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Research Article

The Role of Teachers in Reducing Mathematics Phobia in School Students at Birbhum District, West Bengal, India

Srikanta Sahu
Assistant Teacher, Taloya High School, Birbhum, West Bengal, India

Corresponding Author: *Srikanta Sahu

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Abstract

Mathematics phobia, commonly described in the research literature as mathematics anxiety, is a pervasive affective barrier that undermines the mathematical achievement, confidence and life opportunities of a large number of school students. In rural and semi-urban educational contexts such as Birbhum District of West Bengal, this phobia interacts with structural conditions—first-generation learning, resource scarcity, language of instruction, and examination pressure—to produce persistent underperformance and avoidance behaviour in mathematics. This paper examines the pivotal and often decisive role that teachers play in either reinforcing or reducing mathematics phobia among school students in Birbhum. Drawing on established theories of mathematics anxiety, the National Curriculum Framework (2005) position on the "fear and failure" of mathematics, and a descriptive survey approach involving secondary-stage students and teachers, the study identifies the principal sources of phobia and analyses the teacher-related factors that shape learners' emotional relationship with the subject. The findings suggest that authoritarian classroom climates, procedural and speed-based teaching, public correction of errors, and negative teacher expectations significantly heighten anxiety, whereas empathetic communication, error-tolerant environments, concrete and contextualised instruction, formative assessment, and the deliberate building of self-efficacy substantially reduce it. The paper concludes that teachers in Birbhum are not merely transmitters of mathematical content but the primary affective mediators of the discipline, and it offers a set of context-sensitive pedagogical and policy recommendations for reducing mathematics phobia in the district.

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1. INTRODUCTION

Few school subjects generate as much sustained emotional distress as mathematics. For a considerable proportion of learners, the encounter with numbers, symbols and abstract reasoning is accompanied not by curiosity but by dread. This condition—popularly called mathematics phobia and studied formally as mathematics anxiety—is characterised by feelings of tension, apprehension and helplessness that interfere with the manipulation of numbers and the solving of mathematical problems in ordinary academic and everyday situations. It is not a marginal phenomenon. National and international assessments repeatedly show that a large share of students disengage from mathematics well before they exhaust their cognitive capacity to learn it, abandoning the subject for emotional rather than intellectual reasons.

In the Indian context, the concern is neither new nor peripheral. The National Curriculum Framework of 2005 devoted explicit attention to the "fear and failure" of mathematics, observing that a majority of students develop a lasting fear of the subject and that a significant number simply give up, convinced that the discipline is beyond them. The framework argued that the central aim of school mathematics is to mathematise the child's thinking rather than to drill procedures, and that the widespread fear of mathematics is a systemic failure of pedagogy, not a natural feature of the subject or an inevitable trait of the child. The National Education Policy of 2020, with its emphasis on foundational numeracy and joyful, conceptual learning, renewed this concern at the level of national policy.

Yet policy prescriptions are realised or defeated in the everyday transactions of the classroom, where the teacher stands at the centre of the learning experience. The teacher decides how a concept is introduced, how an error is treated, how a slow learner is addressed, and whether the classroom is a place of safety or of fear. This paper takes the position that the teacher is the single most influential proximate factor in the formation and reduction of mathematics phobia. It focuses on Birbhum District of West Bengal, a predominantly rural and agrarian region with a substantial tribal population and a strong educational heritage associated with Santiniketan, in order to examine how teachers can reduce mathematics phobia among school students in a resource-constrained but culturally rich setting.

2. Conceptual Framework: Understanding Mathematics Phobia

Mathematics phobia is best understood as a specific, learned affective response rather than a general intellectual deficiency. Richardson and Suinn, whose Mathematics Anxiety Rating Scale became a foundational instrument in the field, described mathematics anxiety as feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary and academic situations. Later cognitive research, particularly the work of Ashcraft and colleagues, demonstrated that mathematics anxiety consumes limited working-memory resources: when an anxious learner faces a problem, intrusive worry competes with the cognitive processing the problem demands, so performance declines even when the underlying competence is present. In this sense the phobia is partly self-fulfilling, because the anxiety itself degrades the very performance whose failure the learner fears.

Several features of the phenomenon are important for teachers to recognise. First, mathematics phobia is dissociable from mathematical ability; many capable students suffer from it, and their fear frequently exceeds any realistic assessment of their competence. Second, it tends to intensify across the school years, often becoming acute at the transition to the upper primary and secondary stages when mathematics grows more abstract and symbolic. Third, it produces avoidance: anxious learners take fewer mathematics-related courses, reduce their engagement, and thereby confirm and deepen their difficulties. Fourth, the anxiety has a strong social and evaluative dimension. It is heightened by the fear of being judged, of being publicly exposed as incompetent, and of being ranked and found wanting, which is why the emotional climate of the classroom matters so profoundly.

From an educational standpoint, this framework carries a hopeful implication. If mathematics phobia is learned rather than innate, and if it is sustained by particular classroom conditions and interactions, then it can be unlearned and prevented by altering those conditions and interactions. The teacher, who controls a large share of these conditions, is therefore positioned as the principal agent of both its creation and its cure.

3. The Educational Context of Birbhum District

Birbhum is a district in the western part of West Bengal, bordering the state of Jharkhand. Its economy is predominantly agrarian, and its society includes a substantial population of Scheduled Tribes, notably the Santhal community, alongside Scheduled Castes and other groups. The district is culturally distinguished by Santiniketan and Visva-Bharati, the educational settlement founded by Rabindranath Tagore, whose pedagogic vision of joyful, nature-embedded, fear-free learning stands in instructive contrast to the anxiety-inducing routines of much conventional schooling. This heritage gives Birbhum a symbolic significance in any discussion of humane pedagogy.

At the same time, the district presents the characteristic challenges of rural education in eastern India. Many school students are first-generation learners whose parents cannot support mathematical homework or model a comfortable relationship with the subject. Schools frequently operate with large class sizes, uneven access to trained mathematics teachers at the upper primary and secondary levels, and limited teaching aids and laboratories. The medium of instruction is generally Bengali, but for Santhali-speaking children the language of textbooks and instruction may itself be a second language, adding a linguistic layer to the difficulty of an already abstract subject. Seasonal agricultural labour, domestic responsibilities and irregular attendance further fragment learning, and the high-stakes Madhyamik and Higher Secondary examinations concentrate enormous pressure on performance.

These conditions do not cause mathematics phobia by themselves, but they form the soil in which it grows. A first-generation learner who falls behind in the early stages, who cannot follow instruction delivered in an unfamiliar register, and who is then corrected sharply before peers, is a candidate for exactly the cycle of avoidance and anxiety the literature describes. In such a setting, the teacher's conduct acquires heightened consequence, because the teacher is often the only person in the child's environment able to interrupt the cycle.

4. REVIEW OF RELATED LITERATURE

The scholarly study of mathematics anxiety has produced a consistent body of findings over more than four decades. Hembree's comprehensive meta-analysis synthesised a large number of studies and established that mathematics anxiety is negatively related to achievement, that it is more prevalent among certain groups of learners, and, crucially, that it can be reduced through appropriate intervention, with corresponding gains in performance. Ma's later meta-analysis confirmed a stable negative relationship between mathematics anxiety and achievement across grade levels and instruments, indicating that the association is not an artefact of any single measure.

A cognitive line of research clarified the mechanism. Ashcraft and Kirk showed that mathematics anxiety compromises working memory, so that anxious individuals perform worst precisely on problems that place heavy demands on mental resources. Maloney and Beilock summarised how mathematics anxiety develops early, how it is transmitted socially, and how it can be guarded against, emphasising that anxious teachers and parents can pass their own discomfort to children. Ramirez and colleagues demonstrated that mathematics anxiety already depresses achievement in the early elementary years among children with otherwise strong working memory, underlining the importance of early, teacher-led prevention.

The affective and pedagogical tradition, associated with Tobias's influential account of overcoming mathematics anxiety, reframed the problem as a product of teaching cultures that prize speed, competition and the concealment of confusion, rather than as a deficiency in learners. This tradition places the classroom climate and the teacher's response to error at the centre of both the disease and its remedy. Indian scholarship and policy converge with these conclusions: the National Curriculum Framework's position paper on the teaching of mathematics identified the systemic "fear of mathematics" as a central problem and located its solution in a shift toward conceptual understanding, meaningful problem-solving and a supportive learning environment. Studies conducted in various Indian states have repeatedly found that teacher behaviour, method of instruction and assessment practices are among the strongest correlates of students' attitudes toward mathematics, providing empirical grounding for a teacher-centred analysis of the problem in a district such as Birbhum.

5. OBJECTIVES AND RESEARCH QUESTIONS

The present study was guided by the following objectives:

- To identify the principal sources of mathematics phobia among school students at the upper primary and secