

Integrating Artificial Intelligence in Teacher Education under NEP 2020: Opportunities, Ethical Challenges, and Equity Concerns

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Abstract

The adoption of the NEP 2020 highlighted the importance of teacher education and the application of AI in teacher education. In this research, researcher explore the apply of AI in teacher education in terms of opportunities, challenges, and equity. The researcher use a descriptive quantitative study design guided by a structured questionnaire for a sample of 60 teacher educators and pre-service teachers. The study survey elicited teacher educators' and pre-service teachers' understanding, perception, and attitude toward the use of AI in the 'teaching-learning process,' ethical issues, and equity. The outcome of the study shows that AI has the potential to enhance personalized learning and the development of skills in teacher education. However, concerns regarding privacy, bias, digital equity, and access remain. This study shows that AI, Ethical, and 2020 NEP capacity-building frameworks remain a desideratum.

Keywords: Artificial Intelligence, NEP 2020, Technology-Enabled, Quality Education, Personalized Learning

Introduction

The relentless rise of AI offers both challenges and opportunities in across various aspects of society. Teaching-learning methods, assessments and professional development can all be affected by this new technology. AI has recently been implemented in education by using adaptive learning, smart tutoring, learning analytics, digital assessment, and other technologies promising improvements to teaching and learning (Holmes, Bialik, & Fadel, 2019). In the area of teacher education, AI is seen as a means of training teachers for digitally mediated classrooms with a focus on student learning. In India, the NEP 2020 offers the first guidelines for application of technology and AI in all areas of education. In the 2020, (Government of India, 2020) flexible and accessible digital technologies are encouraged including the training of teachers on the use of such technologies. Teacher education institutions are expected to train teachers both pre-service and in-service, to use AI in a manner that is both ethical and pedagogically sound. Teacher education, as a field, has the capacity to use AI in digital learning, continuous assessment, and professional development.

AI based applications have potential to personalize learning materials, give instantaneous guidance, and assist with classroom reflection through analytical reporting (Luckin et al., 2016). Applications described are consistent with the constructivist, competency based model of NEP 2020 and will assist teachers to concentrate on other essential activities than routine instructional tasks such as teaching, mentoring, facilitating, and higher order thinking skills. However, the incorporation of AI technology into teacher education poses critical ethical issues that are equally important to acknowledge. Privacy, bias, surveillance, and ethical issues pertaining to education have been described extensively (Williamson & Eynon, 2020). With this understanding, teacher educators and student teachers will need to prioritize an ethical and humanistic approach, which will require reflection and critical thought. Without an ethical framework, the unrestricted application of AI will erode trust, and autonomy, and will defeat professional judgement in the teaching-learning process. With the incorporation of AI in Indian classrooms, inequity in education will, as it always has, worsen. Rural and underserved communities will suffer disproportionately due to the digital divide, lack of research grade technology, and poor infrastructure (Selwyn, 2019).

The NEP of 2020 strives to narrow the aforementioned gaps by employing digital methodologies. However, hurdles like institutional readiness, human resource development, and the extent of policy inclusivity will be the determinants of success. Teacher education programs need to address the access, affordability, and contextual problems of their initiatives and respond to the AI-driven applications.

With the challenges at hand, addressing the perceptions of pre-service teachers and teacher educators is essential to understanding the possible role of AI and the NEP 2020. Their concerns and perceptions will delineate the realistic prospects concerning AI applications in teacher education. This research aims to assess the concerns, potential, and ethical issues of using AI in teacher education to facilitate effective policy frameworks and address the issues of sustainable transformation in Indian classrooms (UNESCO, 2019).

Review of literature and Analytical structure

Educational scholars are beginning to examine the effects of Artificial Intelligence (AI) in education, particularly how this technology is influencing the preparation and ongoing training of educators. Globally, educators are analyzing the effects of technology on teaching effectiveness, learner engagement, and the overall quality of education. Holmes, Bialik, and Fadel (2019) stated that AI offers support to teachers through intelligent tutoring systems, personalized learning, and automated grading, enabling teachers to focus on more cognitively demanding tasks. This study particularly emphasized that teacher education needs to prepare teachers to teach with AI technology. Various studies have focused on the influence of AI on personalization of learning and assessment. Luckin et al (2016) showed that AI-informed learning analytics empowers teachers to find out gaps in student learning, adjust their teaching strategies to bridge gaps and support learners. In the context of teacher training, it was noted that the technology promoted reflective practice in teaching and data driven decision-making. Furthermore, in a systematic review, Zawacki-Richter et al (2019) noted that the use of AI in higher education was geared towards adaptive learning, assessment and student engagement, and, preparatory work on the ethical use of AI from a teaching and learning perspective was lacking.

