



Research Article

Reimagining Mathematics Education in India: Equity, Conceptual Understanding, Teacher Preparation, And Digital Futures

Dr. Debasmita Mondal

Research Scholar (Ex.), Department of Education
 Adamas University, Barasat, Barrackpore, Kolkata, West Bengal, India

Corresponding Author: *Dr. Debasmita Mondal

DOI: <https://doi.org/10.5281/zenodo.19205635>

Abstract

India puts mathematics education on the centre stage in national development since it is based on scientific literacy, technological proficiency, logical thinking and readiness in the workforce. However, that field has continually experienced the same issues: uneven foundational numeracy, teaching and learning that focuses on examinations, mathematics-related anxiety, differences between school types and regions, and gaps in teacher education. Simultaneously, recent changes in the form of the National Education Policy (NEP) 2020 and the National Curriculum Framework for School Education (NCF-SE) 2023 are an indication of a significant transition to competency-based, experiential, multilingual, and flexible learning. The article is a review-based research that explores the current situation of mathematics education in India using policy papers, national examinations, and a few empirical research results. It purports that the debate in mathematics education in India needs to shift away from a limited focus on marks and syllabus coverage toward conceptual knowledge, reasoning, problem solving, and inclusion. The article summarises the evidence regarding the levels of student learning, teacher beliefs and competencies, digital interventions, and structural inequalities. It finds that the four interconnected priorities that must be improved to achieve meaningful improvement in mathematics learning in India include improved foundational numeracy, assessment reform, long-term teacher professional development, and digitally sensitive contextual integration. The article provides a policy-driven research-oriented framework to the politicians, teachers, educators, and educational institutions that aim to enhance the performance of mathematics learners and also enable the subject to be more inclusive and valuable to the students throughout India.

Manuscript Information

- **ISSN No:** 2583-7397
- **Received:** 11-01-2026
- **Accepted:** 22-02-2026
- **Published:** 24-03-2026
- **IJCRM:** 5(2); 2026: 249-252
- **©2026, All Rights Reserved**
- **Plagiarism Checked:** Yes
- **Peer Review Process:** Yes

How to Cite this Article

Mondal D. Reimagining Mathematics Education in India: Equity, Conceptual Understanding, Teacher Preparation, And Digital Futures. Int J Contemp Res Multidiscip. 2026;5(2):249-252.

Access this Article Online



www.multiarticlesjournal.com

KEYWORDS: Mathematics Education, Foundational Numeracy, Teacher Education, Problem Solving, Digital Learning.

1. INTRODUCTION

Mathematics has traditionally had a high status in Indian education, not only due to the Indian medieval levels of mathematical culture, but also owing to the concentration of the modern-day economic development on quantitative reasoning, literacy in data, and scientific competency. Mathematics in school education is supposed to develop thinking as logical, abstract, patterns, estimation, and the ability to solve problems. These objectives transform mathematics beyond being a subject in school; it becomes a language of entry to modern-day society. NEP 2020 makes an express connection between mathematics, computational thinking, scientific temper and national development and future employability, whereas NCF-SE 2023 reframes school mathematics as a field of reasoning, discovery, and application, not rote learning. [1,2].

The classroom situation in India is still unequal in spite of this policy vision. Empirical data available on a national scale indicates that access to schooling has increased tremendously, and the quality of learning is questionable. According to ASER 2024, school enrolment of children aged 6-14 years is above 95 per cent across the country, but only 33.7 per cent of Class III children in the country were able to perform at least a numerical subtraction problem, and only 30.7 per cent of Class V children were able to perform a simple division problem. Class VIII performance was higher in arithmetic at 45.8 per cent in a simple arithmetic level, which was still low. The numbers indicate that attendance at school does not necessarily lead to safe and sound mathematical knowledge. [3].

The key issue, however, is not just the question of access, but of the nature of mathematics that is being taught, tested, and who is getting a good education in mathematics. The current article discusses that issue by reviewing the mathematics education in India with a specific focus on curriculum reform, learning outcomes, teacher preparation, and digital pedagogy. Since it is a review-based research article, it presents the main policy and research findings to extract existing strengths and continuing issues and directions. [1-8].

