



The role of artificial intelligence in teacher training and professional development under nep 2020: A review

Anita Sahay

Assistant Professor, Department of Education, Satyug Darshan Institute of Education and Research, Faridabad, Haryana, India

Abstract

In this digital era, Artificial Intelligence has emerged as a transformative force (Murthy & Dasiga, Dec 2024)^[7] which revolutionizes all sectors of human life including the education system. Artificial Intelligence has become an integral part of the education system which also enhances the effectiveness and efficiency of teacher education and training courses and professional development programs. It has potential to revolutionize the field of education and particularly teacher training and professional development programs. The National Education Policy (NEP) 2020, gave strong emphasis on enhancing the quality of education through holistic learning. Empowerment of Teachers is one of the key focus areas of NEP 2020. The National Education Policy 2020 envisions a transformative shift by integrating Artificial Intelligence in teacher training and professional development programs. This research paper aims to explore the role of AI in teacher education, including its potential advantages, limitations and challenges. The paper discusses how AI can enhance teaching skills, improve quality of teacher education and how to facilitate personalised learning. The research paper also highlights some of the ethical, social and cultural implications of AI in teacher education. In the end, the researcher concluded that AI has vast potential to transform teacher education and training programs but it needs careful execution and ethical considerations.

Keywords: Artificial intelligence, teacher training, professional development, NEP 2020

Introduction

In this digital era, Artificial Intelligence has emerged as a transformative force (Murthy & Dasiga, Dec 2024)^[7] which revolutionizes all sectors of human life including the education system. Artificial Intelligence has become an integral part of the education system which also enhances effectiveness and efficiency of teacher training and professional development programs. Teachers, as the cornerstone of educational systems, are increasingly benefiting from AI-driven tools that facilitate their growth, teaching techniques, and engagement with students.

“Artificial Intelligence (AI) refers to the attempts made to create computerized systems that can mimic human thought and behavior. And defines AI as the capacity of computers to think and behave like humans (Wartman & Combs, 2018)” (Saklani, Role of artificial intelligence in education: An overview, 2024, p. 115)^[12]. The Fundamental concept of Artificial Intelligence is the ability of tools or programs to accurately mimic the thought processes and behaviors of humans (Mohammed & Watson, 2019)” (Saklani, Role of artificial intelligence in education: An overview, 2024^[12], p. 115). The modern arena of education has massively revolutionized and overturned the digitally driven world, on such technology that has slowly paved its way inside the world of education is artificial intelligence (Rangaiah, 6 Applications of AI in Education Sector, 2024)^[10]. Technology has overturned the world of learning as education materials, especially during the pandemic of Covid 19 (Rangaiah, 6 Applications of AI in Education Sector, 2024)^[10]. It becomes more accessible to all with the use of smartphones and computers. These facilities allow more time for the students which also helps in close evaluation of student’s aptitude, attitude, interest etc. “Firstly, AI enabled hyper personalization helps in developing customized learning in an environment based on ability performed mode of learning and experience”

(Dwivedi, Mishra, & Hughes, 2020, p. 17). “Secondly the use of smart assistants (Amazon Alexa, Google home, Microsoft Cortana) and associated technologies offer significant potential to help students” (Dwivedi, Mishra, & Hughes, 2020, p. 17)^[1]. The rapid advancement of technology has propelled Artificial Intelligence (AI) to the forefront of education, transforming the learning sphere of students. It has now become an essential part of everyone’s lives, changing the way we learn and teach (Sirish, 2024)^[13]. AI helped in the progress of the education system immensely and both academic professionals and students are benefited by AI.

NEP 2020 and the role of AI in teacher training

India’s Educational framework is completely transformed by NEP 2020, where strong emphasis is given on enhancing quality of education through holistic learning. Empowerment of Teachers is one of the key focus areas of NEP 2020. The National Education Policy 2020 envisions a transformative shift by integrating Artificial Intelligence in teacher training and professional development programs. AI-driven solutions can support personalized learning, automated assessments, and adaptive teaching methodologies. This review explores existing literature on AI’s role in teacher education within the framework of NEP 2020.

