



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 15, Issue 3, March 2026

Artificial Intelligence in Higher Education: Transforming Classroom Teaching and Learning Practices

**Kalokhe Anil Sopan¹, Rupnawar Vitthal Sopan², Dr. Kumbhar Vijaykumar Sambhajirao³,
Dr. Oza Kavita S⁴**

Research Scholar, Department of Computer Science, Shivaji University, Kolhapur, MH, India¹

Assistant Professor, Department of Computer Application, Mudhoji College, Phaltan, MH, India²

Research Guide, Department of Computer Science, Shivaji University, Kolhapur, MH, India³

Research Guide, Department of Computer Science, Shivaji University, Kolhapur, MH, India⁴

ABSTRACT: Artificial Intelligence (AI) is increasingly transforming teaching and learning practices in higher education. AI-based technologies support educators in lesson planning, automated assessment, and student performance analysis while enabling personalized and interactive learning experiences for students. This paper examines the role of Artificial Intelligence in classroom teaching and highlights its major applications, including personalized learning systems, intelligent tutoring systems, automated assessment tools, and learning analytics. The study also discusses the advantages of AI in improving teaching efficiency and student engagement, along with challenges such as lack of infrastructure, faculty training requirements, and data privacy concerns. Based on a qualitative and conceptual analysis of existing research and educational technologies, the study demonstrates that AI can significantly enhance teaching–learning practices in higher education. However, its effective implementation requires a balanced approach that combines Artificial Intelligence with traditional teaching methods to ensure responsible and meaningful educational development.

KEYWORDS: Artificial Intelligence, Educational Technology, Higher Education, Intelligent Tutoring Systems, Learning Analytics

I. INTRODUCTION

Higher education plays a major role in developing students' knowledge, skills, and professional abilities. Education has long been a key element of cultural and intellectual development in India [1]. With the growth of digital technology, Artificial Intelligence has become an important innovation in colleges and universities. AI helps teachers plan lessons, assess students, and track academic progress. It also allows students to learn at their own pace. Rapid technological developments and evolving educational demands are reshaping the landscape of higher education [2].

In higher education institutions, AI is used to analyse student performance, provide personalized learning materials, and improve classroom management. Education has played a vital role in human development, inspiring numerous intellectuals [3].

The increasing availability of digital technologies has significantly changed the way education is delivered and accessed in higher education institutions. Education covers multiple dimensions, including school education and higher education, while teacher education plays a crucial role in shaping a better future [4]. Universities and colleges are gradually shifting from traditional chalk-and-board teaching methods toward technology-supported learning environments. In today's rapidly changing educational environment, the significance of ongoing learning and skill enhancement is extremely important [5]. In this transformation, Artificial Intelligence plays a crucial role by enabling data-driven decision-making in teaching and learning processes. Although the integration of AI in education offers significant potential, it also introduces several challenges, especially regarding faculty perceptions, preparedness, and

adoption [6]. AI systems can analyse large volumes of student data and generate insights that help educators understand learning patterns, student behavior, and academic performance.

Generative AI focuses on developing algorithms and models capable of producing synthetic data that closely resembles real-world data [7]. Another important aspect of Artificial Intelligence in education is its ability to support adaptive learning environments. Adaptive learning technologies use AI algorithms to adjust instructional content according to the learning needs of individual students. This approach allows educational systems to deliver personalized study materials, recommend additional learning resources, and provide targeted exercises based on a student's strengths and weaknesses. AI has the potential to streamline and enhance the overall effectiveness of the educational process [8]. As a result, students can experience a more flexible and supportive learning environment that encourages independent learning.

Artificial Intelligence also contributes to improving academic administration and institutional efficiency in higher education. AI also contributes significantly to making education more accessible by overcoming geographical and socioeconomic barriers [9]. AI-powered systems can assist in academic advising, course scheduling, student support services, and learning analytics. These technologies help institutions monitor student engagement and identify students who may require additional academic assistance. By using predictive analytics, universities can detect potential learning difficulties at an early stage and implement timely interventions to improve student success rates.

