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Research Article

Artificial Intelligence, Equity, and School Transformation in India: A NEP 2020 Perspective

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Abstract

Artificial Intelligence (AI) is emerging as a transformative force in school education, and India is now moving toward a structured integration of AI tools within the framework of the National Education Policy (NEP) 2020. NEP 2020 emphasises the strategic use of technology to improve access, equity, quality, and learning outcomes, while official NCERT and Ministry of Education initiatives show that AI is being introduced through curriculum development, teacher training, digital platforms, and ethical guidance. This article examines how AI tools can support the integrated development of school education throughout India by strengthening pedagogy, assessment, teacher support, school administration, and inclusive learning. It also highlights the structural challenge of the digital divide, which remains a major barrier to equitable implementation, especially in rural and disadvantaged contexts. The article further argues that teacher learning communities are essential for building digital literacy and sustaining innovation at the school level. The study concludes that AI can contribute meaningfully to Indian school education only when it is implemented through a phased, ethical, inclusive, and teacher-centred approach aligned with NEP 2020.

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INTRODUCTION

The transformation of school education in India has become a national priority in the context of technological change, social inequality, and the growing demand for future-ready skills. The school system must serve a vast and diverse population across urban, rural, tribal, multilingual, and economically unequal settings. In such a context, technology is increasingly seen not as a luxury but as a necessity for expanding reach, improving quality, and making education more responsive to learner needs. AI tools have emerged as one of the most promising developments in this direction because they can support personalised learning, automated feedback, learning analytics, administrative efficiency, and teacher assistance. NEP 2020 offers the policy foundation for this transformation. It clearly recognises technology as a means to improve access, equity, quality, and learning outcomes, and it supports the integration of contemporary subjects such as Artificial Intelligence at relevant stages of schooling. The policy's larger vision is learner-centred, competency-based, inclusive, and flexible. AI fits this vision because it can help schools respond to different learning speeds, language needs, and performance patterns while also supporting teachers and educational administrators. However, the policy also implies an important caution: technology must support pedagogy rather than dominate it. India is already moving from policy intent to implementation. NCERT's CIET has organised a training program titled "Leveraging AI for Transforming School Education," which explicitly frames AI as a supportive tool for personalised learning, adaptive instruction, assessment reform, learner support, and data-informed decision-making. The Ministry of Education has also announced that AI and Computational Thinking will be introduced from Grade 3 onwards, beginning in the 2026–27 academic year, with support from CBSE, NCERT, KVS, NVS, states, and union territories. These developments indicate that AI is no longer a peripheral idea in Indian schooling; it is becoming part of the mainstream educational agenda.

At the same time, the introduction of AI tools raises important questions about equity, preparedness, ethics, and feasibility. India's digital divide remains severe in many rural and marginalised areas, where access to electricity, internet connectivity, devices, and trained support is uneven. Teacher digital literacy is also highly variable, making professional development a central issue. For this reason, the integration of AI tools into Indian school education must be understood not simply as a technological shift but as a systemic reform requiring policy support, infrastructure expansion, teacher learning communities, and ethical safeguards. This article examines these issues in an integrated manner with special reference to NEP 2020.

Policy Framework

NEP 2020 marks a decisive shift in Indian education policy by emphasising technology as a strategic enabler of educational reform. The policy states that digital tools, online platforms, and educational software should be developed and made

available in major Indian languages and uploaded on shared platforms such as DIKSHA. It also identifies key areas for technology integration, including digital infrastructure, online teaching platforms, content creation, virtual labs, online assessment, blended learning, teacher training, and digital repositories. This broad framework creates the policy space within which AI tools can be introduced in schools. A particularly important element of NEP 2020 is its concern for inclusivity and equity. The policy recognises that digital and technological solutions must not deepen educational inequality. Instead, they should be used to extend quality learning opportunities to all children, including those in remote and under-resourced areas. This principle is highly relevant for AI because AI systems often require infrastructure, data, and expertise that are unevenly distributed. NEP 2020, therefore, implies that AI must be introduced with attention to the digital divide, local language support, and teacher preparedness.

Government communication after NEP 2020 has made this policy direction more concrete. In 2022, the Ministry of Education stated that NEP 2020 recommends the introduction of contemporary subjects such as Artificial Intelligence, and that CBSE had already introduced AI as a subject at the secondary and senior secondary levels in affiliated schools. More recently, the Ministry has announced that AI and Computational Thinking will be gradually embedded from Grade 3 as part of a consultative and inclusive curriculum design process. These steps show that AI is now being treated as both a curriculum subject and a pedagogical tool.

