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AI-Enabled Pedagogical Transformation: Opportunities and Challenges in Indian Classrooms

Ankur Bhatnagar[1] and Dr. Vikas Somani[2]
[1] Research Scholar, Department of Computer Science Engineering
Sangam University, Bhilwara, Rajasthan
[2] Professor & Associate Dea, Department of Computer Science Engineering
Sangam University, Bhilwara, Rajasthan

Introduction

The rapid development of artificial intelligence (AI) has caused waves of changes in all the aspects of human life on the planet-changing industries, reconceptualizing labor markets, and envisioning education. These fields include the sphere of education which is experiencing a particularly complex process of transformation. With classrooms around the world taking to the AI tool to provide a more in-depth engagement, personalisation, and efficiency, the Indian education system, which is a vast entity with diversity, and hierarchal in nature, is in a crossroad situation. The two forces of digital disruption and policy reorientation with the National Education Policy (NEP) 2020 have necessitated and yet complicated the use of AI in meaningful ways in the Indian pedagogical context of the rationale of preparing over 260 million students on an urgent demographic background (UNESCO, 2022).

In the case of India, where the state of education can be easily defined as being dualistic in nature, occupying both elite campuses, such as the IITs and IIMs, and underfunded schools in rural regions, there is a distinct set of aspirations, as well as trepidations, and uncertainties, when it comes to the implementation of AI in education. Although educational technologies start-ups and schools of the urban elite elate about the transformative potential of AI-based adaptive learning systems, chatbots, automated grading programs, and AI-empowered content curation, most Indian schoolhouses are still facing the weaknesses of infrastructure, digital illiteracy, and even linguistic pluralism. Therefore, AI is no longer a digital tool in this case, it becomes an epistemological, ethical and equity drenched tool that breaks with conventional roles of teachers, curriculum consensus and classroom order.

One very prominent pedagogical question that is at the core of this AI-driven transformation is about the transformation of the pedagogical process of how students will learn and how teachers will teach in the Indian classrooms with the AI in place. In contrast to the Western contexts in which the implementation of AI in schools is to a great extent dependent on the development of digital frames and small-scale learning of theories, Indian case will require a radical reimagination of the place of educators, language of instruction, and socio-cultural sensibility, and the political economy of education. In addition, the implementation of AI educational interventions should be not only assessed by technological effectiveness but also by the accessibility, inclusiveness, and relevance in context (Ghosh & Venkataraman, 2023). On the bright side of the AI, it also brings great opportunity to tackle some of the most deep-rooted educational bottlenecks that India faces. Individualistic lighting systems are capable of assisting the student in learning at his or her own speed and thus do not have to adhere to the one-size-fits-all teaching. Feedback automated systems can minimize workload on teachers and provide data-related information on learning gaps in students. Intelligent education aids can be designed to use AI to enable children with disability to access the curriculum via the use of voice assistants, visual recognition solutions and intelligent tutor

Corresponding Author: Ankur Bhatnagar, ankur.kumar002@gmail.com

systems (Raman & Kale, 2024). When such interventions are ethically and inclusively used, learning can be democratized in ways that have never been conceivable so far. Hence, the present study offers a critical analysis of the multidimensional opportunities and multilayered challenges that AI brings into the Indian classrooms. It questions how AI can reorganize pedagogical norms, expand individualized learning, and change the assessment practices, but also takes into account the pitfalls peculiar to India socio-culturally, infrastructural, and ethically. With India on the edge of a new paradigm of schooling, there is an urgent need to go past revelatory accounts and instead question the politics, promises, and pitfalls of AI in the classrooms. It is only in that case that we will be able to envision the AI-driven cyborg-like future of education that would not only be technologically superior but humane, culturally considerate, and socially equal.

Review of Literature

Over 2011 to 2013, foundational work was going on around the world on intelligent tutoring systems, adaptive learning and early classification algorithms aimed at predicting student performance. In spite of little studies produced in India, emulations around the world prepared the groundwork where experiments were later on done. Remarkably, B Aher and Lobo (2013) have shown the hybridization of the machine-learning algorithms in e-learning systems to recommend the courses (Aher & Lobo, 2013). They demonstrated the validity of personalized learning through the application of predictive analytics in a paper published in the Knowledge-Based Systems journal which was used as a precedent later implemented by Indian platforms. But no country specific empirical results were found during this process in India.

In 2014-2016, AI started to be promoted in concept despite the lack of bodies supporting this theory in India at that time. Das and Chattopadhyay (2014) touched upon academic performance indicators in Indian higher education which implies the need to have data-driven systems (Das & Chattopadhyay, 2014). At the same time, the future direction was shaped by the policy discussions about adaptive, tech-based education. More recently, in 2016 the Sampark Smart Shala program introduced audio-based digital learning in rural schools, though again, technically not AI, this was a precursor of the technology-mediated pedagogy (Sampark Foundation, 2016). These operations paved the way into subsequent formal introduction of AI.

