



Artificial Intelligence Creates New Opportunities in Technology-Based Learning

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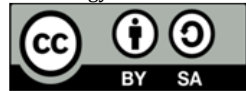
ARTICLE INFO

Kata Kunci:

artificial intelligence, pembelajaran, teknologi

Keywords:

artificial intelligence, learning, technology



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Open Access:

<https://doi.org/10.23887/jjgsd.v12i2.81205>

ABSTRAK

Penggunaan media pembelajaran digital di sekolah dasar memiliki banyak manfaat, Meskipun memberikan banyak keuntungan, pembelajaran berbasis teknologi juga memerlukan perhatian terhadap kesenjangan akses teknologi antara siswa. Salah satu masalah utama adalah kesenjangan akses terhadap teknologi. Berdasarkan hal tersebut tujuan penelitian ini yaitu menganalisis artificial intelligence dalam pembelajaran berbasis teknologi. Penelitian ini menggunakan metode Systematic Literature Review (SLR) dengan metode PRISMA. Pengumpulan data dilakukan dengan menganalisis 150 artikel terkait yang terdapat di google scholar. Setelah proses pemilihan selesai, data yang dikumpulkan akan disajikan dalam bentuk narasi. Hasil penelitian ini menggarisbawahi bahwa penerapan artificial intelligence yang diterapkan dalam pembelajaran memberikan dampak positif terhadap hal pembelajaran. AI menjadikan pembelajaran lebih inklusif, dapat disesuaikan, dan lebih mudah diakses oleh siapa saja, di mana saja. Teknologi ini tidak hanya meningkatkan kualitas pendidikan tetapi juga membuka peluang untuk belajar secara mandiri dan fleksibel, yang sangat dibutuhkan dalam dunia yang semakin terhubung secara digital. Secara keseluruhan, temuan-temuan ini menegaskan bahwa artificial intelligence dapat menciptakan peluang baru dalam pembelajaran berbasis teknologi.

ABSTRACT

Using digital learning media in elementary schools has many benefits, but several problems must be addressed to maximize effectiveness. One of the main challenges is the development of digital-based media. Based on this, this study aims to analyze Augmented Reality (AR) Media for learning in elementary schools. This study uses the Systematic Literature Review (SLR) method with the PRISMA method. Data was collected by analyzing 100 related articles found on Google Scholar. After the selection process, the data collected will be presented in narrative form. The results of this study emphasize that the application of Augmented Reality (AR) Media for learning in elementary schools has a positive impact on learning for elementary school students. Augmented Reality (AR) significantly increases student motivation, which in turn has an impact on their learning outcomes. Augmented Reality is an interesting application that can improve student learning outcomes. Overall, these findings confirm that Augmented Reality (AR)-based learning media can improve elementary school students' motivation and learning outcomes.

1. INTRODUCTION

Technology-based learning is an approach that utilizes various technological devices and systems to support the teaching and learning process. Technology is not only limited to the use of computers and the internet but also includes various digital tools such as mobile devices, learning applications, educational software, and e-learning platforms that allow interaction between teachers and students virtually (Kuswanto & Walusfa, 2017; Warsita, 2017). With technology, the learning process can be carried out more flexibly, effectively, and efficiently. Students are no longer limited by space and time because learning materials can be accessed anytime and anywhere (Khotimah & Hafidz, 2025; Kuswanto & Walusfa, 2017). One of the main advantages of technology-based learning is its ability to create a more interactive and

Received September 20, 2024; Accepted January 4, 2025; Available Online Maret 5, 2025

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engaging learning experience. Technology allows the use of various types of media, such as videos, animations, and simulations, which can help students understand the material in a more interesting way (Kuswanto & Walusfa, 2017; Pozo et al., 2021; Warsita, 2017; Yufita et al., 2021).