NCERT's CIET has also strengthened this policy direction through training, content development, and platform-based support. Its AI training program emphasises ethical and responsible use, data privacy, transparency, fairness, inclusivity, and the human-centred role of teachers. This is consistent with NEP 2020's broader educational philosophy. AI should therefore be seen as part of a policy ecosystem that includes curriculum reform, teacher training, digital platforms, and governance mechanisms, rather than as a stand-alone innovation.

AI Tools in Schools

AI tools in education are digital systems that use data analysis, pattern recognition, and adaptive response to support teaching, learning, and administration. In school education, these tools include intelligent tutoring systems, adaptive learning platforms, automated assessment systems, chatbots, translation tools, learning analytics dashboards, content recommendation engines, and administrative automation tools. Their main value lies in the way they can personalise learning, reduce routine burdens, and generate feedback at scale. One of the most important uses of AI is personalised learning. Indian classrooms are often large and heterogeneous, making it difficult for teachers to provide tailored instruction to each learner. AI-based platforms can identify where students are struggling, suggest appropriate exercises, and modify the sequence of tasks according to learner progress. This is especially useful in subjects such as mathematics, language

learning, and science, where misconceptions can be diagnosed early through regular digital interaction. AI, therefore, helps move schooling closer to the learner-centric model advocated by NEP 2020. A second use is formative assessment. Traditional assessments often provide feedback too late to support immediate improvement. AI can generate quick quizzes, analyse student responses, and provide instant feedback so that both students and teachers can respond more effectively. This is valuable in competency-based education because it helps track understanding, application, and progression rather than rote memorisation alone. However, automated assessment must remain under teacher supervision to avoid over-reliance on machine scoring. A third use is classroom support through translation, voice assistance, and content adaptation. India's linguistic diversity makes this especially relevant. AI tools can support multilingual communication, simplify instructions, or help students who are hesitant to ask questions in class. For children with disabilities, AI-powered accessibility tools such as text-to-speech, speech-to-text, and captioning can greatly improve participation and inclusion. These functions align closely with NEP 2020's inclusive vision. AI also has a growing role in school management and administration. Attendance tracking, timetabling, communication, reporting, and school data management can all be made more efficient through AI-supported systems. In a system as large as India's, reducing administrative burden can free up time for teachers and school leaders to focus more on instruction and student support. However, such systems must be designed with strong privacy safeguards and transparency so that efficiency does not come at the expense of accountability.

Integrated School Development

The value of AI tools is best understood in terms of integrated school development. This means improving not only one aspect of schooling, but the entire system, including pedagogy, curriculum, assessment, administration, teacher development, and learner support. AI is particularly suited to this integrated approach because it can connect these areas through shared data, adaptive systems, and digital platforms.

At the classroom level, AI can support differentiated instruction. Teachers often face the challenge of managing mixed-ability classrooms, where some students need remediation while others need enrichment. AI tools can help by recommending additional practice, identifying learning gaps, and offering differentiated activities. This makes it easier to include more learners meaningfully in the same classroom environment.

At the school level, AI can support evidence-based planning. School leaders can use AI-supported dashboards to monitor attendance, performance, resource use, and student needs. Such information can help schools allocate attention and support more effectively. At the district and state levels, aggregated data can inform policy decisions, training priorities, and intervention strategies. In this sense, AI can help school systems become more responsive and data-informed.

Integrated development also requires that AI be linked with curriculum and teacher education. NEP 2020 stresses the development of digital content and teacher capacity alongside infrastructure. This means that AI should not be introduced as a separate technical layer. It must be woven into classroom practice, teacher training, and school governance in a way that supports broader educational goals. Without this integration, AI risks remaining an isolated pilot rather than a sustainable reform.

Classroom and Assessment

The classroom is where AI's educational promise becomes most visible. AI tools can create a more interactive and responsive learning environment by combining personalisation, feedback, and accessibility. For example, an AI-based language platform can help students practice reading and writing at their own pace while giving teachers data on comprehension and progress. Similarly, an AI-supported mathematics tool can identify recurring errors and recommend targeted exercises.

Assessment is one of the most useful classroom applications of AI. Instead of relying only on end-of-unit or term-end examinations, teachers can use AI to conduct frequent formative checks. This helps identify misunderstandings early and supports remediation before gaps widen. The resulting feedback can also improve classroom planning because teachers can see which concepts need more explanation. This approach is in line with NEP 2020's emphasis on holistic and competency-based learning.