2. REVIEW OF RELATED LITERATURE

The Indian mathematics education literature can be grouped into 4 major strands that include policy and curriculum reform, student learning outcomes, classroom process, teacher preparation and the place of technology.

1. Policy and curriculum reform

Policy literature of recent times can be characterised by a definite change in the objectives of school mathematics. NEP 2020 demands the transition to conceptual learning over rote learning, critical thinking and experience-based learning, as well as competency building. It also underlines, as an urgent national priority, the enhancement of foundational literacy and numeracy, because the acquisition of mathematics is significantly reliant on the initial numerical insight. [1].

NCF-SE 2023 expands this orientation with an offer of a curricular and pedagogical framework that incorporates the elements of discovery, discussion, application, and

interdisciplinary relationships. The framework has been applied in mathematics with the focus being on conceptual clarity, mathematical communication, local context and the process of moving between concrete experience and abstraction. Multilingual learning and the argument that profound learning is facilitated by the ability of children to think and converse in languages they know well are also supported by the framework. This particularly applies to India, where the language barrier can often exacerbate a problem in a mathematics classroom. [2].

The pedagogy resources of NCERT, too, recognise the fact that mathematics tends to become a cause of fear, stress, and avoidance by the learners, and that such effects are partially brought about by the manner in which the subject is being taught. The literature that has developed due to curriculum and teacher education reports always promote child-centered and activity-based pedagogy, but they are not highly implemented. [2,4].

2. Student learning outcomes and the learning gap

Massive tests are the best indications of the learning problem in mathematics in India. The ASER, a household survey of rural India over a long period of time, has demonstrated that basic arithmetic has been an issue for almost twenty years. Even though ASER 2024 shows significant recovery and improvement following the pandemic years, it also shows that significant percentages of elementary school children are still unable to complete grade-level arithmetic tasks. This was because only one-third of Class III children were capable of performing subtraction, and less than one-third of Class V children capable of performing division had a weak foundation. [3].

National Achievement Survey (NAS) 2021 offers a different picture with school-based assessment in Classes 3, 5, 8, and 10. The NAS documentation of NCERT reflects a lot of disparity among grades, states and social situations, which details that mathematics learning in India is influenced as much by the geographical setting, school environment and quality of instruction as much as its curriculum purpose. The importance of NAS is that it does not focus on pass percentages but on the real competencies, which could be covered by traditional board examinations. [5].

The bigger picture is supported by empirical research. In the study of the high achievement in mathematics in Mumbai, Raman maintains that high achievement in India is itself an uneven and complex category. The paper, based on the study of eight schools, demonstrated that effective mathematics learning was not only determined by the merit of students but also by context, expectations, classroom culture, and the school-wide social system of schooling. The research is useful as it debunks simplistic accounts that India is either homogeneously good or bad in mathematics. Rather, it brings forth stratified excellence. [6].

A more recent Manipur study reported that the average levels of mathematics achievement and problem-solving ability, as well as school type, were found to be significantly related to

performance levels among most of the secondary students. It was also found that there was a moderate positive association between problem-solving and mathematics achievement, a finding that supports an old-time argument in mathematics education research; procedural success cannot be achieved without reasoning and problem-solving competence. [7].

3. Teacher preparation, pedagogy, and classroom practice

The teacher has always been found by the literature to be the most important in mathematics learning at the school level. Nonetheless, the preparations of teachers in India tend to be inconsistent among the institutions and states. Demonstration, memorisation, and use of textbooks in classrooms at the expense of exploration, thought, and discussion remain common practices in many classrooms today. This is especially bad in mathematics, where children must have space to make conjectures, describe strategies, compare approaches and learn through mistakes. [2,4].

