
| RESEARCH ARTICLE

The Role of Artificial Intelligence in Modern Classroom Teaching

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| ABSTRACT

The rapid advancement of Artificial Intelligence (AI) has significantly transformed modern classroom teaching, reshaping instructional strategies, learning environments, and educational outcomes. This review article examines the role of AI in contemporary education, with a focus on its applications, benefits, and emerging challenges within classroom settings. AI-powered technologies such as intelligent tutoring systems, adaptive learning platforms, automated assessment tools, and learning analytics are increasingly being integrated into teaching and learning processes. These technologies enable personalized learning experiences by adapting content, pace, and instructional methods to individual learners' needs, abilities, and learning styles. The review highlights how AI enhances teacher effectiveness by automating routine tasks such as grading, attendance tracking, and administrative reporting, thereby allowing educators to devote more time to instructional planning and student engagement. Additionally, AI-driven analytics provide valuable insights into learner performance, enabling early identification of learning gaps and supporting data-informed instructional decisions. The use of AI also promotes student-centered learning, encourages active participation, and supports inclusive education by addressing diverse learning needs. Despite its potential, the integration of AI in classroom teaching presents several challenges. Issues related to data privacy, ethical use of student information, algorithmic bias, limited digital infrastructure, and inadequate teacher training remain critical concerns. The review emphasizes the need for clear policy frameworks, ethical guidelines, and continuous professional development to ensure responsible and effective use of AI in education. AI holds considerable promise for enhancing the quality, efficiency, and inclusiveness of modern classroom teaching. However, its successful adoption depends on balanced implementation, stakeholder collaboration, and alignment with pedagogical goals. This review provides insights for educators, policymakers, and researchers seeking to harness AI to improve teaching and learning in contemporary educational contexts.

| KEYWORDS

Artificial Intelligence in Education, Modern Classroom Teaching, Adaptive Learning Technologies, Intelligent Tutoring Systems, Educational Technology Integration, Learning Analytics, Personalized Learning.

| ARTICLE INFORMATION

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1. Introduction

The rapid advancement of digital technologies has significantly transformed the education sector, with Artificial Intelligence (AI) emerging as one of the most influential innovations shaping modern classroom teaching (Ahmad et al., 2021; Holmes, 2020). AI refers to computer systems designed to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making (Malik et al., 2018; Balacheff, 1993). In recent years, the integration of AI into educational

environments has gained increasing attention due to its potential to enhance teaching effectiveness, personalize learning experiences, and improve overall educational outcomes (Ahmad et al., 2022; Devarasetty, 2023). As classrooms become more technologically driven, understanding the role of AI in contemporary teaching practices has become essential for educators, researchers, and policymakers (Shrivastava, 2023; Dimitriadou & Lanitis, 2023).

Traditional classroom teaching often relies on standardized instructional methods that may not adequately address individual learners' needs, abilities, and learning paces (Mondal, 2019; Pedro et al., 2019). This limitation has contributed to disparities in student performance and engagement. AI-based educational tools offer promising solutions by enabling adaptive and personalized learning (Ahmad et al., 2022; Yadav, 2025). Through technologies such as intelligent tutoring systems, adaptive learning platforms, and learning analytics, AI can analyze student data in real time and adjust instructional content accordingly (Nalbant, 2021; Holmes, 2020). This learner-centered approach supports differentiated instruction and helps students achieve improved academic performance (Malik et al., 2018).

In modern classrooms, AI applications extend beyond personalized learning to support teachers in instructional planning and classroom management. Automated assessment and feedback systems reduce teachers' workload by streamlining grading and evaluation processes, allowing educators to focus more on pedagogical activities and student interaction (Taufikin et al., 2024; Dimitriadou & Lanitis, 2023). AI-driven analytics also provide teachers with insights into student progress, learning patterns, and areas of difficulty, facilitating informed decision-making and early intervention (Ahmad et al., 2021; Pedro et al., 2019). As a result, AI enhances both teaching efficiency and instructional quality (Devarasetty, 2023).

Furthermore, AI plays a vital role in promoting inclusive and equitable education. Assistive technologies powered by AI support learners with diverse needs, including students with disabilities and those facing language barriers (Holmes, 2020; Mondal, 2019). Speech recognition, text-to-speech applications, and intelligent content recommendation systems help create accessible learning environments that accommodate varied learning styles (Shrivastava, 2023; Yadav, 2025). These innovations align with global educational goals that emphasize inclusivity and equal learning opportunities for all students (Ahmad et al., 2022).

