



Generative AI and Teacher Education: Prospects in NEP 2020

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Abstract

The National Education Policy NEP 2020 emphasizes transformative teacher education through competency-based training, multidisciplinary approaches, and integration of technology, concurrently, Generative Artificial Intelligence (Gen AI)-embodied by advanced language models and creative content generators- offers novel pathways to enhance teacher training programmes. This review explores the potential roles of (Gen AI)-embodied by advanced language models and creative content generators offers novel pathway to enhance teacher training programs. This review explores the potential roles of Gen AI within the NEP 2020 framework, including its application in personalized teacher training, curriculum and content design, formative assessment, and professional development-all aligned with the policy's vision for reflective, adaptive, and future-ready educators. By synthesizing current literature, we elucidate how Gen AI can support tailored feedback, scenario-based pedagogies, multilingual content creation, and continuous professional learning. We also examine systematic barriers such as digital inequity, ethical and bias-related concerns, data privacy, and the need for robust regulatory framework that reflect the NEP's stress on responsible and equitable educational innovation. Comparative analysis with global Gen AI in teacher-education literature underscores the nascent nature of empirical studies in the Indian context and highlights opportunities for localized scalable interv. The paper outlines future research directions including longitudinal impact assessment, development of AI literacy among educators, scaffolded prompt- engineering training, and co-designed Gen AI tools that preserve pedagogical integrity. By bridging NEP 2020's policy objectives with Gen AI's technological affordances, this review aims to chart a road- map for responsible, contextually-informed integration of Gen AI teacher education paving the way for a more dynamic inclusive and effective teacher development ecosystem.

Keywords: Generative AI, Teacher Education, NEP 2020, Personalized Learning, Professional Development, Education Policy

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Introduction

The National Education Policy NEP 2020 marks a paradigm shift in Indian education, positioning teacher education at the heart of systematic transformation. The policy mandates that, by 2030, only educationally sound, multidisciplinary, and integrated teacher education programmes will remain in operation, emphasizing a move away from standalone teacher education institutions towards composite universities offering holistic B.Ed. program that incorporate disciplines such as psychology, philosophy, sociology, and more. (National Education Portal) To realize this vision, NEP 2020 envisions structure like the National Curriculum Framework for Teacher Education (NCFTE, 2021) and the National Profession Standards for Teachers (NPST) aimed at enhancing reflective pedagogy and professional standards in teacher training. Complimenting these flows, NEP 2020 underscores the role of technology integration through bodies like the National Education Technology forum (NETE) and digital platforms (e.g., DIKSHA) to support life long professional development, accessible resources, and personalized learning pathways for teachers Singh A 2024,. At the same time, the global advancement of Generative Artificial Intelligence (Gen AI)- typified by tools such as ChatGPT- offers promising new avenues for transforming teacher training. In educational contexts, Gen AI can enable personalised feedback adaptive content generation, and automated lesson planning, while also fostering AI literacy and ethical awareness among educators Kohnke, L., 2025 Together, these developments redefine the teacher's role form content deliverer to curriculum, designer, reflective practitioner, and facilitator of critical thinking- reflecting NEP 2020's vision for transformative, future- ready educator preparation. This paper undertakes structured review to explorer how Gen AI aligns with and can enhance NEP 2020's goals for teacher education. By synthesizing recent scholarly literature, policy documents, and global best practices, this study aim to map out Gen AI potential applications in personalized teacher training, multilingual and inclusive pedagogy, formative assessment and continuous professional development. It also critically examines systematic challenges such as the digital divided, ethical and the requirement for regulatory frameworks, situating them with in the Indian context.