AI has the potential to automate and democratize personalized adaptive learning for students. It can help reduce learning gaps, stimulate students' interest in learning, enhance their learning abilities, improve language proficiency, and support a more effective learning pace [10]. The core principles of AI include reasoning, knowledge representation, planning, learning, communication, perception, and the ability to move and manipulate objects [11]. Furthermore, the integration of Artificial Intelligence in higher education supports the development of innovative teaching strategies that promote active learning and collaboration. AI-enabled tools such as intelligent content generation, automated feedback systems, and virtual learning assistants provide opportunities for teachers to create more engaging and interactive classroom experiences. As higher education continues to evolve in the digital era, the responsible use of AI technologies will become increasingly important in shaping the future of teaching and learning.

II. LITERATURE SURVEY

Artificial Intelligence has been widely studied in the context of higher education. Researchers have explored how AI technologies such as machine learning, intelligent tutoring systems, and adaptive learning platforms enhance teaching effectiveness and student learning outcomes. According to several studies, AI-based learning systems help in identifying student learning patterns and predicting academic performance. Adaptive learning platforms adjust educational content based on student responses and progress, making the learning experience more personalized.

Some researchers highlight the role of AI-powered chatbots in supporting students outside classroom hours by answering frequently asked questions related to courses, assignments, and examinations. Other studies emphasize automated grading systems that help teachers evaluate student assignments efficiently, particularly in large classrooms. However, previous studies also emphasize challenges such as ethical concerns, data privacy issues, and the need for digital literacy among teachers. Therefore, while AI provides many benefits, successful implementation requires careful planning, training, and institutional support.

Kalokhe Anil Sopan, Kumbhar Vijaykumar Sambhajirao [1], discussed that The Indian education system has evolved from the value-based Gurukul tradition to modern, technology-driven models. While ancient education emphasized moral development and creativity, the system has gradually adapted to changing societal and technological needs. Recent initiatives such as the National Education Policy 2020 and the Choice-Based Credit System promote flexibility and inclusivity. By combining traditional wisdom with modern approaches, India can develop responsible and innovative citizens for a sustainable future.

Adesh Kumar Pandey, Surendra Kumar Maurya [2], stated that Artificial Intelligence (AI) has the potential to transform higher education by improving teaching, research, and administrative processes. It enables personalized

learning, adaptive assessments, increased student engagement, efficient administration, and enhanced research capabilities, creating a more effective learning environment for both teachers and students.

III. PROBLEM STATEMENT

The rapid growth of digital technology and Artificial Intelligence (AI) has created significant opportunities for improving teaching and learning practices in higher education. However, many traditional classroom teaching methods still rely heavily on lecture-based instruction, which may not fully support personalized learning, continuous assessment, or active student engagement. In large classrooms, teachers often face difficulties in monitoring individual student progress, identifying learning gaps, and providing timely feedback. As a result, some students struggle to understand complex concepts and may not receive the necessary academic support.

Although AI-based tools such as intelligent tutoring systems, automated grading platforms, and learning analytics systems have the potential to enhance classroom teaching, their adoption in many higher education institutions remains limited. Lack of technological infrastructure, insufficient training for faculty members, and concerns related to data privacy and ethical use of AI technologies creates barriers to effective implementation. Additionally, there is a need to maintain a balance between the use of AI technologies and traditional human interaction in the teaching–learning process.

Therefore, it becomes important to examine how Artificial Intelligence can be effectively integrated into classroom teaching in higher education. Understanding the potential applications, advantages, and challenges of AI in educational environments can help institutions develop strategies that improve teaching efficiency, enhance student learning experiences, and support better academic outcomes.

IV. OBJECTIVES OF THE STUDY

The main objectives of this study are:

1. To understand the role of Artificial Intelligence in classroom teaching in higher education.
2. To examine different applications of AI in teaching and learning processes.
3. To analyse the advantages of AI tools for teachers and students.
4. To identify the challenges and limitations associated with AI integration in education.
5. To explore the future potential of AI technologies in higher education.

V. RESEARCH METHODOLOGY

This study is based on a qualitative and conceptual analysis of Artificial Intelligence applications in higher education. The research primarily uses secondary data collected from academic articles, educational technology reports, and online research resources related to AI in education.

Various AI-based tools and platforms used in classroom teaching were examined to understand their impact on teaching practices and student learning experiences. The study also analyses the advantages and challenges associated with the adoption of AI technologies in higher education institutions.

The research focuses on conceptual discussion rather than experimental analysis, aiming to provide a comprehensive understanding of how AI is transforming teaching–learning practices in modern classrooms.

