



Role of Artificial Intelligence in Shaping Teaching Learning Process in Modern Classroom

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Abstract

Artificial Intelligence (AI) is revolutionizing the field of education by making the teaching-learning process simpler, better and more accessible to students. In this study, we examined the role of artificial intelligence tools in changing the learning process of students in the modern classroom environment. The main objective of this study was to identify the barriers and opportunities of artificial intelligence in changing the teaching-learning process of students in the modern classroom environment. In this study, the researcher used qualitative research methods, especially the in-depth literature review method. In this study, the researcher considered data from various secondary sources, which include peer-reviewed journals, academic journals, books and reliable educational websites, especially databases like Scopus, IEEE, Web of Science, Google Scholar, PubMed, JSTOR, etc. The study found that artificial intelligence plays a significant role in the learning process of students, especially in the modern classroom environment, as artificial intelligence tools help in assessing students, which helps in improving the learning outcomes of students. Overall, artificial intelligence is most effective and beneficial when used as a tool to support the teaching and learning process of students.

Keywords: Artificial Intelligence, Modern Classrooms, Role of Artificial Intelligence, AI in Teaching Learning Process.

INTRODUCTION

Artificial Intelligence (AI) has a significant role to play in transforming education in modern society. The use of artificial intelligence technology in classrooms and education management systems has created opportunities to improve the effectiveness and quality of education (Amiri et al., 2025). AI technology has made it easier to create more interactive and inclusive education systems in diverse learning environments (Ivanashko et al., 2024). AI technology has taken over the classroom teaching and made it more effective and flexible by supporting students in learning at anytime, anywhere in the world (Tahir et al., 2024). In modern society, AI technology has gone beyond providing more personalized education in the classroom and has begun to support teachers in classroom planning and management. AI technology has made it easier to reduce teachers' workload by automating grading and assessment processes, which in turn frees up teachers to spend more time in the classroom teaching and interacting with students (Taufikin et al., 2024; Dimitriadou & Lanitis, 2023). The use of AI-based analytics helps teachers gain insights into students' progress and learning patterns, enabling them to make informed decisions (Ahmad et al., 2021). Thus, AI increases the effectiveness and quality of teaching (Devarasetty, 2023).

AI IN TEACHING-LEARNING PROCESS

Artificial Intelligence (AI) is playing a significant role in shaping and transforming the traditional teaching and learning process in different parts of the world. In fact, AI tools and technologies are being used in school classrooms from primary to secondary and even higher levels to enhance the effectiveness of the traditional teaching and learning process. In

the classroom, AI tools and technologies improve the teaching and learning process by analyzing the relative strengths and weaknesses of students. In fact, AI tools and technologies provide real-time and effective feedback to students, and teachers can improve their interventions in a better and more effective way (Kenchakkanavar et al., 2024). AI tools and technologies improve the overall learning outcomes of students in a better and more effective way (Jaiswal & Arun, 2021; Sihag & Vibha, 2024). In fact, AI tools and technologies can improve the overall learning outcomes of students by personalizing the overall educational experience better and more effectively (Nandi et al., 2024). AI has shown that it can successfully create intelligent machine that thinks and behaves like a human. AI is personalized, interactive, and immersive, and it positively affects students' confidence, sustains their interest in reading, and develops writing skills (Hwang et al., 2023; Lai & Lee, 2024; Ruan et al., 2021; Liu et al., 2022).

OBJECTIVES OF THE STUDY

1. To explore the role of artificial intelligence tools in transforming the teaching and learning process in the modern classroom environment.
2. To understand the opportunities of artificial intelligence in transforming the teaching and learning process in the modern classroom environment.
3. To identify the challenges of artificial intelligence in transforming the teaching and learning process in the modern classroom environment.

