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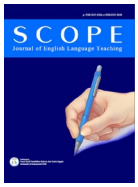

Review

Teachers' Perspective on the Use of Artificial Intelligence in Teaching and Learning Process: A Systematic Literature Review

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A B S T R A C T

Artificial Intelligence (AI) has the potential to transform various aspects of life, including education. This study aims to investigate teachers' perspectives on using AI in the teaching and learning process through a systematic review of 15 journal articles. The review was conducted using databases such as ScienceDirect, Springer, and ERIC, focusing on research published between 2019 and 2023. The findings reveal that teachers generally hold positive attitudes towards AI, recognizing its potential to support professional development, enhance teaching strategies, and provide adaptive learning experiences. However, challenges such as ethical concerns, data privacy issues, and inadequate teacher training were also highlighted.

To successfully integrate AI into education, strategic professional development programs are essential to address these challenges. Additionally, collaboration between educators, policymakers, and technology developers is recommended to create AI tools that are aligned with educational goals and ethical standards. Future research should explore the long-term impact of AI on educational outcomes and its role in fostering inclusive education. By addressing these areas, AI can be effectively leveraged to enhance teaching and learning while ensuring equitable access and ethical use.

INTRODUCTION

Recently, technology has impacted almost every aspect of life, including education. Everyone must be more inventive, creative, productive, adaptive, and competitive in the education field in the society 5.0 era. Since the era of Society 5.0, Artificial Intelligence (AI) has increased significantly. AI may have an impact on educational practices and challenges to the development of learning operating systems, assessment tools, and other mechanisms that support literacy support (Al Darayseh, 2023; Ayanwale et al., 2022; Chu et al., 2022; Ottenbreit-Leftwich et al., 2022).

The latest research findings in the field of AI-based learning show that the more opportunities to improve the education systems and keep up with developments, the more scope there is for learning using the latest technologies. AI plays a variety of important roles in the teaching-learning process and its components, it has the potential to play an important and concrete role in the present and future of learners (Al Darayseh, 2023; Ayanwale et al., 2022; Ottenbreit-Leftwich et al., 2022; Gökçearslan et al., 2024). Furthermore, using AI for educators can be cost-effective, reduce workload, and provide training resources (Gökçearslan et al., 2024).

It is necessary to emphasize the great implicit offered by AI for use in education through the Internet and the accompanying vast developments that have created ease of

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access for students and teachers to the information they need and aim to obtain. According to Ottenbreit-Leftwich et al., (2022), younger students can better explore and understand ideas about AI. Therefore, to achieve effective learning, AI systems must be leveraged and used in the design of lessons, teaching methods, and assessments (Al Darayseh, 2023; Ottenbreit-Leftwich et al., 2022). Despite the huge impact that AI-assisted learning, AI's extensive use in education will depend on the ability of teachers to use AI in the classroom and the quality of their teaching, as teachers may not yet be fully prepared (Miao & Holmes, 2021). Moreover, teachers, tutors, and supervisors are concerned that AI as an intelligent tutoring and expert, will take their jobs rather than making students dependent on AI instead of their brains. AI was designed as a tool to encourage humans not replace them.

Application of AI in Teaching and Learning Processes

Artificial Intelligence (AI) has become a major component in the Industrial Revolution 4.0. Nowadays, AI technology is constantly being updated and is widely used in various fields, including education. More people are interested in AI since it has shown significant applicant advantages. AI offers the potential to change the way of teaching and learning processes. AI gives a wide range of potential for education; it ranges powered evaluations in automatic teacher's instruction, assessment, and customized learning for students (Seo et al., 2021; Sumakul et al., 2022).

Moreover, in terms of education, AI is used to personalize student's learning. The utilization of AI helps teachers in the education process. AI creates a learning profile for students, allowing learning materials customized to student's learning abilities, learning styles analytics and learning interests (Zahara et al., 2023; Gökçearslan et al., 2024).

The presence of AI, teachers and students no longer carry out traditional teaching and learning methods; instead, students can study independently, and design learning activities that optimally serve students' needs and intentions to create interesting learning (Chassignol et al., 2018; Sumakul et al., 2022; Zahara et al., 2023). AI can also support students to enhance the learning experience through virtual tutoring, generating educational content, and instant feedback (Gökçearslan et al., 2024).