Technology allows for more personalized and adaptive learning, where students can learn at their own pace and learning style. Digital learning platforms often provide features to track student learning progress, provide instant feedback, and adapt materials to students' level of understanding (Lima et al., 2019; Rosmawanti et al., 2020). Technology-based learning also supports collaborative learning. Through discussion forums, students can work together on projects or assignments and share ideas (Ramadhan & Marwantika, 2020; Zulkefli et al., 2020). These activities can develop communication and collaboration skills, which are very much needed in the modern workplace. Technology-based learning can improve students' digital skills, which are important competencies in today's digital era (Nurdin & Musthofa, 2020; Rahmaniah & Zainuddin, 2023). Students will be more familiar with technological and digital tools.

Despite providing many advantages, technology-based learning also requires attention to the gap in technology access between students (Mufaziah & Fauziah, 2020; Soewarno et al., 2016). One of the main problems is the gap in access to technology (Primasari et al., 2021; Rigiante, 2020). Some students do not have adequate devices or a stable internet connection, which can hinder their access to online learning materials. In addition, limitations in digital literacy are also a challenge because not all students or even teachers have sufficient skills to utilize technology optimally (Kurnianingsih et al., 2017; Suchyadi et al., 2021). Technology-based learning can also cause students to find it difficult to get direct help from teachers when they face difficulties with the material. In addition, relying too much on technology can cause problems with time management and distraction. The quality of learning materials delivered through digital platforms is also not always in accordance with teacher standards, so learning activities are not running optimally. These issues highlight the importance of a thoughtful approach to implementing technology in learning to ensure success and equity for all students.

Problems that arise in technology-based learning can be overcome by implementing Artificial Intelligence (AI) in learning. One of the main solutions offered by AI is its ability to provide more personalized and adaptive learning. By using AI algorithms, learning systems can analyze the progress and learning style of each student and then adjust learning materials and methods according to individual needs (Muhammad Yahya et al., 2023; Rusmiyanto et al., 2023). This allows students who have difficulty following the material to receive more intensive support, while faster students can be given additional challenges to develop their abilities further. AI can help optimize the use of existing devices (Abulibdeh et al., 2020; Somia & Vecchiarini, 2020). AI can also facilitate digital literacy training programs, helping students and teachers to better understand and use technology through guidance tailored to their ability level.

AI can be used to create virtual collaborative spaces that facilitate group discussions and teamwork among students, thereby creating learning experiences (Mambu et al., 2023; Puspita et al., 2023). Previous findings have shown that AI can develop systems that help students focus by monitoring their activities during learning (Anas & Zakir, 2024; Zawacki-Richter & Latchem, 2018). AI can also ensure that the material provided is always up-to-date, in accordance with the curriculum, and can be personalized according to student needs. Thus, the application of AI in learning can overcome various problems that arise in technology-based learning while increasing the effectiveness and quality of learning experiences for students in various conditions. Based on this, the purpose of this study is to analyze artificial intelligence in technology-based learning.

2. METHOD

This study uses the Systematic Literature Review (SLR) method with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach. The main objective of this study is to analyze artificial intelligence in technology-based learning. SLR is a structured and systematic approach to identifying, evaluating quality, and synthesizing the results of various existing studies to provide a comprehensive picture of the state of available research. In this study, PRISMA is used as a guideline to ensure the review process is carried out with high transparency and clarity and to minimize bias in data selection and synthesis. PRISMA involves identifying studies through database searches, screening articles based on predetermined inclusion and exclusion criteria, assessing the methodological quality of relevant studies, and collecting and synthesizing data to produce reliable conclusions (Motta & Galina, 2020). With this approach, this study aims to produce valid and reliable conclusions about analyzing artificial intelligence in technology-based learning. The research process using the PRISMA method is presented in Figure 1