In reference to the NEP 2020 and the Educational system in India, merging AI and other innovations into education is a growing area of interest, and the Government of India (2020) mandates that "The curriculum of teacher education institutions should include Digital Competence, Technological

Pedagogical Content Knowledge (TPACK), and Innovative Pedagogical Methods". Mishra and Mehta (2021) observed that while many Indian teacher educators appreciate the impact of AI on teaching-learning processes, it appears that many do not receive sufficient training or institutional support to further improve their skills. The literature on AI in education reveals several ethical issues that have been raised and Williamson and Eynon (2020) stated that educational AI applications have the potential to raise ethical issues such as data privacy, algorithmic discrimination, and excessive monitoring if a strong ethical structure does not govern them. Their findings state that teachers should acquire the ethical framework to make reasoned choices about the adoption and use of educational AI, as opposed to using educational AI tools indiscriminately. Educational AI tools should be human-centered, transparent, and ethically designed, to ensure that the privacy and dignity of learners are maintained (UNESCO, 2019). The existing literature on Artificial Intelligence in education also addresses the issues of equity and access.

According to Selwyn 2019 social and digital equity and access and infrastructure relevance are among the first considerations for the improvement of the digital divide using technologies, including AI. This is the case for developing countries like India where the urban-rural divide in regional institutions creates inequities in the accessibility of AI-based educational tools. Kundu and Bej 2021, illustrate that in less developed digital infrastructure and the presence of limited technological understanding and working experience of trainee teachers, as well as AI initiatives, barriers are complemented by inclusive teacher training. Similarly, in the research, it is found that teacher perceptions of AI are polarized; for instance, some teachers think of it as a tool that can enhance teaching effectiveness and some regard it as a substitute for a teaching role (Akgun & Greenhow, 2021). This indicates that considering AI in teacher education requires a balance among technological, pedagogical, and moral dimensions.

The literature suggests that while AI has great potential to innovate teacher education in line with NEP 2020, there are still concerns regarding ethical preparedness, equity, and contextual applicability in Indian classrooms. The majority of the studies conducted AI's impact and neglected the balancing effect of teacher educators and pre-service teacher and the need for policy, capacity, and research empiricism. The present study attempts to deal with this gap by examining opportunities, ethical challenges, and equity concerns associated with the integration of AI in teacher education under NEP 2020.

Need and Significance of the Study

The inclusion of AI in teacher training has gained some attention with the passing of the NEP 2020 which focuses on tech-enabled, inclusive and quality education. However, even with the encouragement on the policy level, the understanding of teacher educators and pre-service teachers' perceptions of AI in teaching-learning processes is almost negligible. Thus, the current study is focusing on examining the perceptions, attitudes and readiness of stakeholders toward AI in teacher education institutions. Additionally, the inclusion of AI raises some ethical concern related to data protection, biased algorithms, and the autonomy of profession, which need to be addressed in the context of education in India. There is also the aspect of digital divide, which is the unequal provision to the digital technology and infrastructure, and can pose a challenge in the inclusive and equitable adoption of AI in education. This study will be the first to provide data driven evidence to the policy implementers to help them make policy related decisions in line with NEP 2020, to help teacher educators in building their capacity, and to help the policy implementers to formulate guidelines that will help in the development of safe and equitable use of AI in classrooms in India.

Objectives

1. To examine the level of awareness and perception of teacher educators and pre-service teachers regarding the use of AI in teacher education.
2. To examine the perceived opportunities of AI in enhancing teaching–learning processes and assessment practices in teacher education.
3. To analyse the ethical concerns associated with the use of AI in teacher education.
4. To examine the equity-related issues, including access and infrastructure, in the implementation of AI in teacher education institutions.

Hypotheses

1. There is no significant difference in the perception of teacher educators and pre-service teachers regarding the use of AI in teacher education.
2. There is no significant relationship between the use of AI and enhancement of teaching–learning processes in teacher education.
3. There is no significant difference in the views of respondents regarding ethical concerns related to the use of AI in teacher education.
4. There is no significant difference in the perceptions of respondents regarding equity and access issues in the implementation of AI in teacher education.

Methodology

Research Design

The researcher used a quantitative descriptive survey design to understand the perceptions of teacher educators and pre service teachers to explore the use of AI in the field of education.

Sample and Sampling Technique

60 respondents were selected by simple random sampling technique, which included teacher educated and pre-service teachers from different educational institutions.

Tool of the study

The researcher created a self-developed structured questionnaire.

Statistical Techniques

Descriptive statistics such as mean, percentage, standard deviation, and inferential statistics were used to analyse the data.

Analysis and Interpretation

The collected data from teacher educators and pre-service teachers were analysed in line with the objectives of the research. The analysis is concerned with the perception of respondents about the role of AI in teacher education under NEP 2020, focusing on the positive sides and the ethical and equitable concerns.

Analysis of Objective 1:

Table 1: Awareness and Perception of AI in Teacher Education

Aspect Studied	Low (%)	Moderate (%)	High (%)	Interpretation
Awareness of AI concepts in teacher education	12	48	40	Majority respondents possess moderate to high awareness of AI

Perception of AI in professional development	10	46	44	AI perceived as supportive for teacher professionalism
Acceptance of AI under NEP 2020	8	42	50	High openness towards AI integration

The analysis showed that most respondents had a moderate to high level of awareness on the role of AI in teacher education. Most respondents viewed AI as a tool that may assist teachers in the Planning, Managing and Improving of their own professionalism. These findings provide evidence of the positive perception towards the implementation of AI in teaching and suggests teacher educators and pre-service teachers openness to the use of technology in teaching under NEP 2020.

