students' unique needs and preferences, resulting in improved student learning outcomes (Hermawan et al., 2024). Therefore, artificial intelligence (AI)-based learning media

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significantly impacts students' understanding of concepts, increasing learning motivation and strengthening interaction between teachers and students (Ali et al., 2025). AI is important in creating a more adaptive and interactive learning system. AI enables real-time analysis of student behavior and provides recommendations appropriate to individual learning needs (Dewi et al., 2025).

The existence of an AI-based adaptive learning system offers a more personalized learning experience by adjusting teaching materials and methods according to the needs and abilities of students (Sarnato et al., 2024). It emphasizes the importance of technology in increasing the effectiveness and efficiency of learning. According to Rohit et al. (2024), AI can help narrow the gap for difficult learners by offering tailored support and guaranteeing equitable access to education.

Various metrics and indicators analyze student behavior, including engagement, affective emotional state, and learning progress (Sajja et al., 2023). AI-based media also encourages educational game-based learning, which presents a more challenging and dynamic learning environment (Meiliawati et al., 2024). Artificial intelligence provides the idea that the learning process is limited in space and time, and information can be extracted independently from various sources, one of which is ChatGPT. Chat GPT can help educators determine the content of learning media according to the theme determined by the educator (Sudrajat et al., 2023).

The use of AI in curriculum development, personalized learning, teacher-student interaction, and addressing education gaps in remote areas (Yulianti et al., 2023). According to Fahrudin et al. (2024), AI also allows for broader access to learning, especially for students in remote areas or with physical limitations, and assists teachers in improving the quality of teaching and monitoring student development. In this case, AI's ability to analyze real-time data to tailor content delivery allows students to learn at their own pace while improving overall engagement and retention (Ikhsan et al., 2025). Tejawiani et al. (2023) introduce the Photomath Application, one of the most advanced applications in solving various related problems about mathematics lessons. Photomath can be a mainstay application for working on math problems, from simple to difficult. Photomath is an application for Android and IOS that functions to read and scan math problems.

Furthermore, ChatGPT is quickly becoming a valuable resource for students and

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professionals (Suariqi Diantama, 2023). As well as the application of AI-based learning, it significantly improves the academic scores of students with special needs, with increased engagement and better social interaction than regular students (Jasmine, 2014). Students who are interested in AI are exceptionally high school students who actively ask questions. Students gain information about the role of AI in human daily life and its advantages and disadvantages (Barus et al., 2023). 99% of students recognize and utilize AI daily to support learning activities. Students are delighted with the implementation of socialization activities because they positively impact their lives (Chandra et al., 2023). According to Zabeta & Sholeha (2025), Artificial Intelligence (AI) significantly develops students' critical thinking skills.

Artificial intelligence (AI)-based behavioral recognition can help evaluate students' attention and engagement during class sessions (Trabelsi et al., 2023). The use of these technologies raises concerns regarding the authenticity of student work. They may obscure the boundary between genuine individual creativity and technological assistance. Consequently, this situation increases the risk of plagiarism, as the submitted work may not fully reflect the student's original thinking (Manuel et al., 2023). According to Chris (2025), students operating AI-based systems significantly improve academic performance, retention rates, and engagement compared to traditional learning environments. Collaborative teaching with AI systems has potential. However, to maximize its efficacy, it is crucial to deeply understand specific students' needs and feedback and make strategic adjustments accordingly (Yang & Xia, 2023). Utilizing AI has many conveniences and benefits, including making it easier for teachers and improving the quality of education. The development of technology and AI helps education personnel in the learning and teaching process so that the quality of education increases effectively and efficiently (Gusli et al., 2023).

CONCLUSION

The integrity of AI in learning systems offers excellent potential to improve the effectiveness and personalization of education. AI can analyze progress in *real-time*, creating a more dynamic and engaging learning environment. AI has also been proven to expand educational accessibility, especially for students in remote areas or with physical limitations, and assist teachers in improving the quality of teaching and monitoring student

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development. However, the study also highlights the challenges and concerns that must be addressed when implementing AI in education. Issues such as the digital divide, teacher readiness, the potential for plagiarism, and the impact on student creativity are important considerations. Therefore, strategic steps are needed to ensure that AI is implemented ethically and effectively, focusing on teacher professional development, the provision of adequate infrastructure, and the protection of academic integrity. The use of AI in learning has transformative potential to improve the quality of education and prepare students to face the challenges of the digital era. However, successful AI implementation requires a holistic and sustainable approach, involving cooperation between governments, educational institutions, and the private sector. Thus, AI positively influences the learning system to analyze student progress in *real-time.*

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