International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Impact of Artificial Intelligence in Reshaping and Transforming the Teacher Education System

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Abstract:
Artificial Intelligence providing dynamic, individualized, and data-driven learning experiences, the incorporation of into teacher training programs is transforming the educational environment. The transformative potential of AI in improving pedagogical efficacy among pre-service and in-service teachers is examined in this study paper. It looks at how AI tools, like data analytics, virtual teaching assistants, adaptive learning platforms, and intelligent tutoring systems, can help with the creation of instructional strategies, classroom management techniques, and reflective teaching methods. The effectiveness of AI-powered simulations, automated feedback systems, and real-time analytics in fostering fundamental teaching competences is examined in this paper, which draws on both theoretical frameworks and recent empirical research. The study also discusses how AI might support prospective teacher candidates' personalized learning paths, allowing for more tailored and responsive professional development.
Additionally, the study investigates how AI might help to reduce the gap between theory and practice by supporting evidence-based self-evaluation and immersive micro-teaching environments. To ensure appropriate and equitable integration of AI in teacher education, important issues such as data privacy, ethical considerations, and the digital divide are thoroughly examined. The study emphasizes the necessity for prospective teachers to be digitally literate and stresses the significance of matching AI applications with educational objectives. The focus of the study how the artificial intelligence influence the teacher education system. The study ends with suggestions for institutions, educators, and legislators to support ethical, inclusive, and successful teacher training environments informed by AI.

Keywords: Artificial Intelligence, Educational Technology, Techno Pedagogical Competency, Professional Development.

Introduction:

AI provides powerful tools and structures that can substantially boost teaching effectiveness. Technolo-

gies like intelligent tutoring systems, virtual teaching assistants, adaptive learning analytics, and immediate performance feedback offer AI's potential to personalize teacher development, pinpoint teaching weaknesses, and encourage thoughtful teaching methods. Using AI, training programs can deliver evidence-based insights to help teachers refine lesson planning, classroom management, and ways to foster student involvement. , AI can create simulated classroom situations, giving aspiring teachers a safe and engaging space to practice and hone their skills. These innovations not only elevate the standard of teaching but also help connect educational theory with practical application in teacher preparation. Despite these possibilities, challenges persist regarding ethical application, data protection, and institutions' capacity to successfully implement these technologies. Considering this background, examining AI's role in teacher training is both relevant and crucial. This research intends to assess how AI-powered tools and platforms contribute to teachers' professional development and improve their teaching skills. It also aims to identify elements that affect the adoption and success of AI in various training settings. Teacher effectiveness is key to student success, and strong training programs are essential for giving educators the knowledge, skills, and confidence they need. Traditional teacher preparation, often limited by rigid curricula and few observation chances, may struggle to keep up with real classroom situations and individual teacher requirements. AI-driven systems can help by providing dynamic, data-backed insights that encourage reflection and ongoing growth. For example, natural language processing can analyze classroom conversations, and computer vision tools can track student engagement in practice teaching. This paper looks at how AI is increasingly being used to improve teaching effectiveness in teacher training programs globally. It discusses AI's ability to offer tailored professional development, automate ongoing assessments, and create engaging learning experiences through simulations and virtual reality. By reviewing current uses and highlighting challenges and opportunities, this research seeks to provide a complete picture of how AI can help train a new generation of teachers ready for tech-savvy classrooms.

Review Of Related Literature

(Dorfler, 2022) , Artificial intelligence is the ability of machines to carry out tasks that need human thought. (**Xue and Wang, 2022**), Artificial intelligence is being used at a never-before-seen rate and is drastically altering many facets of human existence Learning analytics (LA) and artificial intelligence (AI) have been successfully adopted in the sphere of education in recent years. (**Deng et al 2022)** , Education encompasses both school and higher education, and it covers many facets of teaching and learning. Since teacher education helps to shape the future, it is an essential component of our educational system. Higher education and college instructors are closely positively correlated.**(Qadir 2022) ,** 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.

(Luckin et al., 2016), By offering individualized assistance, immediate feedback, and data-driven insights into teaching methods, AI technology can improve pedagogical efficacy .This change represents a growing understanding that AI can close long-standing gaps in teacher preparation, particularly with regard to flexibility, customization, and ongoing development.

