The Role of Artificial Intelligence in Teacher Education

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Abstract

The way we use technology and conduct our daily lives is being altered by artificial intelligence (AI). It has the capacity to completely transform education, particularly teacher education. The purpose of this study article is to examine the possible advantages, disadvantages, and difficulties using artificial intelligence in teacher education. The study investigates how AI may help instructors become more skilled, allow individualised learning, and raise the standard of teacher education. The study also emphasises how AI in teacher education has ethical, social, and cultural ramifications. The study comes to the conclusion that although AI has the potential to revolutionise teacher education, its application needs to be done carefully and ethically.

Keywords: Artificial Intteligence, Teacher Education, Personalized Learning, EdTech, Digital Classrooms, Adaptive Learning, Professional Development, AI Ethics in Education.

Introduction

One definition of artificial intelligence is the ability of machines to carry out human-like tasks using their cognitive abilities (Dörfler 2022). Artificial intelligence is being used at a never-before-seen rate and is drastically altering many facets of human existence (Xue and Wang, 2022). The application of artificial intelligence (AI) and in the sphere of education, learning analytics, or LA, have been introduced successfully. In 2022, Salas-Pilco et al. Education encompasses both higher education and classroom education, and it covers many facets of teaching and learning. Since teacher education is a tool for influencing the future, it is an essential component of our educational system. Higher education and college instructors have a strong beneficial association (Deng and others, 2022).

Teacher education is a program of instruction, research, and training for individuals to instruct children in pre-primary through higher education, according to the National Council for Teacher Education (NCTE). The ultimate goal of training teachers is to cultivate the abilities and capacities of aspiring educators to help them fulfil the demands of the teaching profession and get ready for new demands (Jamal & Lal, 2021). It's critical to realise that, just as these technologies are revolutionising other sectors, artificial intelligence may assist educators by offering educational applications. (2022, Salas-Pilco et al.) "The primary goal of artificial intelligence development is to significantly lessen the burden on humans by making computers and mechanical devices capable of performing complex tasks that typically require human intelligence"(Xue and Wang, 2022b).

The present study starts with an examination of artificial intelligence, then moves on to discuss the evolution of AI in teacher education, current teaching practices, and the theory of the teacher development stage of higher education. It primarily examines the issues facing higher education today, identifies workable solutions and a balance point that aligns with AI's characteristics, and then naturally blends the two.

Artificial Intelligence (AI)

John McCarthy originally used the term "artificial intelligence" in a two-month workshop at Dartmouth College in the United States in 1956 (2019, Zawaki-Richter et al.). However, there is evidence that artificial intelligence had been discussed earlier. "We may hope that machines will eventually compete with men in all purely intellectual fields," wrote M.A. Turing in his 1950 study Computing Machinery & Intelligence. (Turing. Pdf, undated) His forecasts appear to be accurate as ChatGPT is introduced in 2022. Machine intelligence is another name for artificial intelligence. A computer system or machine imitates human intelligence. Academicians are always working to incorporate AI into education in order to automate tasks, provide personalised learning, provide universal access, create intelligent content, train teachers, uncover classroom weaknesses, and offer round-the-clock support. (Top) Seven Applications of Artificial Intelligence in Education, n.d. AI integration in education has the potential to improve teacher education standards and change the way teachers are taught. India has led the way in implementing AI in education, but we still need to recognise the

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opportunities and problems it poses. Compared to other industries like healthcare, business, and finance, the adoption rate of AI in education is quite low. Through the use of AI, the current study offers several evidence-based instructional advances in education of teachers. These applications serve a number of functions, such as visualising the interactions and behaviours of pre- and in-service teachers, automatically assessing their oral presentations that are based on videos, educating in-service teachers about artificial intelligence, etc.

The Role of AI in Teacher Education

Artificial Intelligence (AI) is revolutionizing teacher education by offering innovative tools and methodologies that enhance instructional practices, personalize learning experiences, and streamline administrative tasks. The integration of AI in teacher education encompasses various dimensions, from improving classroom management to fostering inclusive learning environments.

