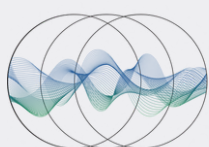


POLICY BRIEF

Emerging Technologies for Bolstering Education Sector in India

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PANJ

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ATTRIBUTION

NFPRC Foundation and PANJ Foundation, '*Policy Brief: Emerging Technologies for Bolstering Education Sector in India*', September 2026

DISCLAIMER

This policy brief presents the discussion pointers during a closed-door roundtable hosted collaboratively by NFPRC Foundation and PANJ Foundation on Emerging Technologies for Bolstering Education Sector in India on 10 August 2026 at India Habitat Centre, New Delhi.

BACKGROUND

India operates the largest and most diverse education ecosystem in the world. At the school level, the system comprises 14.71 lakh schools serving 24.69 crore students across pre-primary to higher secondary levels, supported by 1.02 crore teachers working across more than sixty educational boards and twenty regional languages of instruction. At the higher education level, the system comprises over 1,100 universities and roughly 14,000 AICTE-approved institutions serving approximately 4 crore students, against a Gross Enrolment Ratio (GER) target of 50% by 2035 under National Education Policy (NEP) 2020, an addition of 6.6 crore learners.

The weight of this system sits in the States. Approximately 88% of school students are enrolled under State boards, with CBSE accounting for around 12 to 13%, and nearly 85% of higher education students are enrolled in State universities and colleges. No national approach to technology in education can therefore be designed around premier central institutions alone.

The most significant challenge within this system remains a foundational one. National and independent assessments have consistently shown that a substantial share of students in the elementary grades do not attain grade-appropriate reading and arithmetic competence. The NEP 2020 accordingly treats universal foundational literacy and numeracy as the highest priority in school education. Any discussion of emerging technologies in Indian education is therefore best framed as a discussion of how such technologies can support that foundational objective for the vast majority of students, rather than as an independent agenda of technology adoption.

Since 2020, India has pursued a transformation agenda grounded in the National Education Policy (NEP) 2020 and operationalised through layered regulatory frameworks, enabling technologies, and open-source digital public infrastructure (DPI). The roundtable examined artificial intelligence (AI), blockchain-based credentialing, digital platforms, and interoperable systems as tools for improving access, quality, and administrative efficiency across both school and higher education. This diversity and scale coexist with structural challenges such as digital divides, teacher shortages, infrastructure gaps, and regulatory fragmentation that require deliberate policy sequencing rather than technology deployment alone.

As education in India is increasingly becoming digital, new opportunities and challenges emerge. The rapid technological developments show that traditional approaches and methods alone may not be sufficient to deal with modern requirements in the education sector. In order to improve the delivery, fairness, security and administration of education, including examination and assessment. Technology can play a useful enabling role. At the same time, the evidence that technology adoption by itself

improves learning outcomes remains limited and mixed. For the vast majority of students, the binding constraint continues to be foundational literacy and numeracy, and the value of any technology intervention is best judged by whether it advances that objective.

To address these developments, NFPRC Foundation and PANJ Foundation organised a closed-door roundtable discussion on 10 August 2026 at the India Habitat Centre, New Delhi. The discussion featured participation from Members of Parliament, along with institutional heads, educationists, cybersecurity and data-protection practitioners, and representatives of the technology industry.

KEY DISCUSSION POINTERS

AI in Teaching And Learning

The discussion highlighted the transforming education landscape in India. While the participants acknowledged this, an underlying key concern was also that Artificial Intelligence (AI) must strengthen learning, not replace thinking. To this end, one of the most important concerns is the impact of AI on students' abilities. A large proportion of students are now using AI for everyday tasks including writing and information retrieval. While this can improve efficiency, it can significantly reduce natural cognitive resilience. This creates a shift from learning how to think to learning how to obtain the answer. The discussion therefore pointed towards the need for an appropriate balance. AI should assist teachers, parents, and students but human judgement must remain central.