Literature Review

Generative AI Application in Teacher Training

The integration of Generative Artificial Intelligence (Gen AI) in teacher training is gradually reshaping how educators are prepared for future

classrooms. A narrative scoping review emphasizes that Gen AI supports the development of AI literacy among teachers, enhances pedagogical content knowledge (PCK), and facilitates personalized teacher training pathways. (Andrii O.Kolhatin, 2025) These affordances allow teachers to receive instant feedback, engage in simulated classroom scenarios, and design content attuned to diverse learner needs. However, the same study cautions against technical challenges, ethical dilemmas, and resistance to pedagogical change, suggesting that AI literacy must become part of professional development. A related review, "Harnessing Generative AI for Personalized Learning," contextualize Gen AI within India's NEP 2020 vision. It highlights how adaptive AI platforms can scale personalized learning for teacher trainees, enabling them to engage with multilingual, context-sensitive content, while pointing out systematic gaps such as infrastructure readiness and digital equity Moharana, 2025.

AI and NEP 2020 synergy

Within the Indian context, the NEP 2020 Framework explicitly promotes technology enabled teacher development through structures like the National Educational Technology Forum (NETF) and digital platforms such as DIKSHA Integrating AI particularly Gen AI into these systems is seen as a way to strengthen personalized teacher assistance, curriculum design, and data-informed professional growth Jally & Kaur, 2025. This synergy aligns with the policy's call for competency based reflective teaching practices and life long professional development. However, research also notes significant barriers, digital divides, lack of faculty preparedness, and the absence of a clear implementation roadmap (Prajapati, 2025)

Systematic Reviews of GenAI in Education

Global reviews suggest that Gen AI role in higher education is expanding but remains fragmented. A systematic review of Gen AI in HE underscore the need for Pedagogical Frameworks to ensure that AI use in education aligns with ethical and learning outcomes. (Xia *et al.*, 2024; Ogunleye *et al.*, 2024). These studies reveal that although Gen AI can transform assessment practices, teacher preparation modules and professional training stimulations, consensus is lacking on best practices. This gap highlights the need for localized evidence in India to align Gen AI adoption with NEP 2020 priorities.

NEP 2020: A vison of Teacher Education and Generative AI - An overview

The National Education Policy NEP 2020 provides a transformative blueprint for Indian education, placing teacher education at the core of systematic reform. It envisions that by 2030, the 4 year integrated Teacher Education Programme ITEP will become the minimum requirement for teaching, ensuring professional rigor and multidisciplinary training (Government of India 2020 NEP). This reform emphasizes competency-based learning, reflective pedagogy, and the establishment of the National Curriculum Framework for teacher education (NCFTE, 2021) align with the National Professional Standards for Teachers (NPST, 2022), (NCTE, 2021). Collectively, these policy instruments aim to prepare future ready, innovative, and ethical teachers who can adapt to 21st century educational demands. In parallel, NEP 2020 highlights the critical role of educational technology through the National Educational Technology forum (NETF) and platforms such as DIKSHA, designed to enhance teacher professional development, ensure resource accessibility, and encourage lifelong learning. (Jolly & Kaur, 2025). Within this context, the emergence of Generative Artificial Intelligence (Gen AI)-AI model capable of producing human-like text, images and interactive content - presents unprecedented opportunities for aligning with NEP's technology driven vision. Globally, Gen AI is recognized as a pedagogical enabler that supports personalized training pathways, content creation, automated assessment, and multilingual learning support. (Andrii O Kolhatin, 2025).

In teacher education, it can simulate classroom situations, provide real time feedback to preservice teacher, and generate diverse learning resources that resonate with NEP 2020's emphasis on experiential and multidisciplinary learning. Xia *et al.*, 2024.

At the same time, challenges exist particularly regarding digital equity, data ethics and teacher autonomy. Scholars caution that without structured of literac training and ethical safeguards, the integration of Gen AI into teacher education may risk reinforcing systematic inequalities Kong *et al.*, 2024. Nevertheless, when responsibly integrated, Gen AI hold the potential to strengthen teacher professionalism align with NEP's policy frameworks and create a new generation of reflective adaptive and innovative educators prepared for the demands of future classrooms Prajapati, 2025.