AI can also support collaborative learning through chatbox, question-answer tools, and digital peer interaction. Students may be more willing to interact with digital assistants than to speak in front of the whole class, especially in lower grades or in linguistically mixed settings. Such tools can encourage participation, though they must be carefully moderated to ensure accuracy and safety. In practice, the teacher remains the final authority who interprets, contextualises, and deepens learning.

The main limitation is that AI-based classroom tools may overemphasise what is easy to measure. Creativity, discussion, ethical reasoning, and emotional development are not always captured well by digital metrics. For this reason, AI should be used as a supplement to teacher judgment rather than as a replacement for it. NEP 2020's holistic framework supports this balance by placing human development at the centre of education.

Teacher Support and Learning

Teachers are the foundation of school education, and AI can only succeed if teachers are prepared to use it confidently. AI tools can reduce repetitive tasks such as worksheet creation, question generation, grading support, and report writing. This can free teachers' time for lesson design, mentoring, and individual support. In schools where teachers face heavy workloads, this is a major advantage.

Teacher development is also necessary because AI tools are not self-explanatory. Teachers need training in how to use them,

how to evaluate their outputs, and how to apply them responsibly in the classroom. CIET-NCERT's AI training program makes this point clearly by emphasising AI literacy, curriculum alignment, and ethical use. The government has also indicated that NISHTHA modules and video-based resources will support AI curriculum implementation. This shows that the teacher is central to the reform process.

A key issue is whether teachers see AI as useful or threatening. If AI is presented as a top-down mandate or as a replacement for professional judgment, resistance is likely. If, however, AI is presented as a practical assistant that saves time and supports inclusion, teachers are more likely to adopt it. That is why training must be hands-on, contextual, and linked to actual school tasks. Professional learning should build confidence rather than anxiety.

Teacher support must also include school leadership. Principals, head teachers, and block-level administrators play a decisive role in how technology is adopted. If school leaders encourage experimentation, protect time for learning, and create a supportive culture, teacher adoption becomes much easier. Thus, AI implementation is not only about software; it is about building a professional culture that values continuous learning.

Digital Divide and Inclusion

The digital divide remains one of the greatest obstacles to the equitable introduction of AI tools in Indian school education. The divide is visible not only in access to devices and internet connectivity, but also in electricity supply, digital literacy, language support, and the availability of technical assistance. In rural and disadvantaged areas, these gaps are often combined, creating cumulative disadvantage.

The issue is particularly serious in schools that lack stable infrastructure. Recent analysis indicates that although a large share of Indian schools have become online, many still face major connectivity and electricity problems. In such contexts, AI-based platforms may be impossible to use consistently. This means that AI can only be effective if basic infrastructure is strengthened first. Otherwise, technology adoption may remain uneven and symbolic. The digital divide also has social and linguistic dimensions. Many AI tools are designed for users who are already digitally literate or who operate in English. Yet Indian schoolchildren study in diverse languages and come from families with unequal access to digital resources. As a result, digital learning may reinforce pre-existing inequalities unless content is localised and interfaces are multilingual. NEP 2020's emphasis on Indian languages makes this issue especially important. There is also a gender dimension. In many households, boys and girls may not have equal access to devices, internet use, or support for digital study. This means that the digital divide can reproduce broader social inequality unless policy specifically addresses it. School education policy, therefore, needs to think beyond access alone and include social inclusion, teacher support, and community engagement. Bridging the digital divide is essential for making AI meaningful in Indian schools. This requires infrastructure

investment, affordable devices, school-level technical support, offline and low-bandwidth solutions, local language content, and targeted support for underserved schools. It also requires teacher training so that technology access is matched by pedagogical capability. In the context of NEP 2020, reducing the digital divide is not an optional extra; it is a precondition for equitable reform.

Teacher Learning Communities

Teacher learning communities offer one of the most practical strategies for building digital readiness in Indian schools, especially in rural contexts. These communities allow teachers to learn collaboratively, exchange ideas, solve problems, and develop shared resources. They are effective because they move beyond one-time training and create a culture of continuous professional learning.

A significant Indian case study involved a virtual community of practice formed during the COVID-19 pandemic, bringing together prospective and practising teacher educators across institutions. The participants reported greater confidence in educational discourse, a stronger sense of professional connection, and a willingness to try new pedagogical approaches. This case shows that online communities can sustain teacher learning even when normal institutional interaction is disrupted.