The discussion also recorded a countervailing position. Student use of these tools is already universal, and detection-based responses were considered to be of limited effectiveness. On this view the question is not whether students use these tools but how that use is structured, so that students continue to develop their own reasoning rather than becoming intermediaries for machine-generated work. Several participants reported designing assessments that these systems cannot answer well, which requires independent reasoning from the student without any need for detection.

Teacher Capacity and Institutional Readiness

When discussing technology adoption in the education sector, a few fundamentals are key. Firstly, face-to-face interaction adds value to learning. Therefore, a complete shift to AI driven learning should not be encouraged at a universal level. Second, when integrating technology in education delivery, teacher readiness must come before technology deployment. Technology can improve education only when teachers know how to use it properly. The scale of the training requirement runs to the better part of a crore teachers, against a far smaller pool of professionals qualified to deliver such training. Skilling is a key need of the hour. This sequencing also implies that the immediate priority for most institutions is strengthening core teaching capacity in reading, writing and arithmetic, with technology introduced where it demonstrably supports that work.

Two further constraints on readiness were identified. The first is incentive rather than capability: continuing professional development is not always supported by structured institutional forums for updating knowledge, and curricula across parts of the vocational education system, which includes more than thirteen thousand Industrial Training Institutes, would benefit from periodic revision in line with changing industry requirements. The second is a mismatch in institutional management. Schools are managed principally by teachers, while the work of managing a digitally-equipped institution now demands administrative, procurement and technological competence that subject-matter expertise does not supply.

Language and Bias

Language was identified as central to meaningful access rather than as a matter of content availability alone. Most available models are built to translate from English into Indian languages rather than to operate natively within India's linguistic ecosystem, and participants reported that prompts in Hindi and Punjabi returned markedly weaker outputs than the same prompts in English. Bias in these systems was described as operating through language, gender and social background together. Instances were cited of AI-assisted career counselling recommending nursing and teaching disproportionately to girls, and of lesson-planning frameworks of Western origin being reproduced as though universal.

Cybersecurity for Securing Education

Data protection and cybersecurity were treated as distinct questions. Data protection concerns the lawful handling of personal data; cybersecurity concerns the protection of systems and information from unauthorised access. The two require different instruments and different institutional owners, and are best taken forward as separate workstreams.

Cybersecurity is an important issue concerning the education sector. In the era of digitalisation, as schools and universities are increasingly becoming dependent on digital platforms, this poses a new threat of theft or manipulation of data. Indian education and research organisations are reported to face among the highest volumes of weekly cyberattacks of any sector. A key takeaway was that institutions do not always have to wait for legislation to act. They can begin building responsible AI practices, strengthening cybersecurity and encouraging critical thinking today. It should become an important part of the overall management of educational institutions.

The increasing use of digital platforms has also raised an important question: who controls student data and what happens when this data is shared with foreign companies or third-party service providers? This becomes especially relevant as Governments nowadays are undertaking multiple procurements for deploying tech solutions. The Digital Personal Data Protection (DPDP) framework provides rules and regulations for organisations that collect and protect personal data, including specific safeguards related to children's data. A specific ambiguity was identified. Educational institutions receive certain

relaxations from the requirement of verifiable parental consent, and it is unclear whether those relaxations extend to the EdTech and technology providers on which institutions increasingly rely. Clarification on this point would assist both institutions and service providers. Therefore, educational institutions should prioritise data protection from the beginning while designing a digital system.

Foundational Literacy and Numeracy as the First Priority

A recurring theme was that the case for technology in Indian education has to be made in terms of what it does for basic learning. For the overwhelming majority of students, and particularly in State-run schools, the decisive question is whether children read with comprehension and handle arithmetic at grade level. The evidence that technology adoption by itself improves these outcomes is not yet settled, and available experience suggests that gains depend far more on how a tool is used by a trained teacher than on the sophistication of the tool itself. The applications with the clearest record are also the least elaborate: structured practice calibrated to the child's actual level of learning, teacher-facing diagnostic and assessment tools that identify which children are falling behind and in which specific skill, and low-cost communication with parents. State Governments may therefore find their energies best directed towards the foundational literacy and numeracy goals, with technology treated as one instrument for delivering that mission rather than as a separate readiness agenda pursued in parallel.