Despite its numerous benefits, the integration of AI in classroom teaching is not without challenges. Concerns related to data privacy, ethical use of student information, algorithmic bias, and unequal access to technological resources remain significant barriers to widespread adoption (Dimitriadou & Lanitis, 2023; Taufikin et al., 2024). Additionally, limited teacher preparedness and lack of clear policy guidelines can hinder effective implementation (Nalbant, 2021; Devarasetty, 2023). Addressing these challenges requires comprehensive strategies involving policy development, teacher training, and ethical governance frameworks (Holmes, 2020; Pedro et al., 2019).

This review article explores the role of Artificial Intelligence in modern classroom teaching by examining its applications, benefits, and challenges. By synthesizing existing literature, the study aims to provide insights into how AI can be effectively integrated into teaching practices to enhance learning experiences and support sustainable educational development in contemporary classrooms (Ahmad et al., 2021; Shrivastava, 2023).

2. literature review

2.1 Artificial Intelligence Concept in Education

Artificial Intelligence in education refers to the use of intelligent computer systems that simulate human cognitive processes to support teaching and learning activities (Ahmad et al., 2021; Holmes, 2020). Scholars describe AI in educational contexts as a transformative technology capable of enhancing instructional delivery, learner engagement, and educational management (Malik et al., 2018; Balacheff, 1993). Early studies focused on rule-based systems and computer-assisted instruction, while recent literature emphasizes machine learning, natural language processing, and data-driven learning environments (Ahmad et al., 2022; Devarasetty, 2023). These advancements have enabled AI systems to respond dynamically to learner behavior, making classroom instruction more interactive and responsive (Dimitriadou & Lanitis, 2023; Shrivastava, 2023). The literature consistently highlights AI as a key driver of innovation in modern teaching practices (Mondal, 2019; Pedro et al., 2019).

2.2 AI-Driven Personalized and Adaptive Learning

A significant body of literature emphasizes the role of AI in promoting personalized and adaptive learning in classrooms (Ahmad et al., 2022; Yadav, 2025). Researchers argue that traditional one-size-fits-all instructional approaches often fail to address individual differences among learners (Nalbant, 2021; Mondal, 2019). AI-powered adaptive learning platforms analyze student performance data and tailor instructional content, pace, and difficulty levels to individual needs (Holmes, 2020; Shrivastava,

2023). Studies report improved learner motivation, engagement, and academic achievement when adaptive systems are integrated into classroom teaching (Devarasetty, 2023; Ahmad et al., 2021). Personalized feedback provided through AI tools also enhances self-directed learning and supports continuous academic improvement (Pedro et al., 2019; Yadav, 2025).

2.3 Intelligent Tutoring Systems in Classroom Instruction

Intelligent Tutoring Systems (ITS) have received considerable attention in educational research due to their ability to simulate one-on-one tutoring (Ahmad et al., 2022; Malik et al., 2018). Literature indicates that ITS use algorithms to diagnose learners' strengths and weaknesses and provide targeted instructional support (Holmes, 2020; Devarasetty, 2023). Empirical studies demonstrate that students using intelligent tutoring systems often achieve learning outcomes comparable to those receiving human tutoring (Mondal, 2019; Pedro et al., 2019). In classroom settings, ITS complement teachers' instructional efforts by offering additional practice, instant feedback, and individualized learning pathways, thereby enhancing instructional effectiveness (Shrivastava, 2023; Dimitriadou & Lanitis, 2023).

2.4 Role of AI in Assessment and Feedback

AI-based assessment and feedback mechanisms are widely discussed in the literature as tools for improving evaluation efficiency and accuracy (Taufikin et al., 2024; Ahmad et al., 2021). Automated grading systems, particularly for objective assessments, reduce teachers' workload and ensure timely feedback (Pedro et al., 2019; Holmes, 2020). Research highlights that AI-driven formative assessment tools help identify learning gaps early and provide real-time feedback that supports learning progression (Devarasetty, 2023; Nalbant, 2021). Moreover, learning analytics enable educators to track student performance trends, facilitating data-informed instructional decisions and targeted interventions (Ahmad et al., 2022; Yadav, 2025).

