IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS (IJRAR) | IJRAR.ORG

An International Open Access, Peer-reviewed, Refereed Journal

The Role Of Artificial Intelligence (AI) In Teacher Education: Opportunities & Challenges

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Abstract

Artificial Intelligence (AI) is changing the way we interact with technology and the way we live our lives. It has the potential to revolutionize the field of education, especially teacher education. This research paper aims to investigate the role of AI in teacher education, including its potential benefits, drawbacks, and challenges. The paper explores how AI can improve the quality of teacher education, enhance teachers' skills, and facilitate personalized learning. The research also highlights the ethical, social, and cultural implications of AI in teacher education. The paper concludes that AI has the potential to transform teacher education, but it requires careful implementation and ethical considerations.

Keywords: Teacher education, Artificial Intelligence

Introduction

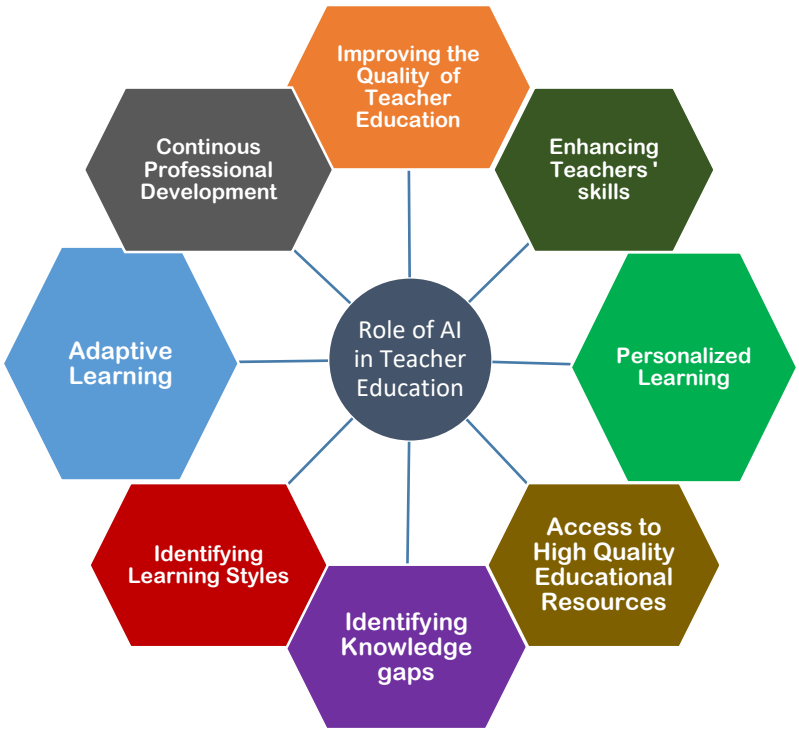
Artificial Intelligence can be defined as machines that can perform the tasks that humans carry out through their thinking.(Dörfler, 2022) The usage of Artificial intelligence is growing at an unprecedented rate & it is rapidly changing the aspects of human life. (Xue & Wang, 2022a) In recent years the use of Artificial Intelligence (AI) & Learning Analytics (LA) have effectively been introduced in the field of education. (Salas-Pilco et al., 2022) Education includes many aspects of teaching & learning and it involves both school education and higher education. Teacher education is an integral part of our education system as it serves as a mean of shaping the future. There is a close positive correlation between the college teachers and higher education. (Deng et al., 2022) The National Council for Teacher Education (NCTE) has defined Teacher Education as a programme of education, research & training of persons to teach students of pre-primary to higher education. The ultimate aim of teacher education is to develop skills and competencies in the prospective teachers so that it enables them to meet the requirements of teaching profession and prepare them to meet future needs.(Lal & Jamal, 2021) It is important to understand that Artificial Intelligence can support teachers, through the provision of educational applications, in the same way as these technologies are reshaping other fields.(Salas-Pilco et al., 2022). "The main purpose of developing artificial intelligence is to make computer combined with mechanical equipment competent for some complex work which usually needs human intelligence and greatly reduce the burden of human beings".(Xue & Wang, 2022b)

"The current paper begins with the exploration of artificial intelligence, this paper then talks about the development process of AI in teacher education, discusses the current educational methods and the theory of teacher development stage of higher education, it mainly analyzes the problems existing in the current situation of higher education, finds out the reasonable solutions and the balance basis point in line with the characteristics of artificial intelligence, and organically combines the two."