Governance Before Pedagogy

Several participants held that the most immediate value of these technologies in Indian education lies in institutional governance rather than in classroom instruction. Institutions were described as repeatedly building the same systems independently to solve the same problems, with common services neither developed centrally nor made available across institutions. Institutional autonomy compounds this, since national frameworks are not always applied consistently as standards across institutions. Digital public infrastructure, blockchain, artificial intelligence and cybersecurity were said to operate as separate islands when they should be integrated so that each strengthens the others. Existing infrastructure such as DigiLocker already demonstrates how records can be secured and verified, and what is lacking is sector-specific procurement and security standards rather than new technology.

RECOMMENDATIONS

The adoption of technology in the education sector is a reality. To better enable this adoption, the following recommendations emerged from the discussion.

1. Anchor educational technology in foundational literacy and numeracy

Public investment in educational technology should be sequenced behind, and evaluated against, the foundational literacy and numeracy objectives set out in the National Education Policy 2020 and the NIPUN Bharat Mission. A simple test may be applied before any new tool is

adopted at scale: does it help a teacher identify which children are behind and in which skill, does it give those children additional practice at their own level, and can its effect be measured in reading and arithmetic outcomes? Where a tool cannot answer these questions, it should not take precedence over direct investment in teachers, teaching time and learning material.

2. Scale successful models across States and institutionalise best-practice sharing

Different States are already using technology in different ways to improve education. Instead of every State developing a new system from scratch, they can learn from tried and tested models in other States. For example, Shiksha Copilot in Karnataka and Vidya Samiksha Kendra in Gujarat show how technology can be used to support teachers and monitor learning. Successful models can be adapted and implemented in other States according to their needs, helping to reduce duplication, save resources and make better use of existing solutions.

3. Consolidate existing frameworks into a single reference for institutional adoption

India already has the required architecture in place. The National Education Policy 2020 sets the direction and the National Digital Education Architecture provides the interoperability principles. Further, Digital Infrastructure for Knowledge Sharing (DIKSHA) and related platforms demonstrate them in working form. What would help educational institutions most is a consolidated reference drawing these together in one place. It will ensure setting out in practical terms what an institution should put in place, in what sequence, and to what minimum standards of interoperability, security and data handling. Such a reference would help institutions apply existing frameworks consistently, reduce duplicated effort, and allow each institution to retain flexibility in implementation suited to its own conditions.

4. Give greater importance to Indian languages in digital education

The bulk of e-learning material is available in English. This can be difficult for students who are more comfortable studying in their own language. New digital platforms should have content in different Indian languages from the start. Models should also be built to operate natively in Indian languages rather than to translate from English, since translation-led systems were reported to produce materially weaker outputs. Bhashini offers a working reference, and performance in Indian languages should be tested at the point of procurement.

5. Develop guidelines for responsible AI use

Clear guidelines are needed for the use of AI in classrooms, examinations and other educational activities. These rules should explain how student data should be used, how AI-generated content should be handled and who should be responsible when an AI system makes a mistake. Obligations should be calibrated to risk rather than applied uniformly, distinguishing routine informational use from interactions touching a student's wellbeing or safety. It should

also be clarified whether the relaxations available to educational institutions under the Digital Personal Data Protection framework extend to the technology providers acting on their behalf. This will help schools and technology companies use AI in a more responsible way.

6. Pilot new technologies before wider adoption

New technologies such as Virtual Reality (VR), Augmented Reality (AR), digital learning tools and simulation-based laboratories should first be introduced on a pilot basis in a selected set of schools, universities and colleges, with outcomes and implementation challenges studied before any decision is taken to scale them further. A phased approach of this kind guards against committing public expenditure to technologies that may not perform well in actual classroom conditions. Such tools may hold value in specific disciplines where hands-on exposure is essential, such as science, medicine, engineering and vocational education, and where conventional laboratory or field access is limited. Their adoption should remain calibrated and evidence-led, expanding where pilot evidence demonstrates measurable learning gains, but should not displace expenditure on foundational teaching and learning.