(Zawacki-Richter et al., 2019), By providing real-time, data-driven feedback during both simulated and live teaching sessions, AI systems can also improve pedagogical effectiveness. Teachers-in-training can

gain useful information from video analytics solutions that evaluate verbal and nonverbal communication, pace, and student engagement indicators.

Objectives of the Study:

The focus of the study how the artificial intelligence influence the teacher education system. Different aspect of artificial intelligence in teacher education system.

1. To explore the readiness, perception among the prospective teachers in applying the artificial intelligence during teaching learning situation.
2. To identify different the AI tools and their optimum use to enhance the learning outcome, student engagement etc.
3. To identify the challenges in applying the artificial intelligence in teacher education system.

Methodology of this Research :

This study was purely theoretical based, and the study was also based on historical work. The information for the study has been collected mainly from so many books, reviews, articles which were consulted during the study period.

Application of Artificial Intelligence through several Apps , Digital equipments in Teacher Education sector:

Virtual mentor: AI serves as a virtual mentor and is being used extensively in a variety of educational technology platforms, particularly those that are online. The practice of mentoring involves a more experienced individual (the mentor) helping a less experienced individual (the mentee) reach a learning goal. Like a teacher or tutor, AI can offer suggestions for material that needs to be reviewed after evaluating students' learning activities and practice problems. According to Zhang (2016), Virtual Mentor (VM) is an e-learning environment that integrates multimedia and emphasizes intelligence, customization, and interactivity. For instance, Blackboard (https://www.blackboard.com/teaching-learning/learning management/mobile-learning-solutions) is a popular software in American and European colleges. Professors and lecturers frequently utilize this AI tool to post notes, assignments, examinations, and quizzes that let students ask questions and complete tasks for the evaluation process. Professors and lecturers frequently utilize applications to post notes, assignments, tests, and quizzes that let students ask questions. Additionally, applications can be employed for evaluation. This program may determine the causes of students' comprehension issues and provide pre-programmed, lecturer-released answers.

Presentation Translator:

Real-time subtitle rendering is possible with Presentation Translator, an AI-based solution. Students can read or hear in their mother tongue thanks to AI Speech Recognition. This technology is comparable to Voice Assistant, which uses voice to perform its tasks. To explain or show a text from a different language into the language of your choice, Presentation Translator just has a usability specification. Therefore, consumers don't need to read; they just need to listen to different types of spoken texts, articles, or digital books. Thus, consumers can hear in their native tongue thanks to AI Speech Recognition. Journals, articles, and books written in any language are easier and faster for us to read and comprehend. This technology has been widely used for a variety of purposes because it plays a

significant role for people with vision and language impairments. These days, "Voice Control" is one of the functions that is always available on smart phones. For those of us who struggle to compose lengthy texts, voice typing is still an option. All we have to do is talk, and the program will instantly translate that sentence into text.

Personalized Learning:

There are several similarities between Personalized Learning and other AI technologies. Essentially, this AI technology enables consumers or students to obtain personal assistant-like services. AI technology plays a major role in enhancing the quality and learning patterns to make them more useful and efficient. This has also been demonstrated by numerous research and implementations by different Edutech platforms, which can, in fact, significantly improve the caliber and efficacy of learning after utilizing AI technology. This technology is widely used. There are several similarities between personalized learning and other AI technologies. Essentially, this AI technology enables consumers or students to obtain personal assistant-like services. AI in education makes it possible for educational institutions to design more individualized learning programs. Teachers and educational institutions can ascertain each student's needs and learning speed using AI analysis of student data. Based on the pupils' strengths and limitations, the school can then create a study plan. However, it is important to emphasize that technology will only serve as a tool and will not entirely replace the work of a teacher. For instance, a teacher is the only person who can relate to emotional and moral issues involving feelings and psychology. Therefore, the best use of AI technology should be made in accordance with its capabilities. Examples of the application of Personalized Learning, are those that have been implemented by Khan Academy (https://www.khanacademy.org/), Duolingo (https://www.duolingo.com/), Ruanguru (https://www.ruangguru. com/), and more.

Educational Games

Games that are intended to teach while still being entertaining are known as educational games. All types of games designed to give players an educational or learning experience are considered educational games. instructional material. Khan Academy Kids and Duolingo are two instances of instructional games. Puzzle Kids and Quick Brain.