- **Enhancing Teaching Support**

AI-powered tools assist educators in managing classrooms more effectively by providing real-time feedback and analytics. For instance, AI systems can monitor classroom interactions, assess student engagement, and suggest strategies to improve teaching methods.

- **Classroom Management**

A study highlighted that AI applications can support teachers in classroom management by offering insights into student behaviour and engagement levels, thereby enhancing the overall learning environment. Moreover, AI-driven platforms can automate routine administrative tasks such as attendance tracking, grading, and scheduling, allowing teachers to focus more on instructional delivery and student interaction. This automation not only reduces the workload on educators but also increases efficiency and accuracy in administrative processes.

- **Creating Inclusive Environment**

AI technologies play a pivotal role in promoting inclusivity within educational settings. By analysing diverse learning styles and needs, AI can help design personalized learning plans that accommodate students with varying abilities. For example, AI can assist in developing adaptive learning materials that cater to students with disabilities, ensuring they receive equitable educational opportunities.

- **Accessible Learning Environments**

Furthermore, AI can facilitate language translation and speech recognition services, breaking down language barriers and supporting multilingual classrooms. This capability ensures that non-native speakers and students with speech impairments can actively participate in classroom activities, thereby fostering a more inclusive learning environment.

- **Enhancing Digital Literacy**

Integrating AI into teacher education programs enhances educators' digital literacy and equips them with essential 21st-century skills. Through AI-driven professional development courses, teachers can learn to incorporate technology into their teaching practices effectively. For instance, OpenAI, in collaboration with Common Sense Media, launched a free AI training course for teachers to better understand artificial intelligence and prompt engineering, aiming to promote the positive role of AI in education.

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- **Professional Development**

Additionally, universities are adapting their AI programs to educate a wider range of students, including those from non-engineering backgrounds. Carnegie Mellon University, for example, emphasizes generative AI and machine learning in its curriculum, making AI education more accessible to a broader audience.

- **Personalizing Teaching Methods**

AI enables the personalization of teaching methods by analysing student data to identify learning preferences and challenges. This analysis allows educators to tailor their instructional strategies to meet individual student needs, thereby enhancing learning outcomes. For example, AI can provide insights into students' problem-solving abilities and strategies, allowing teachers to refine their professional vision and instructional approaches.

- **Enhancing Teacher-Student Relationships**

Moreover, AI can strengthen teacher-student relationships by facilitating more meaningful interactions. By automating routine tasks, teachers have more time to engage with students on a personal level, addressing their individual concerns and providing targeted support. This increased interaction fosters a supportive learning environment and contributes to student success.

Challenges and Drawbacks

Ethical and Social Implications:

There are important social and ethical questions raised by the use of AI in teacher education. For instance, there are worries that AI algorithms might be biassed, which could support societal injustices. Because AI systems gather a lot of information on teachers and pupils, there are also worries over data security and privacy. Humanities students' essays are used by the department to evaluate them. Doctorates are granted based on the quality of the thesis. There are questions about the potential effects on creativity and moral principles if essay writing were to become automated (Thurzo and others, 2023). Many researchers contend that generative AI would give rise to ethical issues since students may utilise AI appropriately to earn grades (Qadir 2022).

Technical Challenges:

The application of AI in teacher education is not without its technological difficulties. AI systems, for instance, need a lot of processing power, which not all educational environments have. The design and development of AI systems also presents certain difficulties, such as guaranteeing their accuracy, legitimacy as well as dependability.

Cultural Challenges:

AI may encounter cultural obstacles in teacher preparation as well. For instance, some educators and teachers may be opposed to the use of AI in the classroom because they believe it jeopardises their professional independence. Globally diverse communities and cultures, with varying values and interpretation methods, engage with AI technologies. Cultural incongruences are the result. This is a problem that must be solved (Prabhakaran and colleagues, n.d).

Combating Plagiarism in Research

Open AI Chabot resources, such as ChatGPT, assist in text generation but lack correct citation. If a researcher distributes an AI-generated text without properly acknowledging the source or obtaining the copyright holder's authorisation, this might land them in legal hot water (Thurzo and others, 2023).