METHODOLOGY OF THE STUDY

This study was used a qualitative research approach grounded on secondary data analysis to artificial intelligence's influence on the future of teaching and learning in modern classrooms. This study employed in-dept literature review method analysis because it allowed conducting a systematic study of the available literature, reports, and conceptual discussions on Artificial intelligence in teaching learning process. In this study data were collected from various secondary sources, such as peer-reviewed academic journals, books, and reliable educational websites, including databases like Scopus, Web of Science, Google Scholar, PubMed, JSTOR, and etc., were consulted to find related studies, Also, searched with keywords like “The Role of AI in Teaching Learning Process,” “AI in Modern Classroom,” “AI in Teaching Learning Process”, “Challenges of AI in Modern Classrooms,” “Opportunities of AI Technology.”

FINDINGS AND DISCUSSIONS

THE ROLE OF AI TOOLS IN MODERN CLASSROOMS

Artificial intelligence (AI) has the potential to completely transform the contemporary classroom education system (Atifnigar, 2025). In recent years, the roles of AI tools in teaching and learning have greatly improved. Some of its roles are mentioned below:

- **Intelligent Tutoring Systems (ITS) Tools:**

The role of AI tools in the teaching learning process in modern classrooms include Intelligent Tutoring Systems (ITS). These are AI tools that effective the one-to-one teaching learning approach. In this system, the AI tool provides feedback and guidance to the students. The system is designed to respond according to the skill level of the students and provide them with customized lessons based on their strengths and weaknesses. With the help of this system, students are provided with improvement points and are able to practice with the guidance of the AI tool itself without the direct involvement of the teachers (Atifnigar, 2025). In fact, AI tools like Duolingo and Rosetta Stone are used to teach vocabulary, grammar, and pronunciation with the help of ITS. The application of the ITS is used for teaching grammar, for reading comprehension, and for vocabulary development (Jiang, 2022; Umar, 2024).

- **GenAI Chatbot Tools:**

Generative AI chatbots are an emerging trend in the create of AI tools in the field of conversational AI, which provides a wide range of teaching and learning guidance in the higher education system. As noted in Rudolph et al. (2024), generative AI tools are revolutionizing the teaching and learning sector in higher education, as they have the Possibility to improve the sector in terms of research, teaching methods, and students. As noted in Ilieva et al.

(2023), the new generation of chatbots has the potential to provide mutual support for teachers and students. AI Chatbot tools like- ChatGPT, Gemini AI, Perplexity, Grammarly etc.

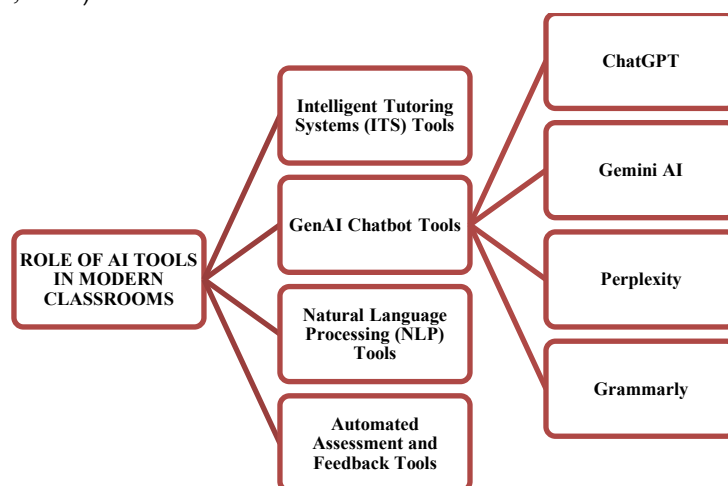
- **ChatGPT:** ChatGPT is providing students with the opportunity to practice their learning process in a modern classroom environment. The ability to provide feedback is one of the key strengths of ChatGPT. ChatGPT is empowering students, as it will provide a platform for them to practice their skills (Neupane et al., 2025).
- **Gemini AI:** Gemini AI has the ability to help students practice specific grammar or vocabulary, considering their skill level, strengths and weaknesses. Gemini has the ability to help teachers provide feedback to students. Gemini has the ability to help students apply project-based learning or collaborative learning strategies to overcome the barriers they face in the language field (Bonner et al., 2023).
- **Perplexity:** Perplexity AI can greatly help students improve their skills through interactive learning methods. Perplexity AI enables teachers to ask questions in class and get answers. It transforms the learning process into an interactive method. Perplexity AI enhances the learning process for the student and enables him to maintain control over this process (Neupane et al., 2025).
- **Grammarly:** Grammarly is a program that works based on complex algorithms. It not only detects grammatical errors, but also provides suggestions for writing style and relevant vocabulary (Giray, 2024). Furthermore, Grammarly enables teachers to provide their students with consistent notes and to gain a comprehensive knowledge of grammar and literature.