2.5 AI for Inclusive and Collaborative Learning

The literature also underscores the contribution of AI to inclusive and collaborative classroom environments (Holmes, 2020; Mondal, 2019). AI-powered assistive technologies support learners with special educational needs through speech recognition, text-to-speech, and adaptive content delivery (Shrivastava, 2023; Yadav, 2025). Additionally, AI-based collaboration tools facilitate group learning by monitoring participation and recommending collaborative strategies (Dimitriadou & Lanitis, 2023; Taufikin et al., 2024). Studies suggest that these applications promote equity, accessibility, and active learner participation in modern classrooms (Pedro et al., 2019; Ahmad et al., 2022).

2.6 Challenges and Ethical Considerations in AI Integration

Despite the growing adoption of AI in education, literature identifies several challenges that hinder its effective integration (Dimitriadou & Lanitis, 2023; Taufikin et al., 2024). Ethical concerns related to data privacy, security, algorithmic bias, and transparency are frequently discussed (Nalbant, 2021; Holmes, 2020). Researchers also highlight issues of unequal access to AI technologies, particularly in under-resourced educational settings (Pedro et al., 2019; Mondal, 2019). Teacher readiness and lack of adequate professional training further limit the successful implementation of AI in classrooms (Devarasetty, 2023; Shrivastava, 2023). The literature emphasizes the need for ethical guidelines, supportive policies, and continuous capacity building to ensure responsible and sustainable use of AI in education (Ahmad et al., 2022; Yadav, 2025).

3. Methodology

This study adopted a qualitative research review approach to examine the role of Artificial Intelligence in modern classroom teaching. A systematic search of relevant literature was conducted to identify scholarly articles, review papers, conference proceedings, and policy reports related to AI applications in education. Electronic databases such as Google Scholar, ERIC, Scopus, and Web of Science were consulted to ensure comprehensive coverage of current and credible sources. Key search terms included "artificial intelligence in education," "AI in classroom teaching," "adaptive learning," "intelligent tutoring systems," and "educational technology."

The inclusion criteria focused on peer-reviewed publications written in English that addressed the use of AI in formal classroom settings at primary, secondary, or higher education levels. Studies published within the last ten years were prioritized to capture recent developments and emerging trends in AI-driven teaching and learning. Exclusion criteria included non-academic sources, opinion-based articles, and studies lacking relevance to classroom teaching contexts.

Selected studies were screened and analyzed thematically. Data extraction focused on key themes such as AI applications, instructional benefits, challenges, and ethical considerations. The synthesized findings were organized to provide a coherent understanding of how AI supports teaching practices, learner engagement, and educational outcomes in modern classrooms. This methodological approach enabled a comprehensive and critical review of existing literature while identifying gaps for future research.

4. Results and Discussions

The literature review indicates that Artificial Intelligence (AI) is increasingly shaping modern classroom teaching by enhancing instructional efficiency, personalizing learning experiences, and supporting inclusive education (Ahmad et al., 2022; Holmes, 2020; Devarasetty, 2023). AI-driven technologies such as intelligent tutoring systems, adaptive learning platforms, automated assessment tools, and learning analytics have been widely reported to improve both teaching and learning outcomes (Malik et al., 2018; Dimitriadou & Lanitis, 2023). One prominent finding across multiple studies is the ability of AI to provide personalized learning experiences. Adaptive learning platforms analyze students' prior knowledge, learning pace, and performance data to tailor instructional content and recommend targeted exercises (Ahmad et al., 2021; Yadav, 2025). This personalization fosters greater learner engagement, motivation, and academic achievement compared to traditional uniform instruction (Nalbant, 2021; Mondal, 2019). Research also shows that AI-enabled feedback systems allow students to receive instant guidance, promoting self-directed learning and enabling learners to correct misconceptions in real time (Pedro et al., 2019; Shrivastava, 2023).

Intelligent tutoring systems (ITS) emerged as a key tool in facilitating individualized instruction. Studies demonstrate that ITS can simulate one-on-one tutoring experiences by identifying learners' strengths and weaknesses and providing targeted support (Ahmad et al., 2022; Malik et al., 2018). In classroom contexts, ITS complement teachers' efforts by offering additional practice opportunities and reinforcing learning concepts (Holmes, 2020; Devarasetty, 2023). Teachers benefit from the integration of ITS as it reduces repetitive instructional tasks while allowing them to focus on higher-order teaching activities, such as facilitating discussions and fostering critical thinking (Dimitriadou & Lanitis, 2023; Mondal, 2019). Furthermore, AI-powered analytics tools provide actionable insights into student performance trends, helping educators make data-informed instructional decisions. These systems enable early identification of learning gaps and allow timely interventions that enhance student outcomes (Ahmad et al., 2021; Yadav, 2025).