Findings of the Review

Based on the synthesis of scholarly literature, several key findings emerged regarding the integration of Generative Artificial Intelligence GenAI into teacher education under the under framework of NEP 2020. Alignment with NEP 2020 vision: The review confirms that GenAI's applications- Such as personalized training, multilingual content creation, curriculum support, and AI-driven assessment - closely align with the teacher education reforms envisioned in NEP 2020. These reforms emphasize competency-based pedagogy, inclusivity, and lifelong learning. Government of India, 2020; Jolly & Kaur, 2025

Promise of Personalization and Reflective Pedagogy:- Gen AI enables adaptive learning pathways that can tailor professional development to teachers needs. Studies highlight how real-time feedback, automated lesson planning, and classroom simulations can support reflective teaching practices thereby enhancing teacher preparedness Xia *et al.*, 2024.

Limited India specific evidence:

Although global literature on Gen AI Education is growing rapidly there is a paucity of empirical research in the Indian teacher education context. Most existing works are conceptual or exploratory, with limited field-based evaluations on how Gen AI tools can be embedded into NEP-aligned B.Ed. or ITEP programs Prajapati, 2025; Moharana, 2025)

Equity and Ethical Concern:

A recurring theme across the literature is the challenge of digital inequity, data privacy and ethical risk. While Gen AI democratize access to learning resources, disparities in infrastructure and AI literacy may reinforce educational inequalities. Scholars also warn about issues of bias in AI generated outputs and the potential erosion of teacher agency if AI is not used responsibly Kong *et al.*, 2024; Moharana, 2025

Urgent Need for AI Literacy:

The findings indicate a pressing need for AI literacy programs in teacher education. Without structured training in ethical use, prompt design, and critical evaluation of AI outputs, teachers may misuse or underutilize Gen AI tools. Embedding AI literacy in the NCFTE and NPST frameworks could ensure that teacher use Gen AI as a supportive tool while maintaining professional autonomy. Andrii O Kolhatin, 2025; Xia *et al.*, 2024.

Prospects of Generative AI under NEP 2020

The integration of Generative Artificial Intelligence Gen AI into India's educational ecosystem present significant prospects for advancing the teacher education vision outlined in the National Education Policy NEP 2020. NEP 2020 emphasizes competency-based teacher preparation, reflective pedagogy, and technology through platforms like DIKSHA and the National Educational Technology forum (NETF) (Government of India, 2020) within this framework Gen AI offers several transformative opportunities:

Personalize Teacher Training and Feedbacks: Gen AI can provide adaptive learning pathways for pre-service and in-service teachers by analyzing their responses, teaching styles, and reflective practices. It enables instant feedback on lesson design, classroom simulation and assessment strategies, supporting NEP's emphasize on individualized professional growth (Andrii O Kalhatin, 2025).

Curriculum and Content Innovation: By automating resource generation, Gen AI can assist teachers in creating context specific, multilingual, and competency-based materials. This aligns with NEP's call for multidisciplinary and inclusive education, especially in India's linguistically diverse classrooms (Moharana, 2025)

Strengthening Reflective Pedagogy: Gen AI can simulated classroom scenarios and role-play interaction, enabling teachers to practice critical thinking and problem-solving skills before entering real classrooms. This strengthens NEP's vision of producing reflective and adaptive practitioners. (Xia *et al.*, 2024)

AI Powered Assessment and Professional Development: AI-driven platforms can generate data-informed insights on teacher performance, highlighting strengths and areas for improvement. Such analytics can feed into continuous professional development CPD programs envisioned by NEP 2020, there by institutionalizing a cycle of lifelong learning. (Jolly & Kaur, 2025)

Enabling Inclusive and Equitable Access: NEP 2020 stresses equity and inclusion in teacher education, and Gen AI can support this by generating low-cost accessible digital resources in multiple Indian languages. However, the effectiveness of this prospect depends on overcoming the digital divide in rural and marginalized regions (Prajapati, 2025)