The pedagogic concept of NCERT indicates that mathematics anxiety is often connected with the classroom practices where the errors are perceived as failure, but not a learning process. These conditions especially hurt first-generation learners and children who require additional time to transition between concrete knowledge and symbolic manipulation. In that regard, teacher knowledge is not restricted to mathematical content, but it extends to sequences, questioning, representation, remediation, and emotional climate as well. [4].

An inspiring closer look at interventions is presented in research in Odisha. Samantray and others tested the methods of ICT-integrated pedagogy in pre-service mathematics teachers and discovered that the experimental group did better than the control group in teaching competence in a 4-week intervention. The research proposes that the quality of teacher education can be enhanced through a more explicit combination of digital technologies, planning, and classroom implementation in pedagogy courses instead of considering technology as an extravagant addition. [8].

The significance of this finding is that the success of mathematics education reformation is bound to fail when the curriculum is not accompanied by teacher development. Teachers who, in turn, were taught mathematics procedurally might replicate the same pedagogy unless the teachers are assisted to instruct otherwise. Thus, the literature shows that mathematics reform in India should comprise pre-service and in-service preparation based on conceptual teaching, assessment learning and classroom discussion. [2,4,8].

4. Technology and digital learning

The COVID-19 pandemic and its aftermath contributed to the increase in the digital turn in the field of Indian education. DIKSHA and other platforms increased access to textbooks, worksheets, question banks, and other teacher resources. A rural Rajasthan study observed high rates of DIKSHA adoption of digital textbooks among teachers and reading and writing of interactive worksheets among students detailed that 96% of teachers reported learning how to use the platform, and 95% of

students were using it during the pandemic. The authors concluded that the platform served to fill the learning gaps, but the connectivity and access barriers were still significant. [9].

This literature is important because it is well-balanced in its message. Maths education may be enhanced using digital tools to aid visualisation, practice, formative assessment, and flexible access. Nevertheless, they are not necessarily the solution to the deeper intrinsic teaching issues of mathematics learning settings. The presence of digital content that is just a simple copy of the rote exercise formats is insignificant. Technology is best applicable when it aids in conceptual explanation, dynamic representation and the faculty of teachers. It is not digitisation as a whole, but rather, pedagogically significant technology integration, which the Indian evidence refers to. [8,9].

3. DISCUSSION

It may be proposed that mathematics education in India is at a crossroads, as proposed by the reviewed literature. On the one hand, there is a high policy momentum. The vision laid out by NEP 2020 and NCF-SE 2023 is logical and focused on conceptual knowledge, flexibility, underpinning learning, and competency education. Elsewhere, national tests and survey research indicate that too large a percentage of children continue to have problems with simple arithmetic, and that school-based learning opportunities continue to be stratified by school, region, and by the quality of the institution. [1-3,5-7].

The most notable contradiction within Indian mathematics education is the presence of high aspirations and poor foundations. India is a producer of students who have trained in competitive tests and high-technology areas, but many school-going children do not have guaranteed early numeracy. The fact that this contradiction was not random. It is partially created through the culture of education that values speed, right answers and performance on exams above reasoning, explanation and sense-making in mathematics. Once the system puts a premium on coverage as opposed to conceptual preparation, a significant number of learners are hurried along without feeling prepared to learn. [3,5,6].

The literature also indicates that mathematics inequity in India is not just an issue in its output but is a pedagogical issue. Resourceful schools are more prone to expose their children to positive teachers, fewer students, more resources, and confidence-building anxiety. Children in poorly-equipped classrooms might encounter mathematics primarily as drill and correction. Therefore, equity-based pedagogy, rather than curriculum revision, is needed to address the challenge of mathematics education in India. [5-7].

The other significant lesson is that foundational numeracy should be given much more consideration than in the past. The poor arithmetic scores that are experienced during elementary grades are a sign that subsequent algebra, geometry and data manipulation are being constructed on weak foundations. This is in line with the emphasis on NEP 2020 on foundational literacy and numeracy as one of the national missions, which is urgent. In the absence of early belief in number, place value,

operations, and estimation, mathematics becomes increasingly alienating. [1,3].

The teacher development can be viewed as the determinant between the policy and classroom practice. The arguments in the literature are in favour of reforms that assist teachers to shift towards facilitating, marks-based correction to diagnostic feedback, and one-method teaching to multiple representations. Similarly, the reformation of assessment is essential. Provided that examination still promotes routine reproduction, even a competency-based curriculum will still be procedure-driven even in classrooms. [2,4,5,8].

Last but not least, digital tools are to be regarded as facilitators but not replacements. According to the Rajasthan DIKSHA study and the Odisha ICT pedagogy study, technology can be used under conditions of local access and pedagogy for teacher training. Nevertheless, the lack of equal connectivity and differing teacher confidence due to the digital divide suggests that such hybrid, context-sensitive reform is more achievable than technology-only reform. [8,9].

4. CONCLUSION

There is a conceptual change in mathematics education in India. The contemporary policy frameworks are aimed at substituting rote, fear, and examination-based mathematics with conceptual, exploratory, inclusive and competency-based learning. However, the national evidence indicates that this transition is not complete yet. Far too many children have yet to reach basic arithmetic skills, teacher training is still unequalized, and school backgrounds still create opportunity in mighty fashion. [1-5].

Four future priorities have been proposed in the review. To begin with, the foundation of numeracy should continue to be the heart of the reform in early mathematics. Second, mathematical reasoning, classroom discourse, remedial and learning assessment should be emphasised in teacher education and professional development. Third, the evaluation systems should be consistent with conceptual and problem-solving objectives. Fourth, good pedagogy should be reinforced with digital tools and not substituted. [1-5,8,9].

To ensure mathematics education in India becomes an excellent and equitable process, the system should no longer focus on mathematics as a sorting machine for a few but a language of understanding for all. This is the actual task that Indian education faces nowadays. [1-9].

REFERENCES

1. Ministry of Education, Government of India. National Education Policy 2020 [Internet]. New Delhi: Government of India; 2020. Available from: education.gov.in
2. National Council of Educational Research and Training. National Curriculum Framework for School Education 2023 [Internet]. New Delhi: NCERT, 2023. Available from: ncert.nic.in
3. ASER Centre. Annual Status of Education Report (ASER) 2024: National findings. New Delhi: ASER Centre; 2024. Available from: asercentre.org
4. National Council of Educational Research and Training. Pedagogy of Mathematics. New Delhi: NCERT; [cited 2026 Mar 13]. Available from: itpd.ncert.gov.in
5. National Council of Educational Research and Training. National Achievement Survey (NAS) 2021 [Internet]. New Delhi: NCERT, 2021. Available from: ncert.nic.in
6. Raman M. High achievement in mathematics education in India: a report from Mumbai. *J Math Educ Teach Coll.* 2010;1(2):46–51.
7. Singh LN, Singh LS, Thokchom J. Impact of gender, family and school on problem-solving ability and mathematics achievement. *J Educ Learn.* 2026;20(1):600–7.
8. Samantray A, Behera RR, Acharya AK. Effectiveness of ICT-integrated pedagogy on pre-service teachers' teaching competence in mathematics. *Front Educ.* 2024;9:1401188.
9. Verma R, Dash DN, Purohit M. Access and use of DIKSHA for school teachers and students amid COVID-19: an assessment of rural Rajasthan. *Indian J Educ Technol.* 2025;7(1):138–47.

Creative Commons (CC) License

This article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution–Non-Commercial–No Derivatives 4.0 International (CC BY-NC-ND 4.0) license. This license permits sharing and redistribution of the article in any medium or format for non-commercial purposes only, provided that appropriate credit is given to the original author(s) and source. No modifications, adaptations, or derivative works are permitted under this license.

About the corresponding author

Dr. Debasmita Mondal is a former Research Scholar in the Department of Education at Adamas University, West Bengal. Her research interests include pedagogy, curriculum studies, and educational development. She is dedicated to academic research and has contributed to advancing knowledge in education through scholarly work and critical analysis.