Computer-Assisted Instruction (CAI) is one example of AI is used in the teaching and learning process. CAI refers to the use of computers as a tool for guided and practice exercises, teachers-students communication, and visualization of objects that are difficult to view (Zahara et al., 2023).

AI help teachers better understand their students, how they learn best, developing deeper comprehension for students, and how this learning is influenced by prior knowledge, teaching methods, and learning and physical context (Lameras & Arnab, 2022). AI helps teachers to achieve curriculum goals through technology-integrated planning, coordination, support, scheduling, implementation, and exploration (Lin et al., 2022).

Drawbacks and Benefits of the Implementation of AI in the Teaching and Learning Process

The use of AI in education in Ed-Tech provides benefits for teachers and students. However, the risks and potential drawbacks of utilizing AI in teaching and learning process were highlighted. Gocen & Aydemir (2020) mention the potential risks of using AI in teaching and learning. As follows: no need for human intervention in the learning process, negative effects on social relationships, uncontrolled using technologies, bad scenarios categorized students based on their IQ, and humanistic values could be replaced through a pragmatic perspective.

In addition, M. Al-Tkhayneh et al., (2023) mention some drawbacks of AI. It concerns the possible missing of traditional educational jobs, the cost of implementing artificial intelligence systems, the errors of programming and processing, the level of control of artificial intelligence on students' learning and lack of the human interaction in the classroom.

Furthermore, in order to minimize the negative implementation of AI in the teaching and learning process, AI is important to encourage teachers and students in a way to enhances learning experiences. The benefits of using AI in education are helping students learn at their own speed, no more paperwork in schools, training in smaller groups with effective planning and preventing waste of time (Gocen & Aydemir, 2020).

Zahara et al., (2023) mention the benefits of using AI in the teaching process. It concerns facilitating the teacher to be easier to teach in the class, unlimited storage, make the teacher's task not repeated.

The next following report about the benefits of using AI in education M. Al-Tkhayneh et al., (2023) report on AI for learning processes, it can improve students' personal learning experience, monitor students' performance and guide them to the most relevant topics, increase the efficiency of the education system, and reduce dependence on teachers to providing educational content.

Research Gaps and Challenges

Although AI is rapidly being adopted in education, research highlights several gaps that need to be addressed. One major challenge is the readiness of teachers to implement AI-driven tools effectively. Many educators may lack the necessary training, support, or confidence to integrate AI into their teaching practices (Miao & Holmes, 2021). Additionally, there is a gap in research concerning

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how teachers perceive AI's role in their classrooms, particularly in balancing AI's benefits with its potential risks, such as reducing student-teacher interaction or depersonalizing the learning experience. Addressing these challenges is crucial for AI's successful integration into education systems.

This systematic literature review (SLR) aims to explore these issues by examining the benefits and drawbacks of AI in the teaching and learning process. To guide this systematic literature review, the following research question is posed: *How do teachers perceive the use of AI in teaching and learning processes?* This question aims to explore the opportunities, challenges, and overall readiness of teachers to adopt AI-driven educational tools in their classrooms.

METHOD

The purpose of a systematic review is to answer a specific question using an explicit, systematic, and comparable search strategy, with inclusion and exclusion criteria determining which studies should be included or excluded (Zawacki-Richter et al., 2019). The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement serves as a guide for this review, which was divided into three steps: (i) article selection, (ii) article screening and inclusion, and (iii) data coding, extraction, and analysis (Chiu et al., 2023).

Search Strategy

The literature search for this review was conducted using three prominent academic databases: ScienceDirect, Springer, and ERIC. These databases were chosen due to their extensive coverage of peer-reviewed journal articles in the field of education, specifically within the context of AI in education. ScienceDirect and Springer are well-established platforms with a wide range of high-impact journals, while ERIC (Education Resources Information Center) is a key resource for educational research literature. By utilizing these three databases, the review aims to capture a comprehensive range of relevant studies on the topic.

