

Original Article

Impact of AI on Education: Need for Teachers Training

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Abstract

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This paper studies the impact of Artificial Intelligence (AI) on teacher education programs in India. It reviews national education policies, government initiatives, digital platforms, and recent research studies to understand how AI is being included in teacher training. The paper explains the opportunities and challenges of AI integration and gives practical suggestions for effective implementation. The discussion is connected with NEP 2020, national AI strategies, and digital platforms such as DIKSHA and NCERT initiatives. The findings show that AI can support personalized learning, assessment, administration, and professional growth of teachers. However, proper infrastructure, digital skills, and careful planning are necessary. The paper ends with an implementation framework and suggestions for future research.

Introduction

Artificial Intelligence (AI) is bringing major changes in many sectors, including education. In India, the National Education Policy (NEP) 2020 strongly promotes the use of technology, computational thinking, and emerging fields like AI at all levels of education. This creates both a need and an opportunity for teacher education programs to adapt. Teachers must learn how to use AI tools effectively, prepare students for an AI-driven world, and understand the ethical and social impact of AI in education.

Teacher education programs—whether pre-service, in-service, or certificate courses—play a key role in educational reform. With the growing use of AI tools such as intelligent tutoring systems, automated assessment tools, learning management systems, and virtual assistants, teacher training must focus on three main areas: building teachers' digital skills, teaching how to combine human teaching with AI tools, and preparing teachers to handle ethical and social concerns related to AI. This paper discusses these aspects in the Indian context.

Objectives

1. To identify current initiatives in India that connect AI with teacher education.
2. To review and understand existing research on AI and teacher professional development.
3. To examine the opportunities and challenges of including AI in teacher training programs in India.
4. To suggest a practical framework and recommendations for policymakers and teacher educators.

Hypothesis:

H1: The inclusion of AI in teacher training improves teachers' digital teaching skills and classroom performance when proper infrastructure and support are available.

H2: If steps are not taken to reduce the digital divide and ensure relevance, AI integration may increase the gap between urban and rural teachers and among different socio-economic groups.

Limitations of the Study:

This paper is based on policy documents, government reports, publicly available information, and recent research studies. It does not include large-scale primary data collected by the author. Since AI and education technologies change rapidly, some information about programs or tools may change over time. Updated sources should be consulted for the latest details.

India's education system is diverse across states and regions. This study highlights general trends and does not describe the situation of each state separately.



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Review of Literature

Foundations of Social Policy and National Strategy

NEP 2020 emphasizes reforms in teacher education, use of technology, and inclusion of 21st-century skills such as computational thinking and AI in school education. It highlights the need to strengthen teachers' capacity to bring meaningful change in classrooms.

NITI Aayog and other government bodies have developed national AI strategies where education is identified as a key area. These strategies recommend using AI for personalization, assessment, and teacher support. They also encourage collaboration between government, academic institutions, and industry to develop AI resources and training modules.

Platforms and National Digital Infrastructure

DIKSHA, the national digital platform for schools, and initiatives by NCERT such as the AI Cell and AI-related training programs, provide strong infrastructure for teacher training. Short-term AI courses have also been conducted by NCERT and CIET to increase teacher awareness and skills in AI.

Empirical and Review Papers

International research shows that AI can help teachers by automating routine tasks like grading, analyzing student performance, supporting personalized learning, and offering timely professional feedback. However, there is limited research on large-scale teacher training for AI, especially in low-resource schools.

Studies from India between 2023 and 2025 show that while early users of AI tools report positive outcomes, infrastructure and access remain important challenges.

Methodology

This study uses a qualitative exploratory approach, including:

1. Policy Analysis: Reviewing NEP 2020 and national AI strategy documents to understand goals and directions.
2. Document Review: Studying information available on platforms like DIKSHA and NCERT/CIET training programs.
3. Literature Review: Examining research articles and conference papers published between 2019 and 2025 related to AI in teacher education.
4. Thematic Analysis: Organizing findings into themes such as curriculum changes, professional development models, infrastructure, ethics, equity, and policy gaps.

This method provides a broad understanding based on available information, though it does not include new field data.

Findings

1. Readiness and Institutional Policies

NEP 2020 and national AI strategies provide a strong policy foundation for AI integration in teacher education. Government initiatives create direction and support for AI-based training programs.