VI. RESULTS AND DISCUSSION

This section discusses the findings related to the role of Artificial Intelligence in classroom teaching in higher education. Based on the analysis of existing research studies and educational technologies, several important applications, advantages, and challenges of AI in classroom environments have been identified. These findings highlight how AI technologies can enhance teaching efficiency, support personalized learning, and improve student engagement.

A. Artificial Intelligence in Education

Artificial Intelligence refers to computer systems that can simulate human intelligence such as learning, reasoning, and decision-making. In higher education, AI technologies are used to support teaching activities, analyse student performance, and improve learning outcomes. AI-based systems can process large volumes of educational data and provide insights that help teachers understand student learning behaviour.

Technologies such as machine learning, natural language processing, and learning analytics enable educational institutions to develop intelligent systems that assist both teachers and students. These systems help in monitoring academic progress, identifying learning gaps, and providing personalized learning support.

B. Applications of AI in Classroom Teaching

Artificial Intelligence has several practical applications in classroom teaching that enhance both instructional efficiency and student engagement. Some important applications include:

- Personalized learning systems
- Intelligent tutoring systems
- Automated assessment and feedback
- AI-based chatbots and virtual assistants
- Smart digital content and simulations
- AI-based classroom management systems
- Learning analytics for student performance monitoring

The major applications of Artificial Intelligence in classroom teaching are illustrated in Figure 1.

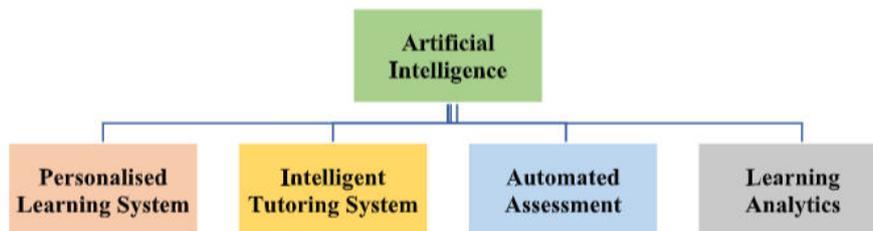


Figure 1: Major Applications of Artificial Intelligence in Classroom Teaching

Figure 1 illustrates the major applications of Artificial Intelligence in classroom teaching. AI technologies support personalized learning systems that adapt educational content according to individual student needs and learning pace. Intelligent tutoring systems provide academic assistance and guidance to students by offering explanations and answering questions. Automated assessment tools help teachers evaluate assignments and tests efficiently while providing immediate feedback to students. Additionally, learning analytics systems analyse student performance data to identify learning patterns and support data-driven teaching strategies. These applications help improve teaching efficiency, student engagement, and overall learning outcomes in higher education institutions.

The role of Artificial Intelligence in improving teaching and learning processes in higher education can be conceptually illustrated as shown in Figure 2.



Figure 2: Cycle of Artificial Intelligence-driven improvement in classroom teaching.

The cycle of Artificial Intelligence-driven improvement in classroom teaching illustrates how AI technologies continuously enhance the teaching-learning process. Artificial Intelligence tools analyse educational data and support personalized learning by adapting instructional content according to students' needs and learning pace. Through learning analytics, AI systems evaluate student performance and identify strengths and weaknesses in the learning process. Based on this analysis, teachers can modify their teaching strategies and provide targeted academic support. This continuous cycle ultimately leads to improved learning outcomes and a more effective classroom teaching environment in higher education institutions. This AI-driven cycle supports continuous improvement in both teaching strategies and student learning outcomes in higher education institutions.

C. Advantages and Challenges of Artificial Intelligence in Classroom Teaching

Artificial Intelligence offers several advantages that enhance the teaching-learning process in higher education. At the same time, the adoption of AI technologies also presents certain challenges that educational institutions must address for effective implementation. The major advantages and challenges of Artificial Intelligence in classroom teaching are summarized in table 1.