The search focused on studies published between 2019 and 2023 to ensure the inclusion of recent research that reflects the latest developments in AI's impact on education. Boolean operators were used to search titles, abstracts, and keywords, ensuring that relevant studies were retrieved. The search query included the terms: [("AI" OR "artificial intelligence") AND "teachers' perspective"]. This search strategy initially identified 144,387 records across the three databases.

To narrow the scope, only peer-reviewed journal articles published in English were considered. The studies were also limited to those focused on educational research to maintain relevance to the topic. After applying these criteria, 401 articles were selected for further screening.

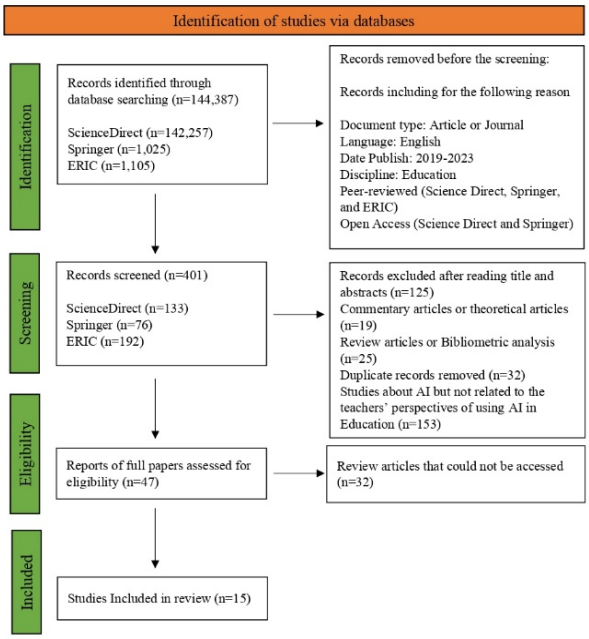

Figure 1. Flowchart of article selection

Inclusion and exclusion criteria

The main analysis was then selected using screening and inclusion procedures. For this study, the inclusion criteria were as follows:

1. The studies must focus on teachers' perspectives on the use of AI in teaching and learning processes.
2. The studies must have been published between 2019 and 2023 to reflect recent advancements.
3. The studies must be written in English.
4. The studies must be published in peer-reviewed journals (journal articles only).
5. The studies must be published in open-access journals to ensure accessibility.
6. The studies must be within the domain of educational research.

Studies were excluded if they:

1. Articles that were not free to access from the specified databases.
2. Articles that were books, systematic literature reviews, meta-analyses, commentaries, theoretical papers, or conference papers.
3. Studies that were not directly related to teachers' perspectives on using AI in teaching and learning processes.

The screening process involved a thorough review of titles and abstracts to identify relevant empirical studies. Of the 401 articles initially identified, 125 were excluded after reading the titles and abstracts due to irrelevance to the research question. Additionally, 32 duplicate records were removed, followed by the exclusion of 19 commentary or theoretical articles, 25 review articles or bibliometric analyses, and 153 studies related to AI but not focused on teachers' perspectives. Furthermore, 32 studies were excluded due to accessibility issues. After this rigorous screening, 15 articles were retained for the final analysis.

Data Analysis

To analyze the data, all articles were reviewed by using the category include and exclude in this review article. The articles were also coded by the study design and execution (descriptive or empirical study) and whether a study about AI was related to the teachers' perspective of using AI in Education. The following section provides information on each coded category as well as specific results for those categories.

Data Extraction

The articles from the selected databases that were included in this review were subjected to a content analysis. Table 1 contains a summary of the 15 publications that met the inclusion criteria.