By 2018, Indian scholars have already started recording pilot work using AI technologies and pedagogical intentions. Subrahmanyam and Swathi (2018) have discussed the advent of the smart content, intelligent tutoring systems and virtual learning environments in Indian urban schools. They witnessed small-scale recommendation engines and AI-based quizzes introduced in smart classrooms which trained the readiness of AI in Indian contexts (Subrahmanyam & Swathi, 2018).

A criticism of this approach by IT for Change cautioned in 2019 that fast adoption of AI would only further entrench surveillance, deskilling and privacy risks in Indian publicly funded education (IT for Change, 2019). In 2020, academic literature started to penetrate the reality of edtech ecosystems. Jaiswal and Arun (2021; based on 2020 data) spoke to Indian edtech companies to unveil the emergent personalized learning platforms, adaptive assessments, and feedback algorithmic systems, but they are in their early days (Jaiswal & Arun, 2021). Driven by their study, the era of theoretical optimism therefore gave way to empirical research on real-world deployment.

A systematic review was carried out by Ouyang, Zheng, and Jiao (2022) and, they found that predictive analytics, auto-grading, and recommendations were the prevailing AI functions, but there was little

advanced AI in usage in Indian institutions. They focused on the difference between potential and practice, in particular, in vernacular and rural environments (Ouyang et al., 2022). At the same time, the global models advised the consideration of ethical sensibility and socio-cultural conformity attributes in cognitive instruction of AI, which is particularly needed in India (Hwang et al., 2021).

Such frameworks have been introduced by Chaudhry, Cukurova, and Luckin (2022) of a Transparency Index Framework to measure fairness and explainability and a stakeholder trust mechanism of AI-based educational technologies- frameworks that the Indian researchers are adapting towards governance policy (Chaudhry et al., 2022). Meanwhile, other research (Subaveerapandiyan and Nandhakumar, 2022) explored the ICT capabilities of teacher educators in India in higher education during the pandemic, reporting missing pedagogy readiness skills in the online mode (Subaveerapandiyan and Nandhakumar, 2022). The research has collectively caused the digital divide to be refocused off of the technology itself and on to its institutional integration and human assimilation.

A notable publication of 2022 was that of Chaudhry, Cukurova and Luckin, by which a transparency index framework was designed to evaluate the facets of AI in education based on various aspects such as fairness, explainability and stakeholder trust. Developing this framework with the contributions of educators and practitioners, they emphasized transparency as the backdrop of governable AI pedagogy of great importance when it comes to application in a heterogeneous educational environment like India (Chaudhry et al., 2022). According to related research by Subaveerapandiyan and Nandhakumar, there are serious gaps in ICT preparedness in online instruction of teacher educator colleagues in the Indian higher education system, even in the post-pandemic period. The findings of their work point to the likelihood of the potential of AI being compromised by training gaps, the low digital literacy level, and the absence of pedagogical use even in cases when the same technologies are present (Subaveerapandiyan & Nandhakumar, 2022).

A number of publications on the India context emerged. Atheeq Sultan Ghori (2023) presented an empirical analysis through the Indian surveys on awareness, tolerance, and the perceived displacement caused by AI-based interventions on the Indian education systems (Ghori, 2023). In parallel, industry-wide reviews, such as the one in the area of inclusion and adaptive solutions, emphasized the necessity of culturally based AI solutions. In addition, Sharma et al. (2023) investigated child-centric inclusive AI based on design futuring and school children experimenting with the anticipation of equitable and responsible AI in New Delhi scenarios (Sharma et al., 2023).

In the future, design-based methods took place in 2023. The article by Sharma, Iivari, Vent-Olkkonen, Hartikainen, and Kinnula infers that there is a cross-country, comparative, study in New Delhi schools of inclusive and child-centered AI. Design futuring helped them involve Indian children into imagining and visualizing more ethical, bias-resistant AI futures; proving that participatory AI can make the AI technology more just and culturally situated (Sharma et al., 2023). Ghori (2023) used empirical surveys in the Indian educational institutions, recording the perceptions of the stakeholders about adoption of AI. He registered a climate of apprehensive optimism: teachers welcomed individuality of constituents and reduced burden of administrators, and remained concerned about equity, the role of teachers and the mismatch of resources (Ghori, 2023). The given studies signify the move towards practical framing of theoretical issues and participatory and context-oriented evaluation of AI in Indian schools.

Design-based approaches came up in 2023. A cross-country comparative study (containing New Delhi schools) of inclusive, child centered AI was conducted by Sharma, Iivari, Vent-Olkkonen and Hartikainen as

well as Kinnula. Design futuring engages Indian children in generating bias-resistant introductions to AI that take ethics into account; they illustrate how to make AI technologies more participatory (that is, more ethical and culturally Responsive) through design (Sharma et al., 2023). Further, Ghori (2023) surveyed empirically in many Indian schools and colleges, where the perceptions of stakeholders were recorded concerning adopting AI. The general mood was vague positivity as educators expressed gratitude towards the personalized study and the relief that lifting overwhelming administrative burdens granted the administrator, and had concerns about equity, teacher role, and resources unequal distribution (Ghori, 2023). The latter studies signal the transition out of theoretical framing to participatory and context-based evaluation of AI at schools in India.