Implication: Clear policies help in securing funding, partnerships, and structured implementation.

2. Large-Scale Digital Platforms Enable Reach but Not Equal Access

Platforms like DIKSHA can distribute AI-related training materials to a large number of teachers. However, differences in internet connectivity, device availability, and digital access create unequal participation.

Implication: While digital platforms support scalability, offline options and infrastructure improvement are necessary.

3. Changing Models of Professional Development

Teacher training is moving toward modular courses, micro-credentials, and blended learning models. AI tools can provide simulations, teaching support, and feedback for faster learning. NCERT and CIET have started AI-focused training programs.

Implication: Blended models with recognized certifications can motivate teachers and improve skill development.

4. Pedagogical Transformation

AI tools provide real-time data about student learning and progress. This can help teachers shift from lecture-based teaching to data-informed and student-centered approaches.

Implication: Training must focus not only on tool usage but also on interpreting data and designing better learning experiences.

5. Administrative Efficiency and Professional Concerns

AI can reduce teachers' workload by automating grading, lesson planning, and record management. However, concerns about job security, data privacy, and over-dependence on algorithms must be addressed.

Implication: Ethics, privacy, and the role of teachers must be included in AI training programs.

6. Equity and the Digital Divide

AI integration cannot succeed without reliable electricity, internet, and devices. Rural and disadvantaged schools risk falling further behind without targeted support.

Implication: Programs must include low-bandwidth materials, offline resources, and regional language content.

7. Strengthening Teacher Training Institutions

Many teacher training institutions lack faculty trained in AI integration. Upgrading curriculum and faculty skills requires coordinated efforts and investment.

Implication: Faculty development and centers of excellence are essential.

8. Teacher Perception and Identity

Teachers' attitudes toward technology influence AI adoption. Training programs must respect teacher experience and encourage active participation.

Implication: Professional development should promote teacher agency and peer learning.

Discussion

India has strong policies and growing infrastructure to support AI in teacher training. However, successful implementation depends on bridging the gap between policy vision and classroom reality.

Policy-implementation linkages must be strengthened by involving teacher educators, subject experts, and AI specialists.

Scalable capacity building through online courses and local training centers can support large-scale implementation.

Infrastructure and equity investments are necessary to ensure inclusion.

Ethics and data governance must be clearly defined and taught.

Continuous research and monitoring are required to measure impact.

Recommendations (Practical Framework for Implementation)

Phase 1: Policy and Capacity Foundations (0–12 months)

Develop a national AI competency framework for teachers aligned with NEP 2020.

Conduct train-the-trainer programs for teacher education faculty.

Create open-source, multilingual AI learning modules.

Phase 2: Pilot and Localization (12–24 months)

Start pilot projects in urban and rural districts.

Provide offline and low-bandwidth materials.

Set clear indicators to measure teacher confidence and classroom use.

Phase 3: Scale and Standardize (24–48 months)

Include AI pedagogy in B.Ed and D.El.Ed curriculum.

Offer recognized micro-credentials for AI skills.

Include ethics and data governance in certification.

Phase 4: Continuous Improvement (After 48 months)

Establish research centers for AI in education.

Conduct long-term studies on teacher training outcomes.

Encourage development of locally relevant AI tools.

Methodological Reflections (on Evidence)

Although this paper reviews policies and existing research, more strong empirical studies are needed in India. Large-scale experiments and comparative studies can better measure the real impact of AI-based teacher training. Current evidence is limited and often descriptive. Future research should use experimental and long-term designs.

Conclusion

AI has strong potential to improve teacher training in India by enabling personalized professional development, reducing administrative burden, and supporting data-driven teaching. National policies like NEP 2020 and digital platforms such as DIKSHA provide a supportive environment. However, infrastructure development, teacher educator training, and ethical safeguards are essential for successful implementation.

Future Research Directions

1. Large-scale experimental studies to measure the impact of AI-based teacher training on classroom practices and student learning.
2. Cost-benefit analysis of blended professional development models in low-resource settings.
3. Research on bias in AI educational tools and their impact on disadvantaged learners.
4. Design-based research to develop locally suitable AI tools in collaboration with teachers.

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