Table 1. Overview of studies selected for review

No.	Authors	Year	Research Method	Publisher
1.	Ottenbreit-Leftwich et al.	2022	Qualitative	International Artificial Intelligence in Education Society
2.	Velander et al.	2023	Qualitative	Education and Information Technologies
3.	Sumakul et al.	2022	Qualitative	LEARN Journal: Language Education and Acquisition Research Network
4.	Kim, J et al.	2022	Qualitative	Education and Information Technologies
5.	Yau et al.	2023	Qualitative	Education and Information Technologies
6.	Gocen & Aydemir,	2020	Qualitative	Research on Education and Media
7.	An et al.	2023	Quantitative	Education and Information Technologies
8.	Lin et al.	2022	Qualitative	Sustainability
9.	Chounta et al.	2022	Quantitative	International Journal of Artificial Intelligence in Education
10.	McGrath et al.	2023	Quantitative	Computers and Education: Artificial Intelligence
11.	Al Darayseh	2023	Quantitative	Computers and Education: Artificial Intelligence
12.	Ayanwale et al.	2022	Quantitative	Computers and Education: Artificial Intelligence
13	K. Kim & Kwon	2023	Mix-Method	Computers and Education: Artificial Intelligence
14	Merelo et al.	2023	Quantitative	Education and Information Technologies
15.	Zhang et al.	2023	Quantitative	International Journal of Educational Technology in Higher Education

RESULTS AND DISCUSSION

Results

The results of this study are presented in Table 1 from the selected articles. In total, 15 journal articles were collected and thoroughly examined. Overall, the data from the articles indicates that teachers are enthusiastic about using AI in the classroom. The goal of this study was to look into teachers' perspectives on using AI in the teaching and learning process.

The reviewed studies revealed that most teachers have a positive attitude toward using AI in education. On the other hand, it also revealed the challenges in using AI in education, which include ethical concerns, lack of teacher

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training and expertise, data privacy and security issues, and bias and fairness. Regarding knowledge about AI, a significant number of teachers reported low levels of understanding of A (An et al., 2023; Ayanwale et al., 2022; Chounta et al., 2022; K. Kim & Kwon, 2023; Lin et al., 2022; McGrath et al., 2023; Velander et al., 2023; Yau et al., 2023).

The teachers expressed skepticism and anxiety about AI, concerns about equity, responsibility, and lack of knowledge and resources with AI in teaching practices, integrating AI into educational curricula is critical. Teachers need guidance on what and how to teach AI, indicating a preference for clear instructions and a focus on the human role in AI and how it uses data to make decisions. The findings indicate that some research would be used by teacher educators and policymakers to improve teachers' competence in teaching AI by incorporating the determined teacher conception categories into professional development programs and curriculum development proposals (An et al., 2023; Ayanwale et al., 2022; Yau et al., 2023).

Furthermore, at least there are three positive impacts of AI in the teaching and learning process, such as (1) Supporting teacher's professional development; (2) Enhancing the teacher's ability to teach; and (3) Providing adaptive teaching strategy. AI in education can be used for multidisciplinary education, authentic problem-solving, and creative tasks. To integrate AI into education, teachers recommend several key factors such as (1) Establishment of AI in education collaboration councils: teachers emphasized the need for collaboration between government, schools, research institutions, and EdTech companies to develop AI and implement AI in education; (2) Updating teachers with the latest AI knowledge and expertise from experts in different fields, such as AI engineering, statistics, mathematics, and education; (3) Culture of collaborative learning: teachers emphasized the importance of establishing a culture of collaborative learning among students and teachers; (4) Supporting teachers` professional learning communities composed of different subject teachers to share information, knowledge, and effective AI in education practices across subjects; (5) Developing students` mindset to learn from mistakes and failures, which is crucial so that human will not subordinate with AI technology (J. Kim et al., 2022).

Discussion

This study aims to perform a systematic review of journals from qualified databases to determine teachers' perspectives and perceptions on using AI in the teaching and learning process. It can be seen that most of the research was conducted using qualitative methods, only a limited amount of the research utilized quantitative methodology and mixed methods methodology, and this topic still has a scarcity of resources. Even though the majority of the results indicate a positive attitude toward AI in education, this study has implications for the future implementation of AI in the teaching and learning process. AI is only a tool to assist teachers in their teaching and learning processes, not a replacement for the teacher's role in the classroom.

The positive attitude toward AI in education aligns with prior studies that emphasize AI's potential to improve educational experiences and outcomes (Sumakul et al., 2022; Velander et al., 2023). For example, An et al. (2023) reported that EFL teachers had positive attitudes toward using AI, citing factors such as performance expectancy and social influence as significant predictors of behavioral intention. Similarly, the enthusiasm for AI noted in the studies reviewed here echoes the findings of Al Darayseh (2023), where science teachers also expressed high acceptance of AI in the classroom.