- **Natural Language Processing (NLP) Tools:**

Natural Language Processing (NLP) is another important artificial intelligence (AI) tool used in the teaching and learning process in contemporary classrooms. NLP is considered an important tool because it attempts to give computers the grammatical source of human language and the ability to understand it. NLP tools are considered important for improving students' reading and writing skills by providing automatic corrections and suggestions (Atifnigar, 2025). The most important tools are the ChatGPT engines GPT-3 and GPT-4. Other tools include the ChatGPT-4 tool and Google Bird (Yang et al., 2022). Chatbots, on the other hand, speak and interact with the user through voice. This feature is commonly seen in smartphone apps like Siri, Amazon Alexa, and Google Assistant (Alnefaie et al., 2021). Examples of such tools are Grammarly and ProWritingAid.

- **Automated Assessment and Feedback Tools:**

Artificial intelligence (AI) is also used effectively in assessment and feedback. Automated AI-based assessment tools help provide immediate feedback to students. AI-based assessment systems use machine learning and natural language processing methods to examine student comments. A systematic review of AI-assisted assessment in higher education suggests that AI tools help provide automated grading and learning analytics, allowing teachers to effectively monitor student progress (Zhao, 2024). Automated feedback tools can effectively help improve teaching methods. A study conducted in a classroom environment found that AI-generated feedback effectively helped improve questioning techniques (Demszky et al., 2024).



(Figure-1: The role of AI tools in modern classroom)

Artificial Intelligence (AI) is significance the teaching-learning process in today's classrooms by create intelligent machine that thinks and behaves like a human. Some notable uses of AI in the teaching-learning process include ITS, which provide feedback to learners; Generative AI chatbots like ChatGPT and Gemini AI, which assist students; and Natural Language Processing (NLP) tools, which help students enhance their reading and writing skills. In addition, AI is being used to automate student assessment and feedback, which is helping teachers improve their teaching methods. The combined goal of all these tools is to provide students with an immersive, personalized, and unique learning experience tailored to their needs.

OPPORTUNITIES OF ARTIFICIAL INTELLIGENCE IN THE MODERN CLASSROOM ENVIRONMENT

The concept of Artificial Intelligence (AI) has created numerous opportunities to enhance the quality and effectiveness of teaching in the modern classroom. The use of AI technology opens the way to create personalized teaching and learning methods. The main opportunities of AI for transforming the teaching-learning process are as follows.

❖ Personalized and Adaptive Learning:

One of the major opportunities for applying artificial intelligence (AI) in education is in the area of personalized learning. This is because AI will enable the system to analyze the learning behavior of different students and provide them with learning materials according to their needs. Adaptive learning will enable students to learn at their own pace, while also helping teachers adapt to the learning abilities of different students in a classroom (Zawacki-Richter et al., 2019).

❖ Intelligent Tutoring Systems (ITS):

Artificial intelligence-based intelligent tutoring systems (ITS) provide real-time academic encouragement to students. These systems provide explanations, hints, and feedback to students as they engage in the learning process. These intelligent tutoring systems mimic one-on-one tutoring and help students understand complex concepts through interactive means. As a result, students are provided with uninterrupted academic support even outside the classroom (Holmes et al., 2019).