Findings ways to use of Artificial Intelligence in Education

Respect for Privacy:

An effort should be made to protect users' personal information, particularly that of students. Teachers should inform pupils that their personal information is being gathered with their permission. Focussing on learning outcomes is the aim of implementing AI in education, and trust is a crucial element of learning. The information supplied by users or students shouldn't be handled improperly in any manner (Mhlanga, 2023).

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Fair evaluation or biased evaluation

It is possible for AI to have biases, especially in the language it was trained on. When employing AI as an assessment tool, educators should be aware of any biases. The marginalisation of under-represented groups would accelerate if AI were to be employed to assess and grade essays produced by them and the results were biassed. the group that is already marginalised (Mhlanga, 2023). "Bias can infiltrate many stages of the deep learning process, and our standard design procedures are currently ill-equipped to detect them."(6 Hacker Noon, n.d.) The Greatest Drawbacks of Artificial Intelligence Technology.

AI can never replace classroom teachers

Teachers must employ AI to carry out their pedagogical processes and goals, as people have been interacting with it for years. While AI can help teachers, it cannot take their place. To improve their instructional practices, teachers should take on the role of mediator and facilitator in the adoption of AI (Queiroz and others, 2022). Despite the fact that bold claims For instance, British education specialist Anthony Seldon has stated that "teachers will be replaced by robots by 2027." "However, teaching is a complex act, and although technology will unavoidably affect teachers' judgement and methods, that complexity cannot be reduced to a collection of algorithms." (2019, Batchelor and Petersen) Inventions and inventiveness and a teacher's wealth of experience can help them bring creativity and innovation to the classroom. AI is controlled by preprogrammed algorithms and lacks a teacher's skill, creativity, and critical viewpoint (Mhlanga,2023).

Accuracy of Information

Students may develop misunderstandings and misconceptions as a result of receiving inaccurate information that feeds them false knowledge about science, arithmetic, geography, or history (Mhlanga, 2023). "Almost all academic and professional fields depend on accurate information because facts are the only way people are capable of determining the truth (Why Is Accurate Information Important? n.d.). Since ICT has been used in many fields, there has been a focus on obtaining correct information. The need for information in the knowledge economy is extremely high. A study released by the American Marketing Association stated that $5.5 billion was spent in 2001 on market research by American companies. (2003, Sutcliffe and Weber) Verifying that the data or knowledge obtained through the use of AI is accurate in every way is crucial.

Need to learn about the limitations of AI

Compared to human intellect, AI lacks ethics and creativity. Computers are efficient, it's true, but they lack the human element needed for productive teamwork. (Artificial Intelligence: Top Benefits and Drawbacks [2023 Edition], 2021). "Despite the fact that technology developments have been expanding quickly, the use of AI may be constrained in recent years by certain hardware constraints, such as constrained processing resources (for RAM and GPU cycles). According to the well-known AI chatbot chat GPT, it has drawbacks, including the potential to create inaccurate information, dangerous instructions, or biassed content, as well as a limited understanding of the world and events that have occurred since 2021.

Conclusion

Although AI has a lot of potential for teacher education, its application necessitates careful consideration of social, technical, ethical, and cultural aspects. While AI has the ability to boost teacher preparation programs, improve instructors' abilities, and enable individualised learning, it also brings up issues with bias, data privacy, and acceptability in culture. The creation of a thorough framework that guarantees AI's appropriate use is crucial to ensuring that it is utilised to its maximum potential in teacher education. Education is not an exception to the growing usage of artificial intelligence (AI) in many domains to increase efficacy and efficiency. AI in education, particularly in teacher education, has the ability to completely transform teacher preparation programs and enhance the overall quality of education. AI systems can offer tailored and flexible learning experiences that meet each student's unique needs, increasing the efficacy of instructional strategies. Examining AI's possible advantages, disadvantages, and

difficulties in teacher education is the goal of this article. This study also looks into the limitations and ethical, social, and cultural ramifications of AI in teacher preparation.

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