Artificial Intelligence (AI)

The term Artificial Intelligence was first coined and used by John McCarthy in the year 1956 during a two month long workshop held at Dartmouth College, US. (Zawacki-Richter et al., 2019) But even before this, evidences suggests that artificial intelligence had been talked about. M.A. Turing in his paper Computing Machinery & Intelligence (1950) wrote, "We may hope that machines will eventually compete with men in all purely intellectual fields".(Turing.Pdf, n.d.) His predictions seems correct as we come across ChatGPT in the year 2022. Artificial Intelligence is also called as the machine intelligence. A machine (computer system) mimics the human intelligence. Knowingly or unknowingly artificial intelligence has become an integral part of our lives.(Arya & Yadav, 2021) It is widely being used during online shopping, browsing internet, travelling using GPS. Efforts are continuously being made by academicians to integrate AI in education for carrying out task automation, personalized learning, providing universal access, smart content creation, teaching the teacher, identifying classroom weakness, 24/7 assistance.(Top 7 Ways Artificial Intelligence Is Used in Education, n.d.) The integration of AI in education has the potential to transform the way teachers are trained and to enhance the quality of teacher education. India has been at the forefront of the adoption of AI in education but we need to identify the challenges and opportunities it presents. The rate of adoption of AI in education is comparatively low as compared to other fields, such as medicine, industry, and finance. The present study provides some evidence-based educational innovations through the application of AI in teacher education. These applications have several purposes—for example, to visualize pre- and in-service teachers' behaviors and interactions, to assess their video-based oral presentations through automatic scoring, to introduce AI literacy to in-service teachers, etc.

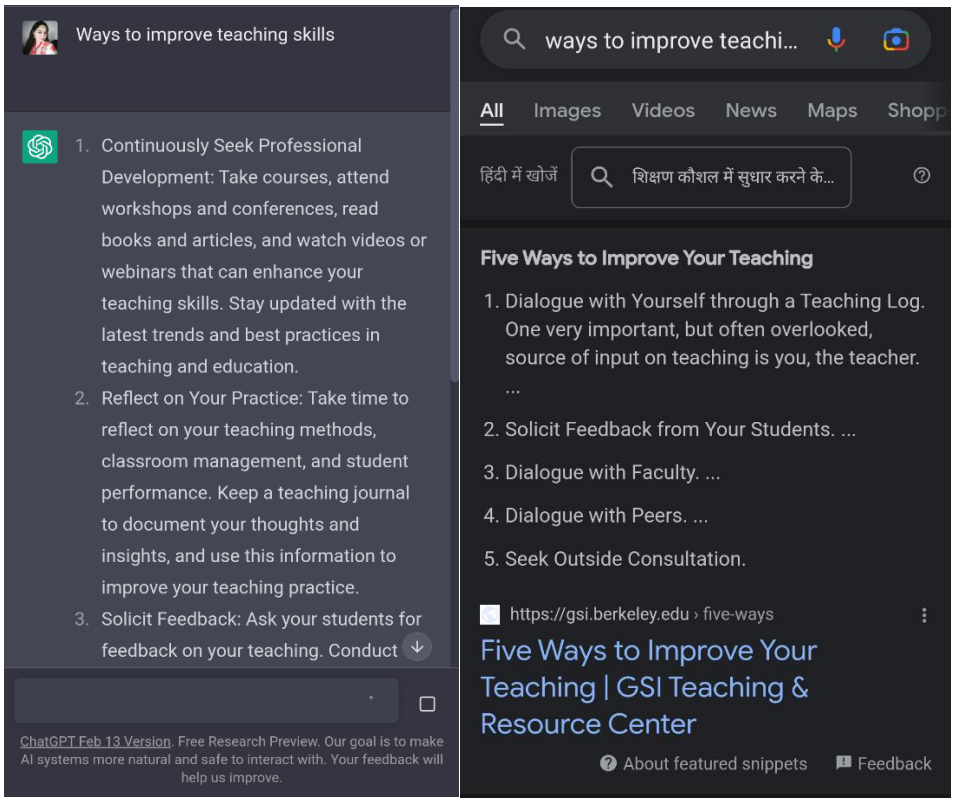
The Role of Artificial Intelligence in Teacher Education:



Improving the Quality of Teacher Education

AI can play a crucial role in improving the quality of teacher education. Artificial intelligence is becoming an integral part of smart ICT based apps targeted for digital learning in India.(Importance of AI in Improving the Quality of Education in India - India Today, n.d.). One of the significant challenges in teacher education is ensuring that teachers have a strong foundation in the subject matter they teach. AI can provide teachers with access to high-quality educational resources and learning materials that are tailored to their individual needs. AI can also help teachers identify knowledge gaps and provide feedback on areas where they need improvement. Teachers can seek

the help of AI to improve their teaching skills. Below is a comparison between the search result for the statement "ways to improve teaching skills" on both Google and open AI ChatGPT.