❖ Automated Assessment and Feedback:

Artificial intelligence (AI) technology helps in automatic assessment of assignments, quizzes and essays. It provides immediate feedback to the student. Immediate feedback helps the student to know his/her mistakes and improve conceptual understanding (Luckin et al., 2016). Research indicates that learning platforms using AI technology help in providing personalized feedback and resources as soon as the assignment is completed (Nandi et al., 2025).

❖ Enhanced Student Engagement:

The application of AI-based tools likes chatbots, virtual learning assistants, and interactive learning tools also facilitates active participation and engagement among students. AI-based tools are useful for collaborative learning and discussion. Interactive learning is more dynamic and engaging for students (Chen et al., 2020).

❖ Data-Driven Decision Making:

Artificial intelligence (AI) systems are capable of processing vast amounts of educational data, and they can help teachers and administrators gain important insights into student performance, learning, and progress. Artificial intelligence can help teachers develop better strategies that can improve student performance, and data analytics can help identify students who need institutional support (Bond et al., 2021).

❖ Support for Teachers and Administrative Efficiency:

Artificial intelligence tools can be used to simplify everyday activities such as attendance recording, assessment, scheduling, and curriculum management. This will enable teachers to be more creative and engaged in mentoring and interacting with students. In other words, it will increase the effectiveness of the education system (Holmes et al., 2019).

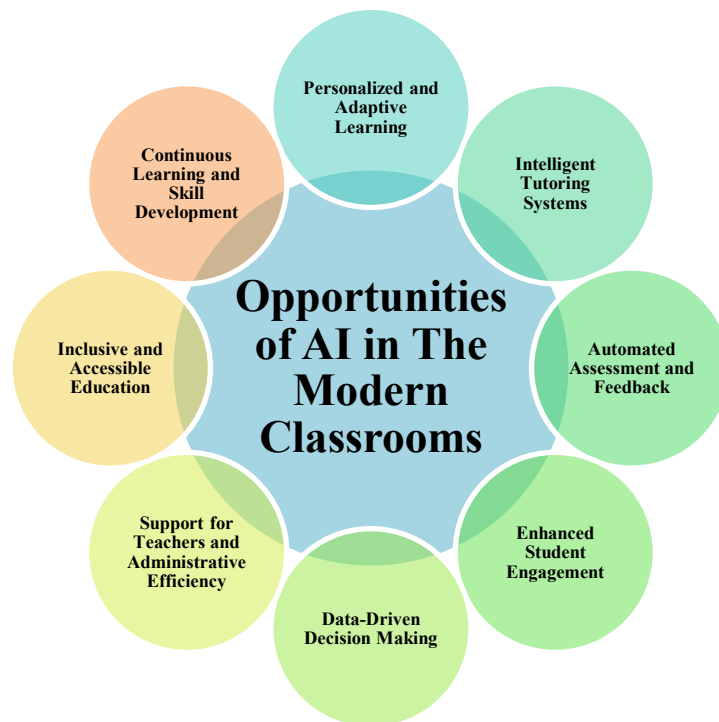
❖ Inclusive and Accessible Education:

Artificial intelligence (AI) technology is playing an important role in promoting inclusive education by providing assistive tools for people with disabilities. For example, speech recognition, text-to-speech, and translation tools

support people with vision, hearing, or speech disabilities. AI technology is helpful in promoting inclusive education in various types of classrooms (Chen et al., 2020).

❖ **Continuous Learning and Skill Development:**

AI-based teaching-learning platforms enable students to learn anywhere, anytime. These platforms support lifelong learning and skill development by providing students with tailored learning paths and recommendations for further education (Zawacki-Richter et al., 2019).