Pathak and Waghmare (2024) directly examined the role of AI in secondary education in India and addressed possible advantages in terms of customization and such problems as technological infrastructure, digital literacy division, and linguistic diversity (Pathak & Waghmare, 2024). Gupta and Kaul (2024) conducted a systematic review on the deployment of assistive learning technologies in the process of providing inclusive education in India, and in this approach, they revealed the potential of assistive learning technologies as well as the individualized learning to benefit students with disabilities but acknowledged the variation in the rural urban context (Gupta & Kaul, 2024). In addition, Kenchakkanavar et al. (2024) outlined the character of transformative teaching and learning through AI in Indian schools and universities, accompanied by suggestions understood in the context of NEP 2020 (Kenchakkanavar et al., 2024).

Systematic reviews with specific regard to India were observed during the year. Inclusive education the full overview of AI was published by Gupta and Kaul (2024) which is based on Indian empirical reports and policy texts. They determined that the AI applications (e.g. assistive systems, adaptive curricula) had potential to be employed by learners with disabilities, although uneven infrastructure, linguistic split, and digit gaps were obstacles to scaling up (Gupta & Kaul, 2024). According to complements, Pathak and Waghmare (2024) examined the case of AI use in Indian secondary schools. By using mixed-method surveys and case studies, they discovered the advantages of a personalized learning experience and immediate feedback, whereas the problems of poor infrastructure and lack of teacher support, as well as vernacular insufficiency, still remained in place (Pathak & Waghmare, 2024). Selectively, a national cross-institutional study (Sindakis & Showkat, 2024) found that less than 30 percent of semi-urban and rural universities possessed any system with AI capability; AI literacy rates were low among faculty and policies in most institutions regarding data ethics were at the nonexistent stage (Gupta & Kaul, 2024; Sindakis & Showkat, 2024). All in all, 2024 saw the shift towards the empirically informed and India-specific critical considerations of the AI education implementation.

Yaduvanshi et al. (2025) have presented the AIIF framework policy and pedagogical model that ensures the AI implementation in the Indian classroom is aligned with the NEP 2020, with a focus on multi-stakeholder collaboration, the equity of infrastructure, teacher training, and ethical precautions (Yaduvanshi et al., 2025). Simultaneously, Goyal et al. (2025) carried out thematic examinations among volunteer educators in rural India exploring Large Language Model interventions; these researchers showed potential in personalized training, but listed significant obstacles such as inadequate associations, insufficient training, and the issue of dependency (Goyal et al., 2025). In the last, Gaumat and Rani (2025) explored the readiness of students to engage with AI in higher education through different models- pointing to the fact that performance expectancy and facilitating conditions are good predictors of adoption intentions among the undergraduate students in India (Gaumat and Rani, 2025).

Some important empirical and policy centered works came out in 2025. In a recent study by Goyal et al., volunteers and educators in rural Rajasthan and Delhi were surveyed on attitudes towards the Large Language Models (LLM) through thematic qualitative analysis. Participants emphasized that AI is no substitute to teachers (Goyal et al., 2025). Their demonstration research indicated that through algorithmic personalization and peer resource networks, the inequalities of access can be corrected mainly by focusing on local adaptation/sustainability (Bardia & Agrawal, 2025). On the policy front of institutions, Kumar Moitra (2025) sounded warning about impending regulation needs coupled with infrastructure investment in artificial intelligence as AICTE proclaimed 2025 as the Year of AI in 14,000 colleges (AICTE, 2025) scholars pointed out to the need of ethical guidelines, data protection, or training of educators to ensure misuse does not take place (Moitra, 2025)

Research Gaps

Even though there is accumulating evidence on AI in education in general and past five years in particular, there remain serious and subtle research gaps as far as artificial intelligence in education is concerned in India, both at the level of scholarship and practice. These gaps in the light of social-educational complexity in India, digital divide and linguistic diversity points towards greater exploration based on reality-based policy, classroom management, and pedagogical morality.

One, there is a significant lack of secondary data synthesis on a national level, and the one that has to be carried out concerns India. Although some general systematic reviews of the data (e.g., Ouyang et al., 2022; Hwang et al., 2021) and pilot studies in India (e.g., Ghori, 2023; Pathak & Waghmare, 2024) have already appeared, there is still no systematized analysis of secondary studies that critically raises the question of the patterns of AI adoption in the Indian educational layers of various profiles, including elite urban schools and underfunded schools in rural areas. The majority of researchers concentrate on individual interventions or case-specific facts but do not track a pattern on a larger scale with national or institutional databases like the UDISE+, DIKSHA analytics or the AICTE frameworks. This restricts their findings in scalability and transferability.

The literature covers the pedagogical outcome of AI implementation under-represented or with inadequate attention, in the instructional design, curriculum re-organization, and cognitive performance among learners/students. India has 22 official languages and a broad range of disparity in terms of digital literacy and accessibility, and AI tools developed in the spirit of one sized-fits-all cannot be applied without violating exclusive trends. Although the idea of inclusion and accessibility has been addressed in the larger body of edtech studies (Gupta & Kaul, 2024), the specifics of the interaction between the linguistic diversity, caste and gender norms, and rural-urban divides with the AI systems have not been researched in depth. Secondary datasets or qualitative synthesis have not been used to systematically assess the repercussions of the application of English-centric AI interfaces in vernacular schools and so on.

there is underwhelming cross-examination of existing data, e.g. government statistics of education, commercial performance reports by edtech providers, and research reviews of education. The majority of scholarships use qualitative or conceptual methods; thus, they are missing an opportunity to triangulate the results and reveal systematic patterns. This gap can be addressed using a data-driven and interpretative synthesis of secondary sources, which will render a national-level image of the pedagogical implications of AI across domains, demographics and governance levels. The role of teacher as an active partner in the AI equipped classrooms is not an aspect which obtains too much attention. Most of the discussions view AI as a subject or substitute of human teaching, as opposed to a mediator to the co-creation of experiences. This

is indicative of the more general under-evaluation of teacher agency in current models of AI use in education and the absence of emic examination of how Indian teachers are actively coping, resisting, or co-designing AI technologies in real time. It is possible to distinguish some individual efforts to develop such an approach, such as the MindCraft (Bardia and Agrawal, 2025) and the AIIF framework (Yaduvanshi et al., 2025), their success and feasibility still require longitudinal, comparative, and multiple sources of secondary data to obtain their effectiveness. This criticises the policy relevance of these models, and the crucial question remains how the process of AI integration in Indian classrooms can be systemized honestly and without the sacrifice of equity, access, or pedagogical integrity as such evaluative research has never been undertaken.

Research Objectives

- To comprehend the level of AI integration in India and specify the aspects to closely focus on, it is important to pay attention to the level of AI adoption in classrooms, the creation of supporting infrastructure, as well as the questions of digital equity.
- To evaluate improvements which occurred in the classroom with the use of AI technology in India
- Critically explore the systemic issues related to the adoption of AI in Indian classrooms, and devise strategic and evidence-based recommendation suggestions on how the adoption could best be connected to NEP 2020 goals

Research Methodology

The research relies on secondary data implying that it will utilize the information that can be already found in the sources provided by the government, the research journals, education surveys, and policy documents. Rather than the creation of new data via surveys or interviews, the study involves the use of established data in order to make out how the concept of artificial intelligence is being implemented in the Indian classroom. The goals are to find the potential opportunities AI opens, such as individualized learning and intelligent assessments and the problems posed by poor internet connections, teacher preparation, and challenge of language. The study also examines actual scenarios in schools and colleges by closely reading reports, articles, and official documents to propose the ways in which AI may be more utilized in the education system of India.

Data Analysis and Interpretation

Objective 1: Exploring Patterns of AI Adoption in Indian Education

The secondary data using government publications, scholarly studies, and industry reports show an extreme difference of AI adoption levels in the education sector in India. Pilot artificial intelligence labs, personalized learning systems and evidence-based assessment systems are common in elite schools and in a limited proportion of urban privately funded schools. Such settings enjoy the provision of special facilities, superfast internet, and access to international education facilitates. In comparison, schools in government or rural environments are largely underutilized when it comes to the innovations of AI. Dissemination of AI tools is so much linked to preparedness by institutions, both, in hardware and in human resources. Although policy-level documents, particularly those supported by NEP 2020 envisage an AI-supported learning environment on a universal scale, based in reality, the practice is restricted only to pockets with high resources. Industry whitepapers reproduce this trend, citing anecdotal reports of AI adoption in urban areas, and invariably also citing low adoption in rural or poorly funded schools.

Resource imbalance and institution preparedness

Processes AI are often piloted in elite institutions and in privately run schools in urban settings, often using adaptive learning systems, algorithmic grading tools, and smart dashboards that aid instruction. Such environments have a strong infrastructure, which creates a reliable power connection, Internet connection, digital devices, and support for experimenting with AI on a long-term basis (Das, 2025; Mehta, 2024). In contrast, schools in rural India still have a problem with digital infrastructure basics. According to UDISE+ data, there are not even 1 percent of government schools that use digital libraries, intelligent classrooms, or working projectors where the AI-enabled learning relies (Ministry of Education, 2025). Henceforth, the technological ability to operate AI tools is missing throughout many country schools as limitations such as power allocation, network access, and gadget insufficiency tyranny constantly affect daily operations.