Challenges of Generative AI under NEP 2020:

While the National Education Policy NEP 2020 envisions the integration of technology to transform teacher education, the adoption of Generative Artificial Intelligence Gen AI presents several challenges that must be addressed for successful implementation. Digital Divide and Infrastructure Gaps: A major challenges lies in India's unequal access to digital infrastructure. Rural and underserved areas after face poor connectivity, lack of devices, and limited digital literacy, which restricts equitable adoption of Gen AI based teacher training platforms. This contracts NEP's emphasize on equity and inclusivity in teacher education Moharana, 2025.

Ethical and Bias Concern: Gen AI systems are trained on vast data sets, which may reproduce biases, stereotypes, and misinformation. Such as can negatively influence teacher preparation, curriculum design and student learning outcomes. Scholars highlights that without ethical guidelines, over reliance on AI could undermine teacher autonomy and professional judgement Kong *et al.*, 2024.

Data Privacy and Security: Teacher Education involves sensitive personal and institutional data. Gen AI platform often require large scale data collection, raising concerns about data protection, cyber security, and intellectual property. Without clear regulatory frameworks, these issues may hinder the safe integration of Gen AI into teacher training. (Xia *et al.*, 2024)

Lack of AI literacy and Teacher Preparedness: Many teacher educators and trainees lack AI literacy, resulting in hesitation or misuse of Gen AI tools. Current literature emphasizes the need for capacity building programs and AI literacy modules with in teacher education curricula to ensure effective and ethical use Andrii O Kothatin, 2025.

Policy Practice Gap: Although NEP 2020 highlights technology enabled education through initiative like NETF and DIKSHA, there is still a lack of a correct implementation road map for integrating emerging tools such as Gen AI into teacher training. Scholars stress that bridging the policy practice divided requires collaborative action among policy maker, institutions, and educators. (Jolly & Kaur, 2025).

Conclusion

That National Education Policy and NEP 2020 has positioned teacher education as the cornerstone of India's educational transformation emphasizing competency based training ,reflective pedagogy, inclusivity and Technology integration through mechanism such as Integrated Teacher Education Programme ITEP, National Curriculum Framework for teachers. (NPST) (Government of India, 2020; and NCTE, 2021) within this policy landscape Generative Artificial Intelligence emerges as a powerful to with potential to reshape teacher training and professional development. The review shows that Gen AI holds significant prospects in enhancing teacher education : It an facilitate personalized training pathways, through simulations ,and support continuous professional development CPD via AI-driven analytics.(Andrii O Kothatin ,2025,Xia *et al.*,2024; Jolly & Kaur,2025) These applications align directly with NEP's vision of producing future ready innovative and reflective teachers . At the same time significant challenges persist.The digital divide threatens equitable access in rural and marginalized reasons (Moharana, 2025) While concerns about bias, ethics ,and data privacy underscore the risk of undergraduated Gen AI adoption (Kong *et al.*, 2024). Moreover, the lack of AI literacy among teachers and the absence of a policy practice road map create barriers to effective implementation Andrii O Kothatin , 2024; Jolly& Kaur,2025. Moving forward, the integration of Gen AI into teacher education under NEP 2020 requires a multi-pronged approach :

- Developing AI literacy framework embedded in teacher educational curricula.Establishing ethical and regulatory guidelines for AI use in education.
- Bridging the policy practice gap through institutional between policy makers EdTech developers ,and teacher educators.
- Ensuring equitable access by investing in digital infrastructure and low cost multilingually AI solution tailored to Indian contexts.

If harness responsible, Generative AI can act as a catalyst for realizing NEP 2020's vision of transforming teacher education. By balancing it's opportunities and risks, India can cultivate a generation of reflective, adaptive, and future ready teachers capable of leading classrooms in an increasingly digital and knowledge driven society.

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