ARTIFICIAL INTELLIGENCE AND TEACHER EDUCATION FOR FUTURE CLASSROOM: THE ERA OF AI

Hanin Badsah
Junior Research Fellow, Department of Education, Aliah University, Kolkata, Email: haninbadsah28@gmail.com

ABSTRACT

Many studies and global reports show that artificial intelligence is increasingly recognized as a key part of educational technology in classrooms and teacher training. Although it has been evolving day by day, teachers still face challenges in understanding how to effectively integrate it into broader pedagogical practices and realize its potential impact on teaching and learning. Through a systematic review, the investigator wants to provide an extensive summary of the literature on the application of AI in teacher preparation for the future classroom. Out of the 50 publications initially identified from 2010 to August 2024, among of these 20 publications met the specific inclusion and exclusion criteria which were selected for final analysis. The investigation's outcomes focus on the transformative possibilities of 'AI in teacher education', accenting the need for adequate training, ethical considerations, and ensuring equitable access to AI-powered tools. The investigator also stressed the importance of encouraging prospective teachers to effectively incorporate AI into their teaching methods while maintaining a focus on human-centered education. The investigator concludes that the 'Integration of AI' into teacher education and future classrooms is creating a more personalized, efficient and engaging informative experience for both teachers and students. By supporting teachers in professional development and automating tasks, AI is freeing up time for creative and impactful teaching. In the classroom, AI fosters an environment where learning is adaptive, interactive and inclusive which helping to prepare students for a rapidly evolving world. As AI continues to advance, its role in education will grow, creating new and efficient learning systems.

Keywords: Artificial Intelligence (AI)*,* Teacher Education,Teaching- Learning, Technologies, Teacher of The Future*.*

INTRODUCTION

Artificial intelligence (AI) is composed of two elements one is "Intelligence" which refers to the ability to understand something and another is "Artificial" which denotes something that is man-made or not naturally occurring. AI can be described as a scientific discipline that involves the development and engineering of systems known as intelligent devices and software. These systems are designed to create autonomous machines capable of executing complicated tasks by employing reflexive processes similar to human thinking (Habib & Bilal, 2019). The quick development of 'artificial intelligence' has led to its adoption in various sectors of the society including education. The application of 'AI in classroom' has the potential to revolutionise education by providing individualised learning opportunities, optimising the grading and evaluation procedures and increasing student involvement. AI could significantly influence education, reshaping how teachers instruct and students learn (Iku-Silan et al., 2023). AI has the capacity to assist teachers in customising their teaching to each learner's needs and in providing instant feedback to enhance the quality of learning (Runge et al., 2023). Additionally, AI can do a lot of administrative work automation, allowing teachers to dedicate more time to providing top-notch instruction. It might also address issues with education, like the need for lifelong learning and the rise in the need for workers to reskill and upskill (Chiu et al., 2023). Furthermore, Artificial Intelligence possesses the capability to improve accessibility to education and

allow for more personalised educational experiences (Lee & Yeo, 2022).
It is critical that teachers recognise the importance of AI technology and welcome its potential advantages as it develops and becomes more broadly available. AI's revolutionary potential which includes the ability to automate administrative duties, improve feedback systems and provide individualised instruction highlights the need for teachers to adjust and take advantage of these prospects. The researcher attempts to explore the usefulness of 'artificial intelligence (AI)' in education and looks into ways to train teachers to use AI in the classroom.

RELATED WORKS

Artificial intelligence (AI) and Teacher Education

In the present days integration of ICT and 'artificial intelligence' in modern teacher education programme has been clearly increased. By supporting individualised learning experiences, advancing grading and evaluation, and raising student engagement, the possibility of 'artificial intelligence' can be completely changing the education. Consequently, there is an increasing focus on offering prospective teachers with the abilities and information required to successfully integrate 'artificial intelligence' into their teaching strategies (Ismail et al., 2024). Lee & Yeo (2022) found that AI integration in teacher education helps to improve ability of teachers' which is customise his/her lessons, make more relevant assessments and establish deeper connections with students. Mizumoto & Eguchi (2023) revealed that AI can assist teachers in identifying students who are struggling at an earlier stage, offering specific interventions and ultimately enhancing student success. Iku-Silan et al., (2023) found that Chatbots and adaptive learning platforms are examples of AI-driven solutions that can facilitate remote learning by providing students with individualised help. Lee & Yeo (2022) found that AI makes a suitable environment to gain the knowledge for example It can provide personalized support to help the students. Yang et al., (2020) revealed that Teachers with proficiency and knowledge in AI may help close the gap between the 21st century abilities that they are looking for and what is being taught in schools. An increasing number of employment opportunities in the workforce require AI expertise.