However, a recurring theme across the literature, which was also evident in this review, is the concern about the ethical implications of AI, such as data privacy and security issues, bias, and fairness (Gocen & Aydemir, 2020; Chounta et al., 2022; Gökçearslan et al., 2024). This aligns with the findings of McGrath et al. (2023), who highlighted university teachers' concerns regarding the responsibilities associated with AI in higher education. These ethical concerns suggest that while teachers are generally optimistic about AI, they remain cautious about its broader societal implications.

Interestingly, while the majority of studies indicate a positive attitude toward AI, this review uncovered a surprising level of skepticism and anxiety among teachers regarding the future role of AI in education. Teachers expressed concerns about AI's potential to reduce human interaction in the classroom, echoing the findings of Chounta et al. (2022), who noted that teachers required more support to effectively integrate AI into their work practices. Additionally, some teachers feared that AI might subordinate their roles in the classroom, as mentioned by Velander et al. (2023), which contrasts with the more optimistic views reported in studies like An et al. (2023).

Moreover, a significant gap was identified in the research regarding the level of AI knowledge among teachers. Many teachers reported a lack of understanding of AI concepts, which poses a barrier to successful implementation. This finding aligns with previous research by Lin et al. (2022), who emphasized the need for comprehensive professional development to improve teachers' AI literacy. The discrepancy between teachers' enthusiasm for AI and their actual readiness to implement it highlights the importance of ongoing support and training (Gökçearslan et al., 2024).

The findings of this review have important implications for educators, policymakers, and researchers. To capitalize on the benefits of AI in education, it is essential to address the challenges identified, particularly in the areas of teacher training and ethical concerns. Professional development programs focused on AI literacy and ethical considerations should be prioritized to ensure that teachers are well-equipped to integrate AI into their classrooms effectively. Furthermore, ongoing collaboration between educators, policymakers, and technology developers is crucial to ensure that AI tools are designed and implemented in ways that support both teaching and learning without compromising ethical standards.

CONCLUSION

Generally, the result showed that the teachers have a positive perspective about using Artificial Intelligence (AI) in the teaching and learning process. AI provides specific educational experiences and increases students' participation. Teachers are highly accepting of the implementation of AI in education. AI supports teachers' professional development, enhancing the teacher's ability to teach, providing an adaptive teaching strategy, and reducing teachers' teaching pressure. To improve teachers' competence in AI in the classroom, professional development programs that help teachers gain a thorough understanding of AI and its applications, as well as incorporate elements of teachers' perspectives into AI curricula, are essential.

The findings of this review suggest that while AI holds significant potential for transforming education, its successful implementation requires strategic support at both policy and practice levels. Educational policymakers should prioritize the development of AI-focused professional development programs that equip teachers with the necessary knowledge and skills to use AI effectively in the classroom. These programs should address not only the technical aspects of AI but also ethical considerations, ensuring that AI is used in a way that promotes equity and fairness in education.

Moreover, collaboration between government bodies, educational institutions, and technology developers is essential to create AI tools that are aligned with educational goals. Establishing clear guidelines for the integration of AI in educational settings will help ensure that AI enhances, rather than detracts from, the learning experience. Policymakers should also consider creating frameworks that support continuous learning for teachers, enabling them to stay updated on advancements in AI technology and its applications in education.

While this review has provided insights into teachers' perspectives on AI, there are still several areas that warrant further investigation. Future research could explore the long-term impact of AI on teaching and learning outcomes, particularly how AI influences student engagement, achievement, and motivation over time. Additionally, more research is needed on the effectiveness of professional development programs focused on AI literacy. Understanding which training approaches are most effective can help shape future initiatives aimed at improving teachers' AI competencies.

Another promising avenue for research is the exploration of AI's role in promoting inclusive education. Investigating how AI can be used to support diverse learners, including students with special needs or those from underrepresented backgrounds, could provide valuable insights into how AI can create more equitable learning environments.

Finally, as AI technology continues to evolve, research should also focus on the ethical implications of AI in education. This includes examining how AI can be used responsibly, and ensuring that its implementation does not exacerbate existing inequalities or create new forms of bias.

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