7. Measure the impact of educational technology

Technology companies should not be the only ones deciding whether their products are successful. Independent organisations and researchers should also evaluate these tools. They should check whether the technology is improving learning and whether it works fairly for students from different backgrounds and language groups. Evaluation should rest on measurable student outcomes rather than on inputs such as investment made, devices supplied or platforms deployed. For school education, foundational literacy and numeracy attainment offers the most direct and comparable measure of whether a given intervention is working.

8. Strengthen collaboration between key stakeholders

Educational technology should be developed by keeping the actual needs of classrooms in mind. Teachers, universities, researchers and technology companies should work together to develop solutions that are useful for Indian students. This can also encourage more research and innovation within India.

9. Build skills for the future workforce

As AI changes the way people work, education should also prepare students for these changes. Along with learning about new technologies, students should learn to supervise and critically evaluate machine-generated outputs, and should develop skills such as communication, creativity, critical thinking and problem-solving. These capabilities are what will distinguish them in a labour market where routine and technical tasks are increasingly automated.

10. Build a sustainable educational system

Technology should not be introduced as a short-term project. Schools and Governments should also think about maintenance, training, cybersecurity, funding and future upgrades. Long-term planning can help ensure that useful technologies continue to benefit students instead of becoming outdated after a few years.

11. Develop secure and interoperable cloud-based LMS platforms

India should promote cloud-based Learning Management Systems (LMS) in schools and higher education institutions. These systems can keep study material, assignments, assessments, attendance and student progress in one place. Teachers and students can access them from different locations, which can make learning more flexible. They can also reduce the need for institutions to maintain separate servers and make it easier to update learning content. Developing these as shared services, rather than leaving each institution to build its own, would reduce duplication and allow security standards to be enforced at one point instead of across thousands of installations. The Government should support secure, affordable and interoperable cloud-based LMS platforms, especially for Government and low-fee institutions.

WAY FORWARD

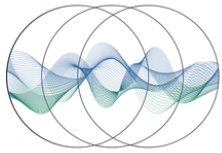
The discussion showed that emerging technology can play an important role in improving education in India. However, simply introducing more technology is not enough. It is important to make sure that technology is affordable, safe and actually helps students and teachers. The focus should be on using technology in a way that improves learning while keeping human interaction and judgement important.

The central challenge is the optimal and not the maximum use of technology. This requires stronger cybersecurity standards, teacher training before technology deployment, AI governance and accountable institutional authority. It also requires that the design of any national approach begin from the State systems in which the overwhelming majority of Indian students study, rather than from the institutions where such technology is already easiest to deploy. It requires, above all, that foundational literacy and numeracy remain the reference point against which any technology intervention in school education is assessed.

The next step for India should not simply be to use more technology in education, but to use it in a better and more responsible way. Clear rules, small-scale testing, common standards, proper evaluation, cooperation between different stakeholders and long-term planning can help India make sure that emerging technologies genuinely improve education. The main focus should remain on students, teachers and better learning outcomes.

NFPRC Foundation is a Delhi-based public policy think tank which undertakes extensive, peer-reviewed research for long-term projects, as well as incisive, quick-turnaround research for actionable agendas. By leveraging its research capacity, NFPRC Foundation assists the Government in reviewing old policies, formulating design and implementation strategies for new ones, and finding ways to enhance the on-ground effectiveness of ongoing schemes. In addition, NFPRC Foundation also conducts an impact evaluation of existing policy interventions to identify lacunae or roadblocks and suggest remedial actions.

PANJ Foundation is a sub-national policy research organisation based out of Punjab, India. Established in February 2024, PANJ operates as an independent organisation, providing research-based, evidence-backed inputs and consultations to ensure socio-economic growth of Punjab. PANJ works as a collaborative front for initiating institutional and policy reform in the state of Punjab focused on enhancing ease of living.www.panj.org.in | info@panj.org.in



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