



CHALLENGES OF USING ARTIFICIAL INTELLIGENCE IN TEACHER EDUCATION IN THE INDIAN CONTEXT

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Abstract

Artificial Intelligence (AI) is increasingly influencing educational systems worldwide, offering possibilities for personalized learning, automated assessment, and data-driven decision-making. In teacher education, AI has the potential to enhance pedagogical preparation, professional reflection, and institutional effectiveness. However, in the Indian context, the adoption of AI in teacher education is shaped by structural, cultural, ethical, and policy-related challenges. This paper critically examines the relevance of AI in teacher education in India and analyzes key challenges associated with its implementation, including digital inequality, curriculum rigidity, limited faculty preparedness, ethical and privacy concerns, algorithmic bias, and the risk of eroding professional judgement. Drawing on national policy frameworks and international literature, the paper proposes strategic suggestions for responsible integration and outlines future directions for research and practice. The paper argues that AI should be positioned as a supportive pedagogical tool rather than a replacement for human judgement and emphasizes the need for context-sensitive, equitable, and ethical approaches to AI integration in Indian teacher education.

Keywords: Artificial Intelligence, Teacher Education, India, Digital Divide, Ethics in Education, Educational Technology

Introduction

Artificial Intelligence (AI) has rapidly transitioned from a specialized technological domain to a widely deployed tool across sectors such as healthcare, finance, governance, and education. In education, AI-based applications are being used for adaptive learning, automated assessment, intelligent tutoring systems, and learning analytics. These developments have important implications for teacher education, which is responsible for preparing future teachers and supporting the professional development of in-service educators.

Teacher education institutions (TEIs) operate across varied socio-economic, linguistic, and geographical contexts, ranging from urban universities to rural District Institutes of Education and Training (DIETs). Despite policy emphasis on quality improvement, teacher education in India continues to face challenges related to infrastructure, curriculum relevance, practicum effectiveness, and faculty capacity.

The growing interest in integrating AI into teacher education is aligned with broader national initiatives such as Digital India and the National Education Policy (NEP) 2020, which advocate the use of technology to improve access, equity, and quality in education (MHRD, 2020). However, the introduction of AI into teacher education is not merely a technical intervention. It raises fundamental questions about pedagogy, ethics, equity, professional autonomy, and the role of human judgement in teaching.

Relevance of Artificial Intelligence in Teacher Education

1. Personalized Learning and Professional Development

Teacher educators in India are highly heterogeneous, with significant variation in academic preparedness, language proficiency, and digital skills. AI-enabled learning platforms can support personalized learning by offering adaptive content, diagnostic assessments, and targeted feedback. Such personalization is particularly relevant in distance and blended teacher education programs, which have expanded significantly in recent years.



2. Pedagogical Skill Development and Simulation

AI-powered simulations and intelligent tutoring systems can provide teacher trainees with opportunities to practice teaching strategies, classroom management, and assessment in low-risk environments. When practicum experiences are often constrained by overcrowded classrooms and limited supervision, AI-based simulations can supplement traditional teaching practice.

3. Assessment and Feedback Support

Assessment in teacher education involves evaluating lesson plans, reflective journals and teaching demonstrations. AI tools can assist teacher educators by automating routine evaluation tasks, identifying patterns in student performance, and supporting formative feedback. This can help address workload challenges faced by faculty in large teacher education programs.

4. Institutional Planning and Quality Assurance

AI-driven data analysis can support institutional decision-making by identifying trends in student performance, practicum outcomes, and program effectiveness. For Indian TEIs functioning under frameworks of UGC, NAAC, NCTE, such tools may enhance quality assurance processes.

2.5 Preparing Teachers for AI-Integrated Schooling

As AI-based tools become more common in schools, teachers must be prepared to use them ethically and pedagogically. Integrating AI into teacher education helps future teachers develop digital competence, critical awareness, and ethical sensitivity necessary for contemporary classrooms (OECD, 2021).