Aspirations of Policies vs. On-the-ground Movement

Whereas the National Education Policy 2020 lays out a strong vision that supports AI-based learning and digital tool teacher training, secondary sources indicate that there is still disparate implementation. AI modules in curriculum and teacher education frameworks have been launched by CBSE and a number of state governments (Ministry of Education, 2020). Nevertheless, few teacher education providers currently include AI literacy--or computational thinking--in the pre-service educational program (Kumar & Sindakis, 2024). Similarly, in industry reports, we see a similar claim that about 50 percent of Indian EdTech websites purport to have an AI-driven adaptive approach, yet the penetration of EdTech in tribal/low-end schools is drastically at low levels (EdTech Review, 2025). This highlights an ongoing decoupling between policy directive and realised practice in the majority of learning establishments.

Educational Urban-Rural Divide

Unequal distribution of artificial intelligence in both urban and rural areas is a thematic concern in the statistics. The different studies have shown active use of generative AI tools and adaptive platform in the schools and colleges in the metropolis (Times of India, 2025). Such technologies are not easily available even in the rural and semi-urban schools, however, as the states lack the infrastructure and teacher training (Education for All in India, 2024). It is noted that only in situations in which AI-facilitated personalized learning is implemented in urban schools with the appropriate take-up of digital resources is the engagement and performance notably improved (Swargiary, 2024).

Industry initiatives; Pilot initiatives

There is also a variation in the use of AI amongst pilot programs. Nonprofit innovation New nonprofit initiatives such as the Baithak app through Sampark Foundation have implemented some aspects of AI, including analytics about learning pace and progress of students, in thousands of government schools. However, even these scalable solutions are restricted to a specific number of states and platforms and are quite frequently limited in their functionality, as compared to commercially available AI tools (Round Table India, 2024; Wikipedia, 2024). As a result, effective AI interventions tend to be experimental and can only continue to be so thanks either to external funding or NGO organizing.

Digital Literacy and Preparedness by Teachers

The absence of teacher readiness is mentioned as the major hindrance in secondary literature. As the UDISE+ data and related reports demonstrate, a major part of teacher educators working in governmental institutions lack having formal training in ICT or AI, a fact that is well recognized in the literature to be the barrier to the usage of even the simplest digital tools (Riddled et al., 2022; Guha & Sen, 2025). The rural and public-school teachers are less likely to apply the presented AI features in teaching or implement it in pedagogy unless they have appropriate training and the belief in AI capacity.

Insights and Patterns of Interpretation

- The use of AI is highly associated with the availability of resources, not all institutions within place digital policies, trained faculty, and stable infrastructure had implemented AI in a constructive way.
- Urban and elite institutions are incubators since they experiment with perfect AI-based learning devices, although they have yet to trickle down to national wide integration.
- Policy frameworks say how ambitious it is but unless you have full-scale planning of infrastructure and training of teachers, adoption is very piecemeal and elite driven.
- NGO and industry pilot programs have promises, yet are small, dependent on future funding, and restricted by a lack of institutional change.

The review of data shows that there is a severe disparity in the use of AI throughout the Indian educational sector. Whereas trial and experimentation are major issues in elite institutions and urban schools, rural government schools are poorly equipped structure wise including infrastructure, lack of training and evenly implemented policies. Such a conceptual framing reinstates the importance of context-sensitive, scalable, and inclusive AI strategies in line with the National Education Policy 2020 of India.

Objective 2: Assessing Pedagogical Shifts Enabled by AI Technologies

The study emphasizes adaptive curriculum delivery, intelligent feedback loops, and differentiated learning experiences tailored to individual student needs. Internal evaluations by platforms and educational start-ups report improvements in student engagement and teacher efficiency. Independent academic reviews corroborate that AI's impact is most visible in well-managed pilot classrooms. However, there remains insufficient independent evaluation to gauge whether these gains persist over time or replicate across diverse school types. Critics often question whether AI-based personalization truly enhances conceptual understanding or primarily accelerates access to structured content. What emerges clearly is that AI tools are transforming classroom dynamics—in urban environments with supportive pedagogical cultures—but their effect remains modest and confined without broader infrastructural or pedagogical integration.

Personalized instruction and Adaptive Learning

Research found on AI-powered learning applications shows that platforms based on intelligence enable unique curriculum pace according to the course of each learner. Such systems can enhance all students to go above the syllabus of their classes or repeat weak areas without having to wait until the class is done (Nair and Raghavan, 2023; Sharma et al., 2024). However, as longitudinal academic reviews warn, adaptive delivery is prone to leaning towards procedural competency, at the expense of meaningful conceptual mastery, especially where the content is academic, such as in mathematics or science. The danger is that being able to complete more problems and faster, the students might not have time to build their conceptual foundation, which will not be strong unless enhanced through inquiry facilitated by teachers (Gupta & Kaul, 2024).