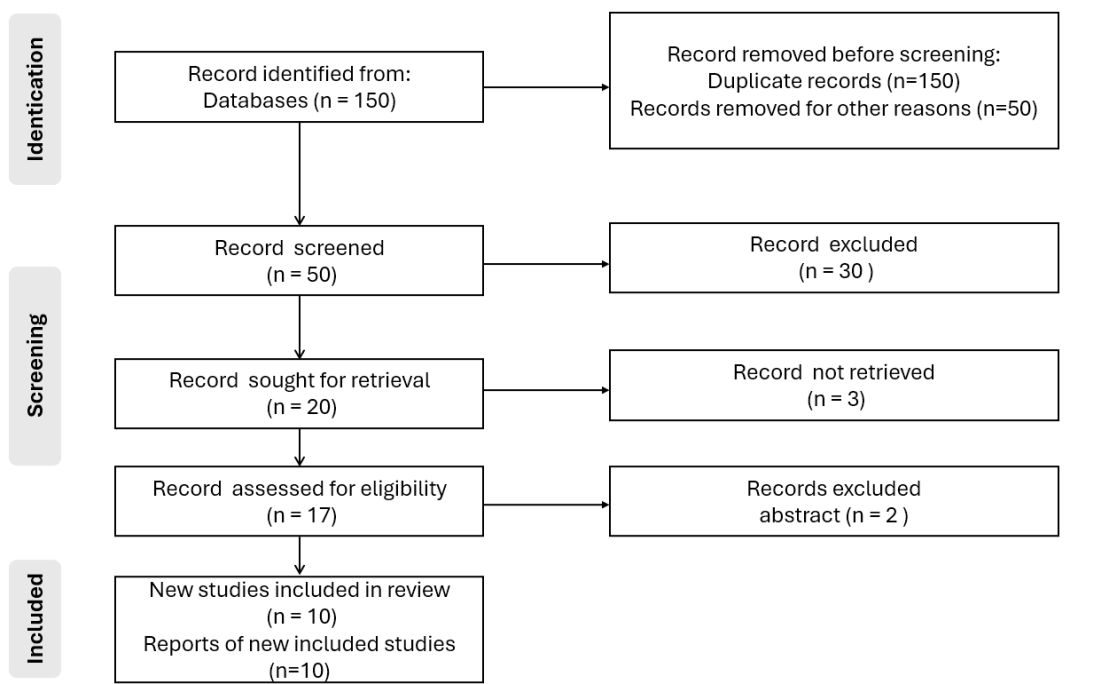


Figure 1. Research Flow Using the Prism Method

The Systematic Literature Review (SLR) analysis using the PRISMA method conducted in this study consists of several stages as follows: 1.) Determination of eligibility criteria; at this stage, a detailed procedure is needed in compiling a literature review. The researcher has determined the research topic regarding artificial intelligence in technology-based learning. The criteria used include: 1) Searching for articles published between 2017 and 2024 via Google Scholar, using the keywords "artificial intelligence" and "learning". 2) Determination of information sources, which begins with searching for eligible items at the planning stage. The requirements set are articles indexed in the Sinta 1-5 journal. 3) Selection of literature, which is based on the criteria for journal publications in the last ten years that are relevant to artificial intelligence in technology-based learning for learning in elementary schools between 2017 and 2025, obtained from Google Scholar sources.

The next data collection process was carried out, where approximately 150 articles were found on Google Scholar. Based on the established criteria, articles that did not meet the requirements were filtered, leaving 50 articles that met the library selection criteria. To assess the suitability of the article topic with the research objectives, 50 articles found at the data collection stage were then selected by quickly reading the entire contents of the article. In the next stage, each section of the article was analyzed to determine whether it was relevant to the research objectives. Articles that did not match the research objectives, including the title, abstract, methods, and conclusions, were eliminated. After the selection process was complete, the collected data was presented in narrative form. After 10 articles were assessed as appropriate and relevant through Path analysis, the researcher then reviewed and analyzed them to ensure they were appropriate to the research objectives.

3. RESULT AND DISCUSSION

RESULT

Artificial Intelligence can provide learning tools that support students with special needs or who require different approaches. Teachers do not need to worry about manually giving special attention to each student with special needs. AI can provide instant feedback and track students' learning progress, which helps them to learn independently and efficiently without being limited by time or place. This makes learning more inclusive. The analysis results found 10 articles from Google Scholar that met the eligibility criteria according to the objectives of this study. The results of the article analysis are presented in Table 1.