Enhancing Teachers' Skills

AI can also enhance teachers' skills by providing them with access to a range of tools and resources that can help them become better educators. For example, AI-powered assessment tools can provide teachers with real-time feedback on student performance, enabling them to adjust their teaching strategies to better meet the needs of their students. AI can also help teachers to personalize learning, creating lessons that are tailored to the individual needs of their students. Educational Institutions like the Kendriya Vidyalayas that follow CBSE syllabus have already introduced AI to their students. Humanoid robots are assisting teachers in the classrooms at Indus International School, Hyderabad.(Nataraj, 2022) Many schools that follow IB curriculum have already taken the initiative and introduced AI as a part of the newly introduced robotics subject.

Facilitating Personalized Learning

AI can facilitate personalized learning by providing teachers with access to a range of tools and resources that can help them create personalized learning experiences for their students.AI has the potential to enrich student's experience (Qadir, 2022). For example, AI can help teachers to identify students' learning styles, interests, and abilities and use this information to develop lessons that are tailored to each student's individual needs. AI can also help teachers to track students' progress and adjust their teaching strategies accordingly. "A personalized learning environment can analyze student performance data in real time and automatically provide customized content, learning parameters and feedback. It also allows teachers to better understand student performance and as a result, teachers can design effective learning plans for their students". (Wadhwa, n.d.).

Access to High-Quality Educational Resources

One of the most significant challenges in teacher education is ensuring that teachers have a strong foundation in the subject matter they teach. AI can provide teachers with access to high-quality educational resources and learning materials that are tailored to their individual needs. For example, the Global Teaching Insights Report found that many teachers in developing countries face significant barriers in accessing high-quality educational resources. But post pandemic the scenario is rapidly changing. The 'ICUBE 2020' report by IAMAI and Kantar indicates that the usage of internet which is pre requisite of adopting artificial intelligence continues to grow in India. It is stated that the number of active internet users are expected to grow and reach 900+ Million by 2025.(KANTAR_ICUBE_2020_Report_C1.Pdf, n.d.). AI can help bridge the gap by providing teachers with access to a range of educational resources, such as online lectures, educational videos, and e-books.

Identifying Knowledge Gaps

AI can also help identify knowledge gaps and provide feedback on areas where teachers need improvement. By analyzing teacher performance data, AI systems can identify areas where teachers may need further development or support. This information can then be used to create targeted professional development programs that help address those gaps.

Identifying Learning Styles

One of the critical aspects of teacher education is to develop teachers' skills in identifying and catering to various learning styles of their students. AI can help teachers to identify students' learning styles and provide recommendations for adapting teaching methods. For example, an AI system can analyze data on how a student interacts with an online learning system to infer their learning style and recommend instructional strategies that cater to that style.

Adaptive Learning

AI systems can provide adaptive learning experiences that cater to the needs of individual learners. Adaptive learning is a teaching method that uses AI algorithms to adjust the difficulty and complexity of the learning content to match the individual's learning pace and ability. By using AI to personalize learning, teachers can help students develop more significant mastery over the subject matter and improve their learning outcomes.

Continuous Professional Development

National Educational Policy 2020 has emphasized on the professional development of teachers. AI can provide opportunities for continuous professional development for teachers in many ways. For example, AI systems can provide feedback on teacher performance, highlighting areas where they may need further development. Additionally, AI systems can provide recommendations for professional development opportunities that are tailored to the specific needs of individual teachers.

Challenges and Drawbacks:

Ethical and Social Implications:

The integration of AI in teacher education raises significant ethical and social implications. For example, there are concerns about the potential bias in AI algorithms, which may perpetuate social inequalities. There are also concerns about data privacy and security, as AI systems collect large amounts of data about students and teachers. Humanities department judge their students based on their essays. Doctorates are awarded on the basis of composition of thesis. There are concerns that if the process of writing essays gets automated then what would be the consequences with respect to originality and ethical values? (Thurzo et al., 2023) It is argued by several researchers that generative AI will raise ethical concerns as students might use AI in an appropriate manner to secure marks.(Qadir, 2022)

Technical Challenges:

There are also technical challenges associated with the implementation of AI in teacher education. For example, AI systems require significant computational resources, which may not be available in all educational settings. There are also challenges associated with the design and development of AI systems, including ensuring their accuracy, reliability, and validity.