Automatic Assessment and Adult Learning Feedback

AI tools are increasingly being used to provide immediate feedback to student performance--marking when they are wrong, providing hints and tracking progress. According to teachers in well-equipped schools, such functionality leaves them free to tend more to activities involving facilitator responsibilities, motivator activity, and the deeper discussion (Singh et al., 2024). According to case studies made by Vedantu and Byju, this feedback raises the instance of practicing and correcting errors in the early stages. The crucial thing, however, is that academic literature notes that automated feedback tends to be contextually devoid of nuances. The comments made by AI are more likely to be about correctness as opposed to instructions

on the reason behind a process and are not intended to stand up in lieu of teacher-student interactions to investigate student thinking/disagreements (Raman & Thomas, 2023). Thus, as there is a time-saving effect, one should not deny the use of such tools altogether because it is expected to supplement but not replace human moderation in the development of higher-order thinking skills.

Experience and Engagement of Students and Scholars

The result of qualitative evidence in the pilot schools indicates that students working on AI platforms do more willingly on their work, especially in cases where the system is able to adapt to their interest and pace of learning. Studies conducted by Swargiary (2024) in the urban classroom settings have found that the students find AI more interesting and engaging compared to regular textbook use or lecture-based learning. According to teachers, there is improvement in participation particularly amongst learners who showed disinterest or had special needs.

The role of teachers in AI supported environments

One of the trends in secondary literature is the preconception of the role of teachers in the AI-enabled environment. In the pilot environments, teachers say they move away from content delivery towards providing learning support, acting as coaches of metacognition, and organizations of student meta-cognition (Chaudhry et al., 2022). Nonetheless, other surveys are more ambiguous: even though some teachers express the opinion that AI is an effective assistant, some fear being deprived of the ability to manage the classroom or losing personal teacher-student relationships (Goyal et al., 2025). Researchers indicate how much the efficacy of AI devices relies on teacher training. Transitions in pedagogy were easier in classrooms where the teachers were given the chance of systematic introduction to AI tools. Conversely, in the case of ad hoc or non-existent training, tools continued to be underutilized or abused.

Change sustainability of Pedagogies

The second data show the concern whether any significant movements noticed pedagogically are temporary. The pilots, frequently funded externally or community-based short-term professional development, are time limited and a common AI implementation strategy. There are limited investigations with an evaluation of whether teachers still apply AI tools during the post-pilot or an examination of how the primary classroom practices change in the long term (Pathak & Waghmare, 2024). In addition, there is some support of institutional inertia: unless there is action to carry through in institutional policy or continued support, AI-driven pedagogical change tends to stagnate. This means that long-term change necessitates system wide integration, not just on a single pilot scale.

Objective 3: Investigating Systemic Challenges and Policy Alignment

Infrastructure constraints and disparity Structural

The secondary data has been indicating that infrastructure is by far the greatest obstacle to the use of AI in Indian education. According to the records of national education surveys, a large number of government and rural schools do not have access to stable Internet connection, digital devices, or electricity backup mechanisms, which are essential in implementing the AI tools (Ministry of Education, 2025). Testimonies concerning technology-based pilot projects also indicate the same, that internet bottlenecks or lack of devices often disrupt the lesson schedule, compromising not only teacher confidence but also the continuity of students. This has the effect of producing a double-bind: students and teachers lose confidence in digital tools when infrastructural provision may be degraded in very long periods of time.

Teacher Capacity, Training and Role Perception

One of the central points in secondary literature is that the training of teachers in AI-infused pedagogy is insufficient and makes them hardly use the available mechanisms. Workshops or online certifications are some of the activities provided by some institutions, but there is no unified and nation-wide education which guarantees that every educator will have the opportunity to work with AI platforms (Kumar & Sindakis, 2024). It can also be observed in secondary accounts concerning a discrepancy between the perceived role of the teacher and AI capabilities: most teachers state that acts of abandoned autonomy; the technology, either in the form of algorithmic recommendations or automated feedback, acts as an obstructor instead of a mentor (Chaudhry et al., 2022). In the absence of well-developed models that incorporate AI into pedagogy, the tools will not be used to their fullest extent or will not be aligned with classroom conditions.

Language-Cultural Ostracism

The study raises the issue of linguistic bias as one of the problems. The current applications of AI capabilities in India are mainly conducted in English and some of the most popular languages, such as Hindi, while ignoring the language diversities that exist in the regional and tribal languages (Charania et al., 2023). The lack of inclusion has the semblance of being systemic as articulations can be found in reports and academic reviews: the content of the regional languages is either not represented at all or way underrepresented to a point of essentially marginalizing learners in regard to about half the linguistic landscape of India. This triggers the equity issues of increasing the current education stratifications through AI, as it is English-medium education that is prioritized by NEP 2020 in terms of multilingual and culturally competent education.

Privacy, Opacity of Algorithms and Ethical Issues

The AI platforms often lack effective and clear ethical and privacy protection. Faculty surveys in elite colleges indicate that many are worried about their data being processed without clear consent or control (Times of India, 2025). Instances of storing data remotely, involving third parties in its processing, or using it for predictive analysis without parental awareness contribute to a growing distrust among both parents and educators (Gupta & Kaul, 2024). Moreover, the lack of trust is amplified by learning recommendations that cannot be explained or audited due to algorithmic opacity. NEP 2020 highlights the necessity of digital learning tools governance with ethics; however, secondary analysis indicates that very few schools had data protection policies and guidelines on the use of AI in practice.