NEP 2020 emphasizes continuous professional development (CPD) for teachers (Nasrin & Mete, Oct 2024)^[8], leveraging AI to provide data-driven insights, upskilling opportunities, and competency-based assessments. According to the policy, teacher education programs must integrate emerging technologies, including AI, to foster 21st-century teaching competencies (Ministry of Education, 2020)^[6].

Artificial Intelligence (AI), with its vast potential for personalized learning and efficient management, is playing an increasingly significant role in transforming teacher training and professional development.

Methodology

The paper is exploratory in nature and the information is gathered by reviewing various articles on Artificial Intelligence (AI) drawn from articles available on journals, magazines and other internet resources. In all the paper is based on secondary sources of information.

Objective of Research

- Examine the role of AI in Teachers training and Professional development.
- To explore AI with the perspective of NEP 2020
- Explore some of the AI tools in Teachers training and Professional development.
- Identify different challenges of AI in education and propose strategies to overcome them.

By addressing these objectives, the paper aims to provide a comprehensive understanding of AI's potential and limitations in the Indian education system.

Literature Review

The 21st International Conference on Artificial Intelligence in Education (AIED) was held in 2020 (Kaur, 2024) ^[3] in Morocco, where it was noted that AIED is a pioneering field in education technology. Sapna Saklani (2024) ^[12] in her work outlined various tools and platforms of Artificial Intelligence that could be used in Education. Bidisha Borchetia and Mridula Hazarika (2024) elaborated utilization of AI technology in new educational policies and strategies. They primarily focus on NEP 2020 and the role of AI in education. Luckin *et al.* (2018) specify some of the features of AI that can enhance self-paced learning, improve retention power and pedagogical skills of learners.

In her research paper Afiya Jamal (2023) worked on AI's influence on teacher education, their challenges, advantages and disadvantages. Authors (Sadiku, Ashaolu, Ajayi-Majebi, & Musa, 2021) ^[11] elaborated that implementation of AI technology in the education process provides immense flexibility and adaptability. This innovation is transforming schools and classrooms, making teaching roles considerably easier. AI is set to change education fundamentally. The paper discusses various ways in which AI can be employed in educational settings.

Joshi, S., Rambola, R. K., and Churi, P. (Joshi, Rambola, & Churi, 2021) ^[2] emphasize that artificial intelligence has become prevalent in nearly every aspect of daily life. This advanced technology is reshaping our social interactions. In the field of education, it is poised to create innovative learning methods that will be applied in various contexts. New educational technologies can enhance the achievement and management of educational objectives. The study assesses how AI can elevate teaching outcomes, offering instances where AI aids educators in utilizing data to foster equity and improve educational standings in developing nations. Kengam, Jagadeesh discusses the applications of artificial intelligence in the educational sector (Kengam, 2020) ^[4]. As highlighted during the 21st International Conference on Artificial Intelligence in Education in 2020, AIED (Krstić & Aleksić, 2022) ^[5] represents a growing area of educational technology. It remains uncertain how teachers can leverage AI for broader pedagogical benefits and the impact AI has on teaching and learning (Tripathi & Rosak-Szyrocka, 2024) ^[14] in higher education. Lee, A. V. Y. (2020) points out that AI's integration into education is no longer a concept found in science fiction; rather, it is

transforming into reality amid significant changes. This domain includes a variety of methodologies, algorithms, and solutions aimed at tackling modern challenges encountered in classrooms today. The paper elaborates on how the existing global support for AI can be applied to education and discusses the current obstacles of implementing AI in classrooms throughout India.

AI's Role in Teacher Training and Professional Development

At first Teacher training programs depend upon in-person seminars, workshops and classroom practice which generally lack personalized approach. With the help of AI these limitations can be solved. Some important roles of AI for teacher training and professional development are discussed below:

▪ AI provide Personalized Teacher Training

AI provides personalized teacher training programs by analyzing their strengths and weaknesses. AI can collect data related to a teacher's progress and provide guidance regarding improvement in the area as per need of the teacher. With the help of AI teachers can access modules, courses according to their pace and style and also received feedback. This individualized approach aligns with the vision of NEP 2020.

▪ Virtual simulation and AI Chatbots

The creation of Virtual classrooms enabled by AI technology and it helps teachers to practice lessons with simulated students. By these AI driven simulations, teachers can refine their teaching techniques and also familiarize with various classroom situations which help them in their teaching task with real students. Moreover, AI chatbots provide on demand support to teachers by answering questions and offering professional development resources.

▪ AI and Continuous Professional development

Previously teacher professional development depended upon formal workshops and seminars which might not happen regularly. But now through virtual workshops, online learning and assessment platforms, AI provides opportunity for continuous professional development to teachers. AI-driven tools help teachers in continually upgrading their knowledge and skills by providing them immediate feedback, assessment and suggestions for further development. These platforms updated teachers with the latest educational trends, technologies and pedagogies.

▪ AI in Classroom Management and Pedagogical Improvement

AI provides data driven insights into student performance, their behavior, and learning patterns. With the help of AI tools, teachers can identify students who need extra attention or different pedagogical approaches. By this data driven analysis teachers can adjust their teaching strategies to enhance learning outcomes, which is a key objective of NEP 2020. Additionally, AI helps teachers in integrating advanced pedagogical tools like adaptive learning systems which assist students in their progress and also teachers can manage diverse needs of students in their classrooms.

▪ AI and Inclusion and Diversity

One of the major focus areas of NEP 2020 is inclusivity and equity. AI helps to make an environment that accommodates

all students irrespective of their background, making it possible that no child is left behind. AI related tools empower teachers in creating a more inclusive learning environment as it helps teachers in recognizing the specific learning needs of students as well as children with special needs or learning disabilities. AI provides differential teaching methods, strategies to cater the needs of the students.

- **AI provide Real time data and feedback for improvement**

Emphasis on Regular assessment and feedback for both teachers and students is a key component of NEP 2020. AI works on it as it provides data related to students' engagement, performance and progress. Also guide teachers in delivery of their lesson and students' participation during teaching sessions. Teachers can receive immediate feedback and accordingly make necessary adjustments.

- **AI and Bridging the gap in remote and underserved areas**

Lack of resources and infrastructure, especially in rural and remote areas is a noteworthy challenge in teacher training programs in India. AI platforms provide solutions to this challenge by offering remote access to high quality teacher training programs. Now there is no need to travel long distances to attend training sessions but they can access from anywhere and anytime as per their own convenience. With the help of AI tools teachers of rural areas also access the same resources and materials as those in urban areas. This fulfills the goal of NEP 2020 to provide equitable education to all, regardless of geographical constraints.

- **Improving Emotional Intelligence**

AI can assist teachers in developing emotional intelligence, which is critical for creating positive classroom environments. AI applications can help teachers reflect on their interactions with students and provide suggestions for improving classroom management. For instance, AI can analyze the tone of voice, body language, and overall classroom sentiment, offering recommendations for strengthening relationships with students and improving overall engagement.

- **Administrative support and AI**

By automating many administrative tasks AI helps teachers in their administrative work. Teachers are overburdened by time-scheduling, attendance and grading tasks and AI tools assist them by alleviating this burden so that teachers can devote more time and attention to teaching and professional development.

- **Improves Efficiency**

AI improve efficiency of teachers by assisting them in planning, assigning tasks and supervision of learner's activities. AI makes teaching learning tasks easier and also minimizes paperwork among teachers.

- **AI and collaborative teacher network**

Through Virtual network, educators across countries collaborate with each other, discuss their strategies with one another, share their ideas and resources. And thus, engage in a collective problem-solving approach, solving each other's matters and help in their professional development through

peer-to-peer interaction and mutual support, which is one of the core goals of NEP 2020.

Ai Tools for Teacher Training and Professional Development

In India, Teacher training and Professional development programs are progressively transforming by Artificial Intelligence.

upEducators' AI for Educators Course: This upEducators' course offers interactive sessions of five weeks to educators. The main aim of the course is to provide hands-on training to teachers in AI concepts, tools and their applications and to make AI affordable and accessible for them. After completion of the course participants received certificates.

Initiatives by National Council of Educational Research and Training: NCERT also takes an initiative to provide educators hands-on experience regarding AI tools. CIET under NCERT conducts training programs in order to enhance skills of teachers to utilize AI tools effectively in the teaching learning process.

Meritus AI's Teacher Training initiative: Meritus AI is an India based company which has taken initiative to provide training to 72000 teachers across Asia. Under this program machine learning, generative AI, prompt engineering and big data applications are covered.

Generative AI: "Generative AI for Educators" is free and self-paced course which is by Google in collaboration with MIT RAISE. This two-hour course is designed for middle and high school teachers. After completion educators received certificates which helped them in professional development. This course provides practical applications of AI to help in personalizing instruction, save time and enhance lesson creativity.

Brisk Teaching's AI Tools: This is free AI tools for educators which include AI lesson plan generator and students' instant feedback mechanisms, which help teachers in enhancing efficiency in their routine activity and increasing effectiveness in the classroom teaching learning process.

OpenAI Training course: This course provides free training in Artificial Intelligence and Prompt Engineering. OpenAI works in partnership with Common Sense Media. This course helps teachers in how to use ChatGPT in their teaching learning process, how to create lesson contents and organize other administrative tasks in a better way.

India ai Portal: This National AI portal was launched by the Government of India, which offers a repository of AI-related resources, including articles, news, research papers and educational resources. This portal helps educators to access AI tools and remain updated on the latest developments of the Indian education system by integrating AI.

Canva: Canva is an online Graphic design platform which provides templates, fonts, photos and design elements for creation of professional design. It is a user-friendly drag and

drop interface which assists in creation of presentation, posters, for resume, brochures, social media graphics and many more.

All these AI tools and platforms contribute to the teacher education and training course and also on professional development in India on a large scale.

Challenges and The Way Forward: Discussion and Suggestions

Although, the role of Artificial Intelligence in Teacher training and professional development is crucial but there are several challenges that must be considered:

- 1. Cost and Accessibility to technology:** AI based teacher training tools need high quality devices and internet connectivity but due to Digital divide, in rural and underserved areas access to technology is limited. There is an urgent need for high-speed internet connectivity, infrastructure, and availability of low-cost devices. Therefore, there is a requirement of policies and initiatives by Government and stakeholders to address these issues.
- 2. Data security and Privacy:** AI tools and platforms require data related to students' performance, their behavior pattern, educational outcomes, biometric information of teachers -students. These are very sensitive data which need to be protected and prevented from misuse. It is important to implement data protection measures to safeguard privacy. Therefore, there must be clear ethical guidelines established to direct the use of AI in education.
- 3. Balance between AI and Human Connection:** AI can enhance professional development but it cannot provide emotional support, mentorship or peer interaction which is crucial for growth of teachers and students. AI cannot replicate completely. The human element of teaching remains irreplaceable. Therefore, there must be a balance between leveraging technology and human connection for teacher growth.
- 4. Teacher training to use AI efficiently:** Teachers must be trained to use AI tools effectively and efficiently. For this there must be integration of AI into teachers training programs and ensure that teachers must be comfortable with new technologies.
- 5. Dependence on Technology:** In the current scenario there is a concern that teachers and students might become heavily dependent upon technology i.e. on AI tools and platforms for answers and solutions of their educational queries. It could lead to decline in critical analysis and problem-solving abilities of students. Moreover, technology has limitations also and it could hinder learning experiences. It is utmost important that AI assist to enhance not to replace the conventional teaching methods.
- 6. Quality and Relevance of Content:** The quality of content available on AI platforms is another significant challenge that needs to be addressed. There is important question that AI content and educational materials are correct, up-to-date and relevant to the curriculum or not

and how educators select the content is another important issue related to AI that need to be considered. There is also the possibility of uniformity, where AI could encourage standardized content, diminishing diverse viewpoints and critical thinking. Educators need to carefully select and oversee the content utilized by AI systems to uphold educational standards. And also, India's linguistic diversity necessitates development of AI tools that cater to regional and vernacular languages.

Conclusion

AI is reshaping teacher training and professional development by offering personalized, data-driven solutions that empower educators to enhance their teaching practices continuously. From real-time feedback to virtual simulations, AI has the potential to improve both the efficiency and effectiveness of teacher development. However, the successful implementation of AI requires addressing challenges such as access, privacy, and balancing technological innovation with the human aspect of teaching. NEP 2020 advocates for responsible AI implementation, requiring policy frameworks to address these challenges (NITI Aayog, 2021)^[9]. With thoughtful integration, AI can undoubtedly play a significant role in shaping the future of education, ensuring that teachers are well-equipped to meet the evolving needs of their students.

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