Table 1: Advantages and Challenges of Artificial Intelligence in Classroom Teaching

Advantages of AI	Challenges of AI
Personalized learning	Lack of infrastructure
Immediate feedback	Need for faculty training
Reduced administrative workload	Overdependence on technology
Improved student engagement	Reduced human interaction
Efficient classroom management	Privacy and data security issues
Data-driven teaching	High implementation cost

VII. FUTURE SCOPE OF AI IN CLASSROOM TEACHING

Artificial Intelligence has significant future potential in higher education. Emerging technologies such as learning analytics, intelligent recommendation systems, and virtual learning environments can further enhance personalized learning and student engagement. In the future, AI may also be integrated with technologies such as virtual reality and augmented reality to create immersive learning experiences. With proper infrastructure, training, and ethical guidelines, AI technologies can play an important role in transforming modern classroom teaching.

VIII. CONCLUSION

Artificial Intelligence is emerging as a transformative technology in higher education, significantly influencing classroom teaching and learning practices. AI-based tools and systems support educators in lesson planning, student assessment, and learning analytics while providing students with personalized learning experiences and immediate feedback. The integration of AI technologies such as intelligent tutoring systems, automated assessment tools, and learning analytics enhances teaching efficiency and promotes student engagement. However, successful implementation of AI in education requires adequate technological infrastructure, proper training for educators, and careful consideration of ethical and privacy concerns. Therefore, a balanced approach that combines Artificial Intelligence with traditional teaching methods can help improve the overall quality of higher education and create more effective and adaptive learning environments for students.

REFERENCES

- [1] Kalokhe Anil Sopan, Kumbhar Vijaykumar Sambhajirao, "A Comprehensive Evolution and Impact of the Indian Education System: From Ancient Wisdom to Modern Innovation," *Journal of Non Linear Analysis and Optimization: Theory and Applications*, Vol -16, Issue-1, pp.144-151, 2025.
- [2] Adesh Kumar Pandey, Surendra Kumar Maurya, "Transforming Higher Education: The Role of Artificial Intelligence in Enhancing Learning and Teaching process," *Journal of Research in Business and Management*, Vol -13, Issue-5, pp.99-103, May 2025.
- [3] Kalokhe Anil Sopan, Kumbhar Vijaykumar Sambhajirao, "Comparative Analysis of the Evolution and Integration of Traditional and Modern Education Systems in India," *International Journal of Advanced Research in Science, Communication and Technology*, Vol -5, Issue-2, pp.47-52, May 2025.
- [4] Dr.Saroj Kumari, Chesta Kalra, "The Role Artificial Intelligence in Higher Education," *International Journal for Multidisciplinary Research*, Vol -7, Issue-2, pp.1-7, March –April 2025.
- [5] Kalokhe Anil Sopan, Kumbhar Vijaykumar Sambhajirao, "Intelligent Course Recommendation for Students using Machine Learning Models," *International Journal of All Research Education and Scientific Methods*, Vol -12, Issue-12, pp.2397-2402, December 2024.
- [6] Filomachi Spathopoulou, Konstantinos M. Pitychoutis, Stavros Papakonstantinidis, "AI and higher education: Understanding faculty roles in teaching, research, and administration," *Contemporary Educational Technology*, 17(4), 2025, <https://doi.org/10.30935/cedtech/17406>.
- [7] Kalokhe Anil Sopan, Kumbhar Vijaykumar Sambhajirao, "A Personalized Course Recommendation System for Students Using Machine Learning Techniques," *Journal of Technology*, Vol -12, Issue-12, pp.903-912, 2024.
- [8]. Kalokhe Anil Sopan, Kharade Vaishnavi Santosh, Shinde Gauri Krushnath, Kumbhar Vijaykumar Sambhajirao, "Enhancing Student Performance Prediction and Course Recommendation Using Machine Learning," *International Journal of Advance and Applied Research*, Vol -6, Issue-22, pp.183-190, April- May 2025.
- [9] Dr. P.Venkateshwarlu, Dr.Ravikumar Thallapalli, "Artificial Intelligence in Higher Education: Transforming Learning and Teaching Paradigms," *International Journal of Multidisciplinary and Current Educational Research*, Vol -7, Issue-1, pp.281-293, 2025.
- [10]: Dr. Yashpal D. Netragaonkar, "Role of Artificial Intelligence (Ai) In Higher Education," *IJFANS International Journal of Food and Nutritional Sciences*, Vol -11, Issue-10, pp.1-7, December 2022.
- [11] Neha Saini, "Research Paper On Artificial Intelligence & Its Applications," *International Journal for Research Trends and Innovation*, Vol -8, Issue-4, pp.356-360, 2023



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details