Challenges in the Use of AI in Teacher Education in India

1. Digital Divide and Infrastructure Inequality

The digital divide remains a major barrier to AI adoption in Indian teacher education. Many TEIs, particularly in rural and semi-urban areas, lack reliable internet connectivity, adequate hardware, and technical support. Unequal access to devices among teacher trainees further increases disparities, raising concerns about equity and inclusion.

2. Limited Digital and AI Literacy

Effective use of AI requires both technical competence and pedagogical understanding. However, many teacher educators have limited exposure to AI-based educational tools and lack opportunities for systematic professional development. This results in superficial use of AI, rather than meaningful pedagogical integration.

3. Curriculum Rigidity and Examination Orientation

Teacher education curricula in India are often rigid, content-heavy, and aligned with examination requirements. Such structures leave little scope for experimentation, interdisciplinary learning, or reflective engagement with AI technologies. As a result, AI may be used primarily to generate assignments or lesson plans, reinforcing compliance-oriented practices rather than professional learning.



4. Ethical Concerns and Data Privacy

AI systems rely on large volumes of data, including sensitive academic and personal information. In teacher education, this may include practicum records, classroom observations, and student evaluations. In the absence of robust institutional data protection policies, there is a risk of misuse of data.

5. Algorithmic Bias and Cultural Mismatch

Many AI tools used in education are developed using datasets that reflect Western educational contexts. These tools may fail to account for India's linguistic diversity, socio-cultural norms, and classroom realities. Algorithmic bias can disadvantage teacher trainees from marginalized backgrounds and reinforce dominant norms related to language, gender, and socio-economic status.

3.6 Financial Constraints and Sustainability

Implementing AI-based systems requires sustained investment in infrastructure, training, and maintenance. Many public TEIs operate under constrained budgets, making long-term sustainability a concern. Dependence on commercial platforms also raises questions about affordability, transparency, and institutional autonomy.

3.7 Over-Reliance and Erosion of Professional Judgement

Teaching is a relational and context-sensitive profession that requires judgement, empathy, and ethical reasoning. Excessive reliance on AI-generated recommendations risks undermining the development of professional judgement among teacher trainees. There is a danger that AI may be perceived as an authoritative source of pedagogical knowledge, reducing critical reflection and adaptability.

Suggestions for Responsible Integration of AI in Teacher Education

1. Infrastructure and Access Enhancement

Government agencies and regulatory bodies should prioritize investment in digital infrastructure for TEIs. Ensuring equitable access to devices and connectivity is a prerequisite for ethical AI integration.

2. Faculty Capacity Building

Continuous professional development programs focusing on AI literacy, pedagogy, and ethics are essential. Teacher educators must be empowered to critically evaluate AI tools and model responsible use for trainees.

3. Curriculum and Assessment Reform

Teacher education curricula should incorporate AI-related competencies such as data literacy, ethical reasoning, and digital pedagogy. Assessment practices should emphasize reflective processes, classroom enactment, and justification of pedagogical decisions rather than product-based submissions.



4. Ethical and Regulatory Frameworks

Institutions should develop clear ethical guidelines for AI use, addressing data privacy, transparency, consent, and accountability. Ethical reasoning should be embedded as a core component of teacher professionalism.

5. Contextualization of AI Tools

AI tools should be localized to reflect Indian languages, curricula, and classroom realities. Collaboration between educators, technologists, and policymakers is essential for developing context-sensitive solutions.

Future Directions

Future research should examine the impact of AI on teacher identity, professional judgement, and equity in teacher education. Indigenous AI solutions aligned with Indian educational goals should be promoted. Teacher education institutions can serve as critical spaces for experimenting with and evaluating AI integration, rather than merely adopting external technologies. AI offers significant opportunities to enhance teacher education in India, but its integration is accompanied by complex challenges related to equity, ethics, pedagogy, and institutional capacity. Addressing these challenges requires a holistic and contextually grounded approach that prioritizes human judgement, inclusivity, and ethical responsibility. AI should be positioned as a supportive tool that strengthens teacher professionalism rather than undermines it. With thoughtful policy, curriculum reform, and capacity building, AI can contribute meaningfully to the future of teacher education in India.

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