(Figure- 2: Opportunities of AI in The Modern Classrooms)

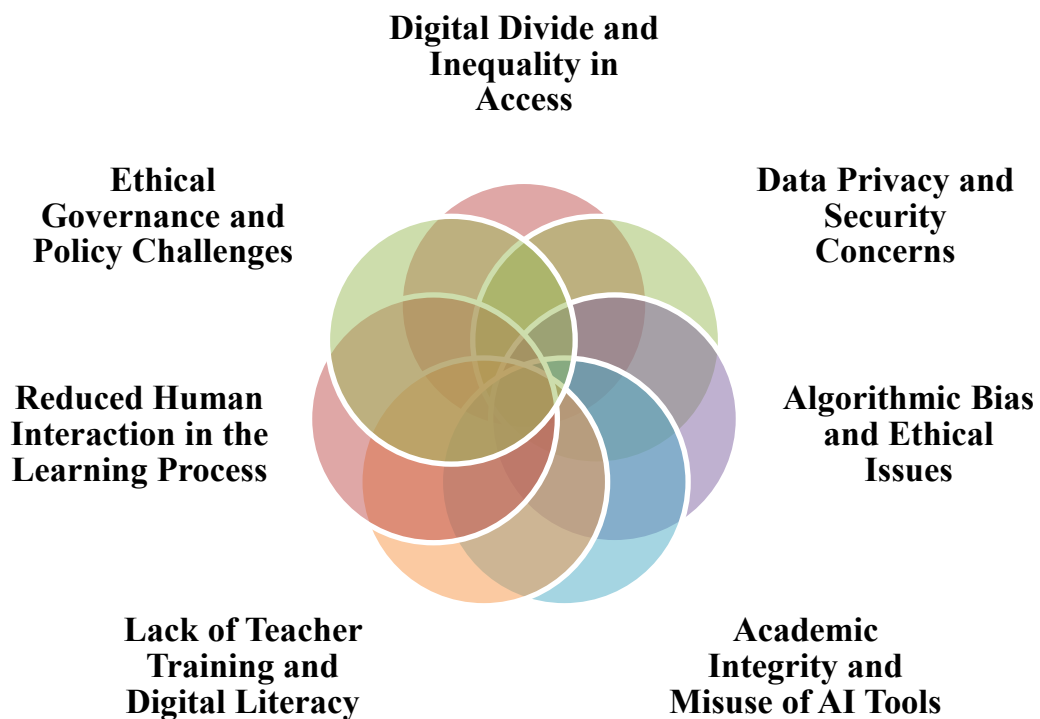
The role of artificial intelligence in teaching and learning is very important. The benefits of using artificial intelligence in teaching and learning include personalizing teaching and learning through student behavior, using artificial intelligence to assess students with immediate feedback, and increasing student engagement. Another potential of artificial intelligence is that it can improve teaching and learning strategies through data-based decision-making, increasing the effectiveness of the system. In addition, artificial intelligence can help in the inclusion of students with disabilities and continue their education by enabling them to learn anywhere, anytime.

CHALLENGES OF ARTIFICIAL INTELLIGENCE IN MODERN CLASSROOMS

Artificial Intelligence (AI) has the capacity to enhance effective teaching-learning processes, its inclusion in the modern classroom also has its own set of barriers and limitations. The main barriers related to the inclusion of AI in the modern classroom are mentioned below-

- **Digital Divide and Inequality in Access:** One of the major challenges related to incorporating artificial intelligence (AI) into education is the issue of digital divide. Students need internet connectivity and other technologies to use AI-based learning systems. Developing countries and other resource-limited regions may have limited internet connectivity and other technologies. This can lead to disparities among students in using AI-based learning systems. Students in disadvantaged areas may not have equal access to AI-based learning systems (Garzón et al., 2025).
- **Data Privacy and Security Concerns:** The application of artificial intelligence in the education sector includes the collection of data such as student learning outcomes, their behavior, etc. and the use of that collected data. There are concerns about the privacy of data collected by AI applications in the education sector. Educational institutions need to protect this data from misuse by other platforms and cyber-attacks. Researchers have highlighted the importance of data protection policies, which help protect students' digital identities (Delello et al., 2023).