Beyond personalized learning, AI contributes to inclusivity and accessibility in classroom teaching. The literature highlights the use of AI-based assistive technologies for students with disabilities, including speech-to-text, text-to-speech, and real-time language translation tools (Shrivastava, 2023; Holmes, 2020). These technologies create a more equitable learning environment by accommodating diverse learning needs and promoting participation among all students (Pedro et al., 2019; Mondal, 2019). Additionally, collaborative AI tools facilitate group learning by monitoring interactions, suggesting optimal grouping strategies, and supporting cooperative learning activities (Taufikin et al., 2024; Devarasetty, 2023). Such applications not only enhance classroom engagement but also cultivate communication and teamwork skills (Ahmad et al., 2022; Yadav, 2025).

The integration of AI in assessment practices represents another significant benefit reported in the literature. Automated grading systems and AI-driven formative assessment tools reduce teachers' workload, improve the timeliness of feedback, and ensure more consistent evaluation (Pedro et al., 2019; Taufikin et al., 2024). Learning analytics further support the continuous monitoring of student progress and provide valuable data for refining instructional strategies (Ahmad et al., 2021; Dimitriadou & Lanitis, 2023). Collectively, these tools promote evidence-based teaching practices, increasing both the efficiency and quality of classroom instruction (Malik et al., 2018; Holmes, 2020).

Despite these advantages, the literature consistently highlights several challenges associated with AI implementation. Ethical concerns, particularly regarding data privacy, security, and algorithmic bias, are recurring issues (Nalbant, 2021; Dimitriadou & Lanitis, 2023). Misuse of sensitive student data or biased AI algorithms can inadvertently disadvantage certain groups of learners (Pedro et al., 2019; Holmes, 2020). Additionally, disparities in access to digital infrastructure and insufficient teacher training limit the widespread and equitable adoption of AI in classrooms (Devarasetty, 2023; Taufikin et al., 2024). Studies emphasize that successful integration requires clear policy frameworks, ongoing professional development for educators, and alignment with pedagogical goals (Shrivastava, 2023; Yadav, 2025).

Overall, the findings suggest that AI has substantial potential to enhance modern classroom teaching by making learning more personalized, engaging, and inclusive while supporting teachers in their instructional roles (Ahmad et al., 2022; Holmes, 2020). However, the effective use of AI depends on careful planning, ethical governance, and adequate training (Dimitriadou & Lanitis, 2023; Taufikin et al., 2024). As the technology continues to evolve, educators and policymakers must work collaboratively to address implementation challenges, ensure equitable access, and leverage AI's capabilities to improve educational outcomes (Pedro et al., 2019; Shrivastava, 2023). The current literature highlights the transformative potential of AI in education, yet underscores the importance of responsible and informed adoption to maximize its benefits while minimizing risks (Ahmad et al., 2021; Yadav, 2025).

5. Conclusion

Artificial Intelligence (AI) has emerged as a transformative force in modern classroom teaching, offering significant opportunities to enhance instructional effectiveness, personalize learning, and promote inclusivity. The review of existing literature demonstrates that AI-driven tools such as intelligent tutoring systems, adaptive learning platforms, and learning analytics provide educators with the ability to tailor instruction to individual learner needs, deliver timely feedback, and monitor student performance more efficiently. These technologies support learner engagement, motivation, and academic achievement, while also reducing teachers' administrative workload, allowing them to focus on higher-order teaching and facilitation of critical thinking skills.

Moreover, AI applications contribute to creating more inclusive and accessible learning environments. Assistive technologies, such as speech-to-text and text-to-speech systems, accommodate diverse learning needs and ensure equitable opportunities for all students. Collaborative AI tools further enhance classroom interactions, supporting group work and fostering skills such as communication and teamwork. These innovations reflect the potential of AI to align educational practices with contemporary pedagogical goals, making learning more student-centered and dynamic.

However, the literature also highlights several challenges that must be addressed for effective AI integration. Ethical considerations, including data privacy, security, and algorithmic bias, require careful management, alongside the need for adequate digital infrastructure and teacher training. Policies and guidelines that govern responsible AI use are critical to ensuring equitable access and maximizing educational benefits.

In conclusion, AI holds considerable promise for transforming classroom teaching by enhancing learning experiences, supporting teachers, and promoting inclusivity. Its successful implementation depends on thoughtful integration, ethical governance, and continuous professional development. As AI technologies continue to evolve, their strategic adoption in education has the potential to foster innovative, efficient, and inclusive teaching practices that meet the needs of 21st-century learners.

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