Table 1. Artificial Intelligence in Technology-Based Learning

No	Name	TITLE	RESULT
1	(Sarinda et al., 2023)	“Islamic Religious Education Based on Artificial Intelligence (AI) Technology”	Artificial Intelligence (AI) has had a major impact on the education sector, especially in Islamic religious education. AI (Artificial Intelligence) technology makes it easier for educators to deliver interesting teaching materials and methods.

2	(Permana & Astawa, 2020)	“Artificial Intelligence in the Development of English Language Learning Media”	The AI Clopedia application is suitable for use as a supporting tool in English learning media.
3	(Azizah et al., 2024)	“Implementation of Artificial Intelligence-Based Learning Through Canva Media for Prospective Mathematics Teachers”	A 22% increase in students' understanding, abilities, and skills in mastering quantification material after implementing artificial intelligence-based learning through Canva media..
4	(Rathore et al., 2023)	“Artificial Intelligence and Curriculum Prospects for Elementary School”	The results of the study showed that the majority of respondents agreed with the idea of introducing AI into the curriculum to help AI educational literacy. The results of the study reflect that curriculum modification is needed continuously according to the needs of the modern era. AI can monitor the usefulness of the curriculum and identify certain areas.
5	(Muhammad Yahya et al., 2023)	“Implementasi Artificial Intelligence (AI) di Bidang Pendidikan Kejuruan Pada Era Revolusi Industri 4.0”	The application of AI technology in education is considered to help and facilitate the tasks of educators, especially in administrative aspects such as assessment and determination of final grades based on applicable weights and evaluations. In addition, AI technology can also create a more active and interactive learning experience.
6	(Rusmiyanto et al., 2023)	“The Role Of Artificial Intelligence (AI) In Developing English Language Learner's Communication Skills”	AI has the potential to significantly improve the communication skills of English language learners by providing personalized and interactive learning experiences.
7	(Ingvavara et al., 2022)	“Computers and Education : Artificial Intelligence The use of a personalized learning approach to implementing self-regulated online learning”	The experimental results showed that the post-test of the experimental group and the learning gain scores of the experimental group were significantly higher than those of the control group. Students' perceptions of learning benefits, ease of use, goal setting, structuring of the learning environment, task strategies, time management, self-evaluation, impact on learning, and attitudes toward the learning environment were important predictors of behavioral intention to learn with self-regulated online learning integrated with a personalized learning approach.
8	(Fauziyati, 2023)	“The impact of using artificial intelligence (AI) in Islamic religious education learning”	The impact of using Artificial Intelligence (AI) in Islamic religious education learning brings great potential to increase efficiency and effectiveness in Islamic religious education learning.
9	(Mambu et al., 2023)	“Utilization of Artificial Intelligence (AI) Technology in Facing the Challenges of Teaching Teachers in the Digital Era”	The use of AI technology can provide significant benefits for teachers in facing challenges in the digital era. By utilizing AI, teachers can manage data more efficiently, provide personalized learning, and provide effective feedback to students.
10	(Siahaan et al., 2020)	“Application of Artificial Intelligence (AI) to a Blind Person with Disabilities”	Artificial Intelligence can help a blind person to carry out daily activities normally and better.

Previous research states that AI (artificial intelligence) can help and make it easier to do everything, such as in Islamic religious education, namely during the learning and teaching process, thereby improving the quality of active and innovative learning (Sarinda et al., 2023). Other studies also reveal that AI applications are suitable for use as supporting tools in English learning media (Permana & Astawa, 2020). Various studies show that artificial intelligence applied in learning has a positive impact on learning. AI makes learning more inclusive, customizable, and more accessible to anyone, anywhere. This technology not only improves the quality of education but also opens up opportunities for independent and flexible learning, which is very much needed in an increasingly digitally connected world.