Teachers for the Future Classroom

"Teachers of the Future" refers to a new generation of instructors who has a wide range of abilities to successfully negotiate the challenges of modern education (Ismail et al., 2024). Drigas et al., (2023) investigated on "Teacher of the Future" and found that teachers of the future perform a vital role in connecting the gap between the school, parents and students. They are adept at integrating modern technologies like artificial intelligence into their lesson plans. They are crucial in helping students develop their identities in social and academic settings. Luo, (2018) revealed that future teachers can easily adopted dynamic educational environment and they are proficient to use AI based technology as well tools to help and support their students. They more proficient to use AI and others tools which can help to increase the student outcomes. UNESCO (2023) define that Future teachers must use technology to make instruction more dynamic and interesting. They must use in-the-moment learning resources to spark students' curiosity and ignite their passion for learning.

METHODS

The investigator has decided the purpose of this review, which is to address the central question: "How do we use artificial intelligence in teacher education for the future classroom?" The method used for this investigation was content analysis. A study technique that offers a methodical and impartial way to describe and evaluate an event is called content analysis (Sandelowski, 1995). This method is also recognized as a technique for analyzing documents. Content Analysis used to draw conclusions from

data that are reliable and repeatable within their context. Its goals are to reflect facts, provide new knowledge, and provide a useful action guide (Krippendorff, 1980). A survey of relevant literature was conducted, with an emphasis on academic publications and research projects pertaining to the incorporation of AI in education. Important arguments and insights that influenced the paper's viewpoint were presented in this review. Different strategies and findings were use in the results and discussion section after a review of related literature and an assessment of their viability and efficacy. The paper presents a narrative that draws on the information synthesized from the literature study to support its position on how to prepare future teachers to address the challenges and grasp on the chances that artificial intelligence brings. The paper's ideas for real implementation were based on this synthesised literature.

SEARCH STRATEGY

In the context of this comprehensive review's objectives, the first search strategy and second criteria (see Table- 1 and 2) concentrated on international journal's articles which is only published in English that addressed AI in Teacher Education and Teaching Learning process in classroom, also those types of articles give importance which was discuss about AI and school, college or university level education in globally. Two international databases Web of Science and Scopus, were searched for these publications using keywords, abstracts and titles. Although there are issues with peer review procedures in the scientific community (Smith., 2006). The review was limited due to their widespread academic credibility and stringent review procedures and the review was restricted to articles published in various journals (Nicholas et al., 2015). At first total 50 documents were found when the search was done in July 2024.

Table-1: Initial Search

Topic	Terms used during the searched process
Artificial Intelligence (AI)	*"Artificial Intelligence" / "Chat Bot" / "Automated Tutor" / "Personal Tutor" / "Intelligent Agent" / "Artificial Intelligence and Teacher Education" / "AI And Classroom" / "AI and Teaching- Learning".*
Education Level	*"Elementary School" / "Primary School" / "High School" / "Vocational Education" / "Adult Education" / "Higher Education" / "Teacher Education" / "Professional Training"*
Teacher Education	*"AI and Teacher Experience"/"AI and Teacher Knowledge and Skill"*
Teaching Learning	*"AI and Classroom" / "AI and Teaching".*

Table-2: Final selection criteria

'Inclusion Criteria'	*'Exclusion Criteria'*
Paper Published 2010 to August 2024	*Paper Published before 2010*
Paper Published in English language	*Paper Published in Others language*
Teacher Education or School/College/ University Education	*Not in Teacher Education Teacher Education or School/College/ University Education*
Empirical/Primary related study	*Not Primary (e.g., review) related study*
'Web of Science & Scopus Articles'	*'Not a journal article'*
AI uses in Teacher education/Education/Classroom	*AI not uses in Teacher education/Education/Classroom setting*

RESULTS AND DISCUSSION

Based on synthesis of finding from various study, synthesis of insights and evaluation of various studya number of approaches have been developed for educating Teachers in this AI Era. These strategies include:

AI and Teacher Education: After conducting the content analysis the investigator found some essential result which represent in the era of AI, teacher needs to develop some essentials skills of AI and gain necessary knowledge regarding various type of AI powered tools like Canva, ChatGpt, AudioPen, Assessment, Quilbolt etc. AI has the potential to significantly change preparation for teachers but there is a need for training programs to focus on developing teachers' competencies in using AI effectively in the classroom (Holmes et al., 2019). AI-powered tools can provide personalized, data-driven professional development, but successful implementation requires addressing issues of access, equity and teacher readiness (Zawacki-Richter et al., 2019). AI can assist teachers in designing lesson plans, recommending resources and even generating teaching materials aligned with curriculum goals. This simplifies the planning process and ensures that the content is customized to meet students' needs. AI in education opens up numerous possibilities. For example, an AI in education tool could automatically recommend student groupings best suited for specific collaborative activities. It could do this by intelligently connecting individual student models, which contain insights into their previous learning experiences, achievements, current learning progress, personalities and other relevant factors (Alberola et al., 2016). AI serves as a valuable assistant in enhancing teaching, not as a replacement for teachers. The misconception that AI will take over teaching roles should not overshadow the advantages it offers to teachers' instructional practices. Teachers need to have confidence in their vital role within the educational process and adapt AI tools to complement and improve their teaching strategies (Queiroz et al., 2022). The facilitator and mediator role of the teacher in integrating AI to improve pedagogical practices. It also highlights the challenge of implementing collaborative teaching methods, asserting that AI supports and complements these approaches rather than taking over the role of the instructor in the classroom (Alberola et al., 2016). AI tools for students that aim to improve learning and assessment were the first in a line of evolution for the application of AI in education. It has since expanded to include teacher-facing AI, which supports instructional practices in addition to system-facing AI meant to help

with educational institution management (Baker et al., 2019). Integrating AI content across current teacher training programs embeds AI concepts within the broader curriculum rather than isolating them as separate subjects. This method helps future teachers recognize how AI interrelates with various components of education, including curriculum development, assessment strategies and classroom management (Ismail et al., 2024). Teachers play a unique role in offering emotional and moral support while fostering critical thinking in students. At the same time, AI holds significant potential for enhancing teaching and learning processes. Promoting literacy in AI, using AI into classroom and various types of teacher education, encouraging peer learning among prospective teachers, offering ongoing professional development and fostering an optimistic outlook on AI integration are just a few of the essential strategies involved in preparing future teachers for the AI era. Teacher training institutions should prepare future teachers with a solid foundation in applying AI in their teaching practices through comprehensive education programs (Ismail et al., 2024). This study collectively highlights the transformative possibilities of 'artificial intelligence' in teacher education programme, highlighting the need for adequate training, ethical considerations and ensuring equitable access to AI-powered tools. The investigator also emphasises how crucial it is to focus on human-centered education while teaching future teachers how to effectively integrate 'artificial intelligence' into their lesson plans.

AI and Future Classroom: After synthesised of the data from the review of the relevant literature a number of techniques have been developed to help teachers get ready for the future classroom. These studies demonstrate the transformative role that technology will play in classrooms of the future by highlighting the ways in which AI may enhance and improve teaching learning process as well classroom situation. With the use of AI, intelligent systems that support student learning, offer customised feedback and help teachers monitor and evaluate student progress may be developed (Akavova et al., 2023). With the use of AI teachers can modify their pedagogy to provide better instruction by gaining insightful knowledge about students' progress through the analysis of learning data. Technologies like smart classrooms and virtual reality offer greater potential for embedding concepts in students' minds compared to traditional literary mediums. However, challenges remain in integrating AI to create smarter classrooms that enhance learning and improve student outcomes (AlFarsi et al., 2020). According to Baker and Smith (2019) There are three categories of educational AI technologies are learner-facing, teacher-facing and system-facing. Adaptive learning systems and other learner-facing technologies directly support students in acquiring new information. Teacher-facing tools reduce workload by automating tasks like grading and plagiarism detection while providing insights into student progress for more targeted support. System-facing AI tools give administrators data to monitor broader trends, like student regress. The readiness of instructors is an essential aspect in the effectiveness of 'AI in education' as their central role remains crucial (Trotsko et al., 2019). Teachers are key to preparing students for an AI-integrated future, making their willingness to embrace AI vital for successful implementation (Ayanwale et al., 2022). These studies emphasize AI's potential to change education, highlighting the importance of teacher training and addressing ethical challenges to ensure AI supports rather than replaces humans as well as teachers. After synthesized the data, this study offers a thorough analysis of AI's potential application in future classrooms going forward, focusing on its impact on teachers, teaching practices and classroom management. The study emphasises how AI has the ability to revolutionise education while emphasizing the importance of teacher training, ethical considerations and ensuring that AI complements rather than replaces the human element in teaching.

CONCLUSION

A teacher who combines pedagogical and digital skills acts as a mediator, centers the student in the learning process and employs new technologies effectively (Stathopoulou et al., 2020). This approach guides students towards self-directed learning and fosters continuous engagement. Additionally, engaging in a digital learning community can improve a teacher's ability to collaborate and

communicate with colleagues, as well as their digital proficiency. Mastery of pedagogical, scientific and digital skills also enables a teacher to transform syllabuses. Improving student education is necessary to meet the demands of the twenty-first century and exploring innovative methods to prepare them as active, critically thinking members of society. It is clear that there is a shortage of in-depth critical thought regarding the difficulties and dangers posed by AI in education. Additionally, the link to established pedagogical theories remains underdeveloped. This emphasises the need for a deeper investigation of ethical and instructional approaches when applying 'AI to education' (Zawacki-Richter et al., 2019). The integration of 'AI into teacher education programme and future classrooms is creating a more personalized, efficient and engaging educational experience for both educators and students. By supporting teachers in professional development and automating tasks, AI is freeing up time for creative and impactful teaching. In the classroom, AI fosters an environment where learning is adaptive, interactive, and inclusive, helping to prepare students for a rapidly evolving world. As AI technologies continue to develop, their role in education will expand, leading to innovative and effective learning systems.

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