1. **Duolingo** - In addition to teaching English, this educational game software allows kids to learn thirty other foreign languages, such as Mandarin, French, Italian, Spanish, Korean, Japanese, and more.
2. **Khan Academy**- For toddlers, preschoolers, and kindergarteners, Kids offers thousands of interactive activities. Children can study reading, language, writing, math, social and emotional development, problem-solving abilities, and motor development in this one-stop educational game.
3. **Quick Brain** -is the upcoming instructional game for kids. This newest kids' game, as its name implies, improves the brain's processing speed.
4. **Puzzle Children-** Jigsaw puzzles and animal shapes Mini-games fall into four categories: jigsaw puzzles, matching shapes, item arrangement, and picture guessing. Every mini-game tests your child's ability to locate and work with shapes, solve jigsaw puzzles, and understand how forms fit into larger images.

Smart Content Preparation by Artificial Intelligence :

A summary of different educational resources, such as digital textbooks and user interfaces that may be

customized to meet our needs, is called smart content.

CRAM101-

One example of smart content technology in use is Cram101, which divides digital textbooks into discrete sections Artificial intelligence can swiftly and methodically locate and classify the books you're looking for. Even book recommendations and other content pertinent to our search will be provided. One example of smart content technology in use is Cram101, which divides digital textbooks into discrete sections. Cram101 is an online service that reads textbooks, summarizes them, and posts the main ideas and highlights of the content online using artificial intelligence. The monthly subscription fee for the service is $9.95. Thus, tests, chapter summaries, and other materials may be included in the book. It is helpful since it allows users to locate more precise information based on their requirements.. Thus, tests, chapter summaries, and other materials may be included in the book. It is helpful since it allows users to locate more precise information based on their requirements. One such framework is Cram101, which generates advanced content using cheat sheets, practice exams, and section rundowns. **(Jain & Alam ,2020).**

Netex Learning

Another business that specializes in developing intelligent content platforms is Netex Learning. AI-based elements abound throughout the solution. Additionally, a customized cloud platform with virtual conferences, training, and more is provided by the Netex platform. Artificial intelligence used to smart content features makes it easier and faster to share and locate programmable digital book and material content. These days, public libraries, academic institutions, and schools all have digital libraries that are common instances of how this technology is being used. Netex Learning is a more advanced and comprehensive technology that provides a customized cloud platform with workshops, virtual training, and other features. **(Jain & Alam ,2020).**

Voice Assistant:

Voice Assistant uses the voice feature more as a hub for communication and engagement. Voice assistants can converse with consumers in natural language and leverage cloud computing to integrate AI. Voice Assistant technology has also been included into a number of Edutech platforms to make it easier and faster for students to locate materials and content. One of the most well-known and utilized AI technologies across a variety of industries, including education, is voice assistants. Some well-known voice assistants are Cortana (Microsoft), Siri (Apple), Google Assistant (Google), and others. By just saying or mentioning the topics they wish to search for, students can use Voice Assistant to find resources, reference queries, articles, and books. Without speaking to the instructor, voice assistants enable engagement with a variety of educational resources. The instructional platform can therefore be utilized at any time and from any location. In this manner, even in the absence of an instructor or tutor, students can study on their own without fear of confusion because voice assistant allows for the presentation of all information, including that which is not comprehended, solely by voice. Virtual mentors and voice assistants both use artificial intelligence.

AI in Assessment Procedure:

AI is frequently utilized for question rectification and online autonomous assessment. Teachers and tutor