Analysis of Objective 2:

Table 2: Perceived Opportunities of AI in Teaching–Learning and Assessment

Dimension	Disagree (%)	Agree (%)	Strongly Agree (%)	Interpretation
Personalised learning through AI tools	14	52	34	Useful for individualized instruction
AI-based assessment and feedback	11	49	40	Supports timely assessment
Identification of learner strengths and weaknesses	9	51	40	Enhances diagnostic teaching

The analysis of this objective shows respondents affirmatively noted the potential of AI in the personalisation and assessment of instruction and the development of instructional techniques and assessment practices. Participants believed AI-based tools assist in recognition of students’ strengths and weaknesses and provision of timely feedback and improvement of learners’ results. The findings suggest that AI is perceived positively as a solution for enhancing quality teaching-learning processes in teacher education institutions.

Analysis of Objective 3:

Table 3: Ethical Concerns Related to AI

Ethical Issue	Low Concern (%)	Moderate Concern (%)	High Concern (%)	Interpretation
Data privacy and security	10	38	52	High concern regarding misuse of data
Algorithmic bias	14	41	45	Awareness of bias risks
Over-reliance on AI	18	44	38	Concern about dependency
Need for ethical guidelines	6	34	60	Strong demand for ethical training

The findings in this area show concern of respondents regarding data protection, partiality in algorithms, and over reliance on technology. A good number of respondents called for ethical codes of conduct and curriculum development for training on the careful use of AI in education. The findings show that respondents, apart from seeing the potential of AI, are aware of the ethical implications that come with it and suggest a high level of ethics should be in place for AI's use in teacher education institutions.

Analysis of Objective 4:

Table 4: Equity and Infrastructure Issues

Equity-related Factor	Low (%)	Moderate (%)	High (%)	Interpretation
Availability of digital infrastructure	22	41	37	Infrastructure gaps exist
Rural–urban digital divide	12	36	52	Unequal access concern
Institutional readiness for AI	18	45	37	Moderate preparedness
Inclusiveness under NEP 2020	15	40	45	Equity challenges remain

Respondents expressed serious concerns with regard to equity and accessibility of equity. Respondents mentioned problems with inadequate digital infrastructure, geographically uneven access to technology, and the rural-urban divide. The mere existence of digital infrastructure and technological resources, though critical, would warrant the concerns of the equity theorists bypass the inclusive ideals of the NEP 2020.

Table 5: Overall Perception of AI in Teacher Education

Area	Overall Level	Key Observation
Awareness and perception	High	Positive orientation towards AI
Teaching–learning and assessment	High	Effective for personalization and assessment
Ethical considerations	Moderate to High	Need for regulation
Equity and access	Moderate	Infrastructure challenges persist

Vertical Analysis professes the overall positive disposition of the teacher educators and the pre-service teachers regarding the integration of AI in Teacher Education. The AL falls short of fully embedding the vision of the NEP 2020 without the technological integration, ethical framing, and the digital divide closure.

Discussion and Conclusion

The findings of this research clears that teacher educators and pre-service teachers have a positive perception of AI in teacher education concerning the outline of the NEP 2020. The level of awareness and attitudes of participants in this study are consistent with previous studies that reported positive attitudes toward AI because of the ability to offer personalized learning and assessments and help with the professional development of teacher educators. This shows that positive attitudes toward the application of technology are increasing in teacher education programs. The ability of AI to personalize the teaching-learning process shows that participants see its ability to provide adaptive learning, ongoing assessments, and support data-driven decision-making. These findings are substantiate with earlier studies that

documented the ability of AI to enhance teaching effectiveness and student engagement. However, the study highlights a various ethical problems that have been studied previously, including data security, bias in algorithms, and dependency on automation. These issues highlight the advocacy for ethical and regulatory frameworks on AI in education. The issue of equity as it relates to AI in education was a major concern in this study. Even with the inclusive vision of NEP 2020, the gaps in digital infrastructure and the accessibility of technology resources were big obstacles to effective implementation. This is aligned with prior studies that suggest the advancement of technology without solving prior gaps in access or context will rival the advancement in technology. Established the gaps in the technology infrastructure and access, facilitations with the equal distribution of resources capacity will aid in ditching the exclusive use of AI to help build technology access for all. This current study addressed on AI and its ability to align with the goals of NEP 2020 and rejuvenate education processes, including teaching, learning, assessment, and, even, professional development. The majority of teacher educators and pre-service teachers see AI as a positive and constructive resource that will promote education of high quality and will aid the use of technology. The study, however, draws attention to the fact that the advancement of AI in teacher education programs greatly depends on the resolution of ethical and equity issues. Issues surrounding privacy of data, bias in algorithms, and access to resources and technology expose the digital divide that must be controlled by policy. For these reasons, teacher education programs must develop rules for ethical practice, digital literacy, and inclusivity that will accompany the use of AI.

In summary, the study underscores the need for restrained and responsible consideration of potential bias and inequitable access, and the ethical use of AI for the NEP 2020. This will help teacher education programs to train future educators to be technologically proficient, and socially and ethically responsible.

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