Mismatch between Policy Goals and Reality on the Ground

NEP 2020 sees a holistic use of AI to transform classrooms through adaptive content, automation of assessment and training of teachers, however most of the policy intentions are not met. As an instance, whereas the policy requires the integration of AI pedagogy in the teacher education programmes across the country, fewer pre-service institutions have started their implementation (Kumar & Sindakis, 2024). Similarly, while the policy encourages private-public partnerships for AI-related initiatives, these collaborations are primarily found in urban and elite regions, leaving many rural areas in India without any AI pilots. Such shortages indicate not only resource imbalances but also shortcomings in planning, coordination, and other accounting systems that are more systemic or institutional in nature.

Major Findings:

Improper and uncoordinated AI usage in education Demographics

The most striking observation is the atomized underpinnings of structural inequality between the allocations of AI technologies in the classrooms. Although there are already a few urban and elite institutions that are

beginning to use AI tools in the learning environment either as pilot programs or in agreement with a commercial EdTech company, the larger education system has not been impacted. The government schools, especially in rural areas and semi-urban areas, do not have access to basic infrastructure facilities like access to electricity, internet, and Internet-based devices (Swargiary, 2024; Ministry of Education, 2025). This disparity further perpetuates an already unequal educational environment, so that the gains of AI are reaped mostly by students with well-provided situations rather than following the equity-based ideals of the National Education Policy (NEP) 2020.

The pedagogical potential of AI is High, yet qualified

The review also shows that AI-based software has the ability to dramatically transform pedagogy by providing variable content, intelligent responses and individualized learning paths that respond to the unique requirements of each student. AI technology has created new personalized models of instructions whereby education is no longer based on a uniform delivery of knowledge one know-how, especially in the field of STEM where the method of teaching includes recurring the concepts and monitoring educational achievements through the algorithm-based platform (Sharma, et al., 2024; Nair, and Raghavan, 2023). These advantages, however, are strongly dependent on background issues: the effective participation of teachers, the stability of infrastructures, and incorporation into curriculum schemes. Where AI is new in a school and there has been no training or pedagogical-alignment, it will only be used superficially, in drill- and repeat-style activities. Furthermore, the impact assessments over a long period are mostly lacking, and thus we do not know much about the long-term benefits of AI in a variety of learning environments.

Teachers Feel Confusion in Reconfiguration of roles and dressing of skills

Teachers are the key factor regarding the implementation of AI, and they are usually not properly supported when moving towards the transition. Even though some teachers welcome AI as a co-teacher who can help in administration or grading, most of them are concerned with the loss of professional agency and role dilution (Chaudhry et al., 2022; Goyal et al., 2025). The absence of systematic education and exposure to varying degrees causes fear, restraint or failure to use such tools optimally. Even with provision of training, it is mostly aimed at operations and use of tools with little to zero capability of empowering teachers to interpret and apply AI insights into their classroom settings.

Ethical, Linguistic and Cultural Issues have not been sufficiently addressed

One of the most important systemic problems is the fact that AI in the context of education is not made ethically clear and inclusive. The platforms mostly work in English or Hindi and do not include students who can study in vernacular languages or even tribal ones. This linguistic exclusion undercuts the goal of inclusivity in NEP 2020 and continues to disadvantage the already marginal students (Charania et al., 2023). Also, there are fears of data privacy, bias in algorithms, and transparency issues. Teachers and parents are usually ignorant of how the data on students is stored, processed, or otherwise used, which causes mistrust against commercial AI programs applied in educational environments (Gupta & Kaul, 2024; Times of India, 2025b). These facts indicate the necessity of national models on ethical AI governance in education.

Frequent Disconnect between Policy Intent and Practice

Even though NEP 2020 presents a visionary plan on the importance of integrating AI in the educational system, its practical application remains disorganized and irregular. It is obvious that there is a desirable image of what has not been achieved yet universal AI literacy, integration in teacher education and AI-enabled learning. A majority of teacher education institutions have failed to enroll AI modules in their training programs, and most state education departments do not have tailored AI implementations (Kumar

& Sindakis, 2024). Moreover, pilot programs, contrary to their innovative character, are not being scaled with systemic planning or funding sustainability. The development presents a compelling indication of the national endeavor, which should harmonize policy expectations and local, institutional capabilities.

Short Term Initiatives are at danger of Overtaking Long-Term Transformation

A large number of EdTech interventions are funded on a temporary basis by shotgun grants or partnerships and are not sustained in the curricular or infrastructural ecosystem of states. The lack of ownership on institutional level means that these efforts quickly dissipate without the initial fervor, resulting in pieces of disconnected digital experiences, and unused platforms. This result highlights the necessity of planning AI stratagems to be scalable, teacher owned and sustainable financially. All together, these results illustrate an environment where misconceptions about AI are present, yet the effect on Indian education remains a possibility that has not yet materialized. They possess the tools, hold the potential for pedagogical applications, and are supported by a favorable national policy. However, until the systematic challenges that encompass infrastructural deficiencies, language communication issues, teacher preparedness, and professional integrity are addressed, the adoption of AI will remain divisive and unequal. The most important next step seems to be not the creation of new technologies, but rather the establishment of inclusive, ethical, pedagogically aligned, and locally adapted implementation ecosystems.

Conclusion

The path to AI-enhanced pedagogical transformation is risky but bright at the same time. The extent of AI integration in Indian classrooms, assessing the pedagogical transformations induced by artificial intelligence, and critically examining the systemic barriers are hindering its widespread implementation. The research objectives provide a systematic prism through which it was possible to unravel the effects of AI in real classrooms, the possible opportunities, it presents to teaching and learning, and gaps still to be filled institutionally, infrastructural and ethically. Positive indications of AI's impact on personalized learning, real-time feedback, and dynamic teaching methods already exist, especially in well-funded urban institutions where staff training on AI-related topics is more feasible and algorithms are accessible. On the other hand, inadequate infrastructure, limited teacher autonomy, and a scarcity of localized content have kept AI innovations on the periphery of most educational systems throughout India. Crucially, AI failures are unrelated to its capabilities; rather, they stem from shortcomings in training, preparation, and integration. The results demonstrated that without developing teacher capacity, acknowledging language diversity, encouraging ethical standards concerning student data, and ensuring classroom engagement aligns with national policy, artificial intelligence tools will not connect to the real lives of most Indian students and teachers.

It can be stated that despite being on the brink of a possible digital revolution, the education system needs more than just policy statements and EdTech interventions in order to make the potential a reality. It requires structural preparations-the ones that consider empowerment of teachers, decentralization of curriculum, ethics in governance and infrastructural inclusivity. AI is to be perceived as a source to enhance the human aspects in education and not as a substitute. The future of education should be diverse, adaptable and embedded in the tradition and diversity as NEP 2020 reasonably envisions. To aid that vision, AI should be integrated in the cloth of pedagogy and not be strapped to it. And it is only then that we can transition to a national transformation in the way knowledge is delivered, accessed and experienced in all its classrooms.

Implications

The present study has severe repercussions on Indian education policy makers as well as classroom practitioners. At the policy level, one can notice that promotion of the integration of AI is not sufficient by means of developing strategic documents like the NEP 2020 and spreading awareness about the importance of the integration thereof at the policy level. Systemic congruency between vision and implementation is required, especially in under-serviced areas where AI is little more than a promise, instead of reality. The government will have to focus more on digital infrastructure which goes beyond the provision of devices but includes providing stable internet, localized software and training teachers on how to use the software in the field as opposed to generalized training. Besides, the policies should promote space decentralized, state-led AI strategic plans, also taking India considering it's linguistic, cultural, and socioeconomic diversity into account.

The research leaves a message to practitioners as well as an orientation change is recommended, to view AI as either a burden or threat, and it is proposed that AI may be viewed as a collaborative pedagogical tool. Capacity-building programs are urgently needed to accrue more than technical training and focus on pedagogical alignment, ethical awareness, and integration of the curriculum. Educators should not be treated as AI-powered education end-users but as co-designers. Also, the EdTech companies and content providers need to partner with teachers, linguistics experts; local curriculum boards and the content providers and developers have to make sure that the content and platforms support Indian classrooms and Indian reality. A balance between regional languages and inclusive content without learners with disabilities and incongruence with academic objectives is not a luxury; it is what makes AI sustainable and relevant to education.

Limitations and Future Studies

This study is based on secondary data. The lack of empirical evidence at the classroom level constrains the degree of detail with which one can examine the data using government reports, peer-reviewed journals, and EdTech case studies, even though the latter provide invaluable knowledge. The firsthand precision was not possible in terms of regional differences, teacher attitudes and student experiences. Moreover, AI technologies are evolving fast, which indicates that the data analyzed might fail to reflect the new or late emerging tools and sophisticated innovations in classrooms, in addition to the sporadic policy responses at state level. Such limitations never reduce relevance in the findings, but they present a reason to generalize results to all other regions and types of school in India with considerable caution. It is also important to analyze gaps in future research to respond to these limitations, including primary data collection on a representative sample of Indian schools (urban and rural; those run by the government and parent; etc.). Longitudinal research is of particular value when studying the development of AI interventions over time, and whether short-term engagement and learning will result in long-term learning or more fundamental education. The comparative analysis of teacher professional development models in AI across states is another opportunity that could determine practices that can be scaled. Furthermore, the next research needs to consider the ethical and governance models of AI education, especially when considering student data privacy, the transparency of algorithms, and bias elimination. With India moving in the direction of a digitally enriched education in future, such research will be critical in the process of guaranteeing that instead of being an obstacle, AI becomes a gateway to shedding light to parity and quality.

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