can more easily and practically plan and administer examinations and quizzes when they employ features like these. It is no longer necessary for instructors and tutors to create and edit questions by hand. Teachers and tutors can more easily and practically plan and administer examinations and quizzes when they employ features like these. It is no longer necessary for instructors and tutors to create and edit questions by hand. The Kejarcita platform's (https://kejarcita.id/) quiz production and automatic correction tools are an illustration of the use of automated assessment. Teachers can develop tests and quizzes with ease and practicality thanks to this tool. Only the subject type, difficulty level, number of questions, and a few other options need to be selected by teachers. After that, all the teacher has to do is provide the pupils with the quiz link so they may complete it online. Teachers can develop tests and quizzes with ease and practicality thanks to this tool. Only the subject type, difficulty level, number of questions, and a few other options need to be selected by teachers. After that, all the teacher has to do is provide the pupils with the quiz link so they may complete it online. The teacher's account can automatically accept the outcomes of student quizzes. A score, a list of incorrect and right questions, and a commentary are all included. Imagine that teachers won't have to spend time manually reviewing and editing quiz and student test outcomes. The AI system has been programmed to do everything. Teachers and educators may find it easier to manage repetitious administrative duties like creating lesson plans, grading tests, reviewing student work, and more with the use of AI technology. Teachers will have more time to assess student progress and concentrate on refining their teaching methods if these operations are automated. The AI system can learn based on the user's or student's habits and will operate autonomously in accordance with preprogrammed instructions. Based on your results, AI will even suggest topics that need to be reviewed and others. The AI system can learn based on the user's or student's habits and will operate independently in accordance with preprogrammed instructions. Based on your results, AI will even suggest topics that need to be reviewed and others. A deployment approach for a college English-assisted learning system based on artificial intelligence is presented. When integrated with English instruction, several aspects of the English teaching system are improved and made more relatable . To improve the caliber and efficacy of English training, researchers are looking into the application of artificial intelligence in English education.

Prospect of Artificial Intelligence in the context of Indian Education system and its future according to NEP2020:

Routine tasks like scheduling, monitoring attendance, and grading assignments can be automated by AI. Teachers are able to concentrate more on teaching as a result. Classrooms in India are becoming smarter thanks to the use of artificial intelligence in teaching. India is making significant efforts to advance AI in education. AI awareness and digital learning are promoted by the National Education Policy (NEP 2020). AI for All programs have also been introduced by NITI Aayog. AI will soon be more deeply incorporated into research, higher education, and career training. AI-based courses are starting to be offered by colleges. In order to collaborate with or create AI systems, students are learning new skills. AI tools are being taught to teachers. This aids in their adoption of innovative teaching and evaluation strategies. The future appears bright. AI has the potential to increase education's power and inclusivity with the correct infrastructure and support.

Benefits Of AI implementation in Teacher Education Sector:

Artificial intelligence has numerous advantages in the field of education. Among them are:

1. **Personalized Learning:** AI modifies courses to meet the needs of individual students. enhances comprehension and maintains students' motivation.
2. **Full Time Tutoring**: Chatbots and apps with AI capabilities are accessible at all times. Help is available to students at any time.
3. **Effective Assessment:** Automated grading and progress tracking can help teachers save time.
4. **Design Of Curriculum:** AI assists in creating curricula based on the interests and performance of students.

   The significance of artificial intelligence in education is demonstrated by these educational advantages. It provides intelligent and scalable support for both teaching and learning.

Drawbacks of AI implementation in Teacher Education Sector

AI has certain disadvantages in addition to its many advantages. Let's examine artificial intelligence's drawbacks in the classroom.

1. **Absence of Human Touch**: AI cannot take the place of human empathy, support, or guidance.
2. **Data Privacy Concerns:** If platforms do not adhere to stringent security regulations, student data may be at risk.
3. **Technology Dependency**: An excessive reliance on machines can impair social connection and critical thinking.
4. **Accessibility Gaps:** The benefits may not be distributed equally in rural regions or in schools with inadequate internet access.

These are legitimate worries. Building safe, inclusive, and ethical systems is crucial when weighing the benefits and drawbacks of artificial intelligence in education.

Conclusions:

The integration of artificial intelligence in education is transforming our teaching and learning methods. It is facilitating smarter classrooms, enhancing student involvement, and aiding teachers through automation. In India, the adoption of artificial intelligence in education is rapidly increasing. Various stakeholders, including platforms, universities, and the government, are contributing to this growth. We have examined its advantages, such as personalized learning and round-the-clock access. However, we have also encountered issues, including concerns over data privacy and the absence of emotional support. Moving forward requires finding a balance. We should leverage AI to complement human-led education rather than substitute it. Using AI ethically and ensuring equitable access will enable it to reach its full potential in the educational landscape of India. Artificial Intelligence course if included in teacher education curriculum , it makes the future tech savvy teacher which is very essential to develop 21St century skill among the prospective teacher that actually help to develop technological sound future generation.

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