Cultural Challenges:

AI may also face cultural challenges in teacher education. For example, there may be resistance to the use of AI in education from some teachers and educators, who may feel that it threatens their professional autonomy.AI technologies interact with globally diverse societies and cultures, with different values and interpretive practices, this results in cultural incongruences. This issue needs to be addressed. (Prabhakaran et al., n.d.)

Combating Plagiarism in Research

The open AI Chabot sources like the ChatGPT help in text generation but without any proper citation, if a researcher passes a text generated by AI without proper citing the source or without the consent of the copyright holder then this might lead him/her in legal dispute.(Thurzo et al., 2023)

Findings ways towards appropriate and ethical use of Artificial Intelligence in Education

Respect for privacy

Attempt should be made to safeguard the personal data of the users, especially students. Educators should make students aware of the fact that the data their personal data are being collected as per their consent. The objective of using AI in education is to focus on learning outcomes and for learning, trust is an essential component. The data provided by the users/students shouldn't be mishandled in any way.(Mhlanga, 2023)

Fair evaluation or biased evaluation?

There is a possibility that AI can exhibit biases, particularly in the language that it was trained on. Educators should pay attention on any biases while using AI as an evaluation tool. If AI is used to evaluate and assign grades to essays written by underrepresented group and the results are biased, it would result in accelerating the marginalization of the already marginalized group.(Mhlanga, 2023) "There are many stages of the deep-learning process that bias can slip through and currently, our standard design procedures simply aren't aptly equipped to identify them".(6 Biggest Limitations of Artificial Intelligence Technology | HackerNoon, n.d.)

AI can never replace classroom teachers

People have been interacting with AI since years, teachers need to use AI for executing their pedagogical processes and objectives. AI can assist teacher but would not replace them. The teacher should act as a facilitator and mediator in the adoption of AI in order to enhance their pedagogical practices. (Queiroz et al., 2022) Although bold statements like, "Robots will replace teacher by 2027" has been made by British Education expert Anthony Seldon. "But the act of teaching is complex and, while technology will inevitably influence the judgment and practice of teachers, it is not possible to reduce that complexity to a set of algorithms". (Batchelor & Petersen, 2019) Creativity, inventions and originality can be brought in the classroom by a teacher through his/her rich experience. AI is run by preprogrammed algorithms, it lacks the talent, experience originality and critical perspective of a teacher. (Mhlanga, 2023)

Accuracy of Information

An incorrect piece of information can feed wrong knowledge related to history, geography, mathematics or science into the minds of the learners can lead to misunderstanding and misconception. (Mhlanga, 2023) "Accurate information is crucial to nearly every professional and academic discipline because facts are the only way humans can ascertain truth"(Why Is Accurate Information Important?, n.d.). Emphasis has been laid upon gathering of accurate information ever since ICT has been adopted in various fields. "The knowledge economy is extraordinarily hungry for information. According to a report published by the American Marketing Association $5.5 Billion was spent by U.S. corporations on market research in 2001.(Sutcliffe & Weber, 2003) It is important to ascertain that the information/knowledge received with the usage of AI is accurate in all respect.

Need to learn about the limitations of AI

AI doesn't display any ethics or creativity as compared to human intelligence. It is true that computers work efficiently but the lack emotions which is essential for effective team work. (Top Advantages and Disadvantages of Artificial Intelligence [2023 Edition], 2021). "Even though technological advancements have been rapidly extending in recent years, there are still some hardware limitations like limited computation resources (for RAM and GPU cycles) that can serve as a limitation on the usage of AI. (6 Biggest Limitations of Artificial Intelligence Technology | HackerNoon, n.d.) The popular AI chatbot chatGPT itself states that it comes with limitations such as, may generate incorrect information, it may produce harmful instructions or biased content and it has limited knowledge of world and events after 2021.

Conclusion

The potential of AI in teacher education is significant, but its implementation requires careful consideration of ethical, social, technical, and cultural factors. While AI has the potential to improve the quality of teacher education, enhance teachers' skills, and facilitate personalized learning, it also raises concerns about data privacy, bias, and cultural acceptability. To ensure that AI is used to its fullest potential in teacher education, it is essential to develop a comprehensive framework that ensures its proper usage. Artificial intelligence (AI) has been increasingly used in various fields to improve efficiency and effectiveness, and education is no exception. The use of AI in education, specifically in teacher education, has the potential to revolutionize the way educators are trained and improve the quality of education in general. AI systems can provide personalized and adaptive learning experiences that cater to the individual needs of learners, enhancing the effectiveness of teaching methods. This paper has aimed to examine the role of AI in teacher education, its potential benefits, drawbacks, and challenges. Additionally, this research paper investigates the ethical, social, and cultural implications and limitations of AI in teacher education.

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