Discussion

The results of data analysis show that artificial intelligence applied in learning has a positive impact on learning. Some of the positive impacts are as follows. First, artificial intelligence enables more personalized learning. Artificial Intelligence (AI) makes learning activities more personalized by providing learning experiences tailored to students' needs and characteristics (Chen et al., 2020; Jamshidi et al., 2020). Through AI technology, learning systems can analyze data collected during the learning process and how students solve problems. AI can adjust learning materials to match students' abilities and learning styles, ensuring that they get the right content according to their level of understanding (Bertram et al., 2021; Rathore et al., 2023). AI can provide additional explanations, more practice, or even learning materials in a way that is easier to understand, such as using more visual videos or animations. AI allows flexibility in setting the pace of learning (Bertram et al., 2021; Rathore et al., 2023). Every student learns at a different pace, and AI allows them to progress at a pace that suits their abilities. Students who are quicker to grasp the material can move on to the next topic without having to wait for the whole class to finish, while students who take longer can get more support. This helps create a more effective and less stressful learning experience for students, as they can learn at their own pace without feeling stuck or left behind.

Second, artificial intelligence supports more flexible and accessible learning anytime and anywhere. Artificial Intelligence (AI) plays a very important role in creating a more flexible and accessible learning environment anytime and anywhere. With the ability to analyze data quickly and accurately, AI enables the creation of adaptive and personalized learning systems, which can be tailored to the learning styles, needs, and abilities of individual students (Muhammad Yahya et al., 2023; Rusmiyanto et al., 2023). This technology can identify the strengths and weaknesses of each student and provide appropriate materials to help them learn most effectively. AI allows students to access learning materials or educational content anytime and anywhere through various digital devices (Bertram et al., 2021; Muhammad Yahya et al., 2023; Rathore et al., 2023). This gives students the freedom to manage their own study time. Learning can be done at home, which provides comfort. With real-time feedback from the AI system, students can find out their understanding of the material being taught (Abulibdeh et al., 2020; Chen et al., 2020; Jamshidi et al., 2020). AI can create interactive learning experiences, such as simulations or educational games, which further increase student engagement in the learning process.

Third, artificial intelligence can help teachers manage the learning process more efficiently. Artificial Intelligence (AI) has great potential to help teachers manage the learning process more efficiently and effectively. One of the main ways AI supports teachers is by automating various administrative tasks that are usually time-consuming (Puspita et al., 2023; Somia & Vecchiarini, 2020). With an AI system that can perform automatic assessments, teachers no longer need to spend hours manually checking student work. AI systems can also provide real-time feedback to students, giving them the opportunity to correct mistakes or understand the material better (Ingkavara et al., 2022; Mambu et al., 2023). In addition, AI allows teachers to gain deeper and more accurate insights into student learning progress. By analyzing automatically collected learning data, AI can identify certain patterns, such as areas where students often struggle or topics they are good at. This activity provides teachers with clearer information about how best to adapt their teaching approaches (Anand & Shohel, 2019; Anas & Zakir, 2024).

AI also allows teachers to provide more personalized learning based on the individual needs of students. By using an AI-driven adaptive learning system, students can learn at their own pace, and AI can adjust the material and provide exercises or challenges that are appropriate to each student's abilities. This helps teachers to ensure that each student gets the attention that is appropriate to their needs. In this way, teachers do not have to worry about manually giving special attention to each student with special needs because AI can help support them more effectively. The limitations of this study are that the number of studies relevant to the topic of AI in technology-based learning may be limited or not yet fully developed. Some areas, such as AI applied to education, may still be in their early stages or only applied in limited environments, which can affect the depth of the analysis. This study implies that these findings can help policymakers in designing education policies that support the application of AI to improve learning. This can improve the quality and flexibility of learning worldwide.

4. CONCLUSION

The results of the data analysis show that artificial intelligence applied in learning has a positive impact on learning. AI not only reduces the administrative burden for teachers but also improves the overall quality of teaching. Teachers can focus more on direct interaction with students, create a more immersive learning experience, and ensure that each student gets the attention they need to thrive. In the long run, the use of AI in education can create a learning environment that is more efficient, dynamic, and responsive to student needs.

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