- **Algorithmic Bias:** AI systems are also trained on data sets that tend to be biased by race, language, culture, and socioeconomic status (SES). As a result, AI systems in education are at risk of producing biased and unfair results. It has been observed that AI systems incorrectly identify essays written by non-native speakers as AI-written. This has raised concerns about the fairness of AI essay evaluation systems (Delello et al., 2023).
- **Academic Integrity and Misuse of AI Tools:** The availability of generative AI tools has raised concerns about academic dishonesty and integrity. Students may use AI tools to create essays, assignments, or answers without fully understanding the content of the text. Research has shown that students are using AI tools to complete assignments, which can negatively affect the validity of the assignments and the learning process. Research has also shown that the overuse of AI can lead to plagiarism, which undermines traditional assessment methods (Ng et al., 2025).
- **Lack of Teacher Training and Digital Literacy:** Teachers need to have appropriate digital skills and knowledge to incorporate artificial intelligence (AI) into the classroom. However, current teachers are not skilled and knowledgeable enough to apply AI tools in teaching. It is agreed that teachers need to be trained to successfully incorporate AI and achieve the expected benefits in teaching and learning (Yan et al., 2023).
- **Reduced Human Interaction in the Learning Process:** Education is not just about acquiring knowledge; it also involves interacting with others, developing empathy, and emotions. Overreliance on AI-based systems can lead to a decrease in interaction between teachers and students. Researchers have warned that the overuse of AI-based systems can deteriorate teacher-student relationships and reduce the personalized learning environment, which affects student motivation (Delello et al., 2023).
- **Ethical Governance and Policy Challenges:** The rapid integration of AI technologies into education and learning has made it essential to establish an ethical framework that will guide policymaking. Governments and educational institutions must formulate policies that guide the use of AI technologies, data protection, transparency, and accountability. In addition, there is a need for human-centered policymaking for AI technologies, so that they do not replace the role of teachers in the learning process (Yan et al., 2023).



(Figure-3: Challenges of AI in Modern Classrooms)

Artificial Intelligence (AI) is seen as having great potential to enhance the quality of education, although there are many barriers associated with its inclusion in the classroom. Some of these barriers include the issue of the digital divide, where students, especially those living in disadvantaged areas, may not have equal access to AI tools, which poses a problem of 'equity in education'. There is also the issue of data privacy, where there is a large amount of student data, which can pose security issues if not managed properly. Another issue is that of bias, where AI may not produce equal results, especially if students come from different backgrounds. There is also the issue of institutional integrity, where students may use AI tools to complete their assignments, which can affect their learning. Finally, there is the issue of teacher training, where teachers may not be adequately trained in 'digital literacy'. In this regard, over-reliance on artificial intelligence (AI) can disrupt human interaction in education, which can have a negative impact on student motivation and emotional intelligence. Finally, there is a need for a comprehensive ethical governance and policy framework that will be effective in the use of AI in education and will support teachers rather than replace them.

CONCLUSION

The purpose of the present study is to explore the role of artificial intelligence in transforming teaching and learning processes in the context of the modern classroom, especially in terms of its scope and limitations. The results of the present study indicate that the role of artificial intelligence in transforming teaching and learning processes in the context of the modern classroom is significant. The role of AI-based technologies in developing effective teaching and learning processes is significant. For example, the role of AI-based technologies in meeting the diverse needs of students and developing a student-centered approach in the teaching and learning process is significant. On the other hand, the present study also identified some limitations in incorporating AI-based technologies in the teaching and learning process. Digital divide, issues related to data privacy and security, dishonesty in educational institutions, and unpreparedness of teachers are some of the limitations in incorporating AI-based technologies in the teaching and learning process. In addition, the excessive use of AI-based technologies can affect the development of critical thinking skills and teacher-student relationships.

In conclusion, the future of teaching and learning will be influenced by artificial intelligence (AI) in the following ways: AI will have the ability to create an effective learning environment. The future of AI will depend on its proper application, observation, and attention to the ethical aspects of the subject, which will create an effective education system.

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