Another relevant case comes from Karnataka, where a bottom-up professional learning community supported open educational resource adoption. The research found that teachers improved their technology skills and understanding of OER while creating and adapting content suited to their classrooms. This is especially useful for rural education because it demonstrates how collaborative teacher action can produce practical, localised resources.

British Council-supported work on communities of practice in Maharashtra and New Delhi further highlights the value of collaborative professional development. The associated framework emphasises reflection, peer feedback, and problem-solving as key features of effective CoPs. These features are highly relevant in India because they allow teachers to learn from one another in ways that are tied to daily classroom realities.

Teacher learning communities are especially valuable in the era of AI because they reduce isolation and help teachers build confidence with new tools. In rural schools, where formal training opportunities may be limited, such communities can serve as a bridge between policy and practice. They are also well-suited to supporting digital literacy, local language content creation, and collective problem-solving. For this reason, teacher communities should be treated as a core part of an AI implementation strategy rather than as a supplementary activity.

Challenges and Ethics

The introduction of AI in school education raises several important challenges. The first is the risk of deepening inequality. If AI tools are introduced mainly in well-resourced

schools, they may widen the gap between advantaged and disadvantaged learners. This is why the digital divide must be addressed as part of implementation, not after it.

The second challenge is teacher preparedness. Without strong training, teachers may use AI superficially or not at all. Even worse, they may rely on it without understanding its limitations. This creates the need for structured capacity building through teacher education institutions, school networks, and learning communities. AI literacy should include both technical use and critical evaluation.

The third challenge is ethics and privacy. AI systems collect data, and student data must be handled with extreme care. Schools need clear rules on consent, transparency, security, and responsible use. CIET-NCERT explicitly identifies ethical and responsible AI use as central to implementation, including data privacy, fairness, and inclusivity. This principle must guide all future development. The fourth challenge is overdependence on technology. Education involves relationships, trust, motivation, and moral development, none of which can be reduced to algorithms. AI can assist, but it cannot replace the human dimensions of teaching. NEP 2020's vision remains human-centred, and that should continue to guide implementation.

A fifth challenge is contextual relevance. Many AI tools are created for global markets and may not fit Indian school conditions, regional languages, or curriculum needs. Therefore, local research, contextual testing, and Indian language adaptation are essential. AI must be designed for India, not merely imported into India.

Implementation Strategy

A realistic implementation strategy for AI in Indian school education should be phased and inclusive. The first phase should focus on infrastructure, basic digital access, and teacher orientation. Schools need devices, electricity, connectivity, and basic support systems before more advanced AI can be used effectively. The second phase should involve pilot projects in selected schools and districts. These pilots can test AI tools for personalised learning, formative assessment, translation, teacher support, and administrative efficiency. Pilot evaluation should examine not only academic outcomes but also usability, equity, teacher workload, and learner response. This evidence-based approach is necessary to avoid premature scaling.

The third phase should focus on localisation and integration. AI tools should be linked to NEP 2020, NCF-SE, DIKSHA, and teacher training systems so that they become part of everyday schooling rather than separate interventions. Regional language content and offline-friendly features should be prioritised.

The fourth phase should formalise governance. This includes standards for data protection, ethical use, procurement,

accessibility, and human oversight. School leaders, teachers, and policymakers should have clear guidelines on how AI should and should not be used. Such governance is especially important in child-centred settings.

Finally, implementation should be research-led. Universities, teacher education institutions, and policy bodies should study AI's impact on learning, inclusion, and teaching practice. This will allow India to move from experimentation to informed scaling. NEP 2020's emphasis on research and innovation supports this direction.

CONCLUSION

AI tools hold great promise for the integrated development of school education in India. They can support personalised learning, assessment reform, teacher assistance, inclusive education, and evidence-based governance. NEP 2020 provides the policy framework for this transformation by emphasising technology, equity, quality, and learner-centeredness. NCERT and Ministry of Education initiatives show that India is already moving toward implementation through curriculum development, teacher training, and digital platforms.

However, AI must be introduced carefully. India's digital divide, teacher preparedness gaps, ethical concerns, and contextual diversity make simple technology transfer impossible. AI can only succeed if it is rooted in infrastructure, equity, and professional learning. Teacher learning communities are especially important because they create the collaborative culture needed for sustained adoption. In this sense, AI is not just a technical intervention but a broader educational reform.

The future of AI in Indian school education depends on whether it can remain human-centred, locally relevant, and socially inclusive. If these conditions are met, AI can become a powerful instrument for realising the vision of NEP 2020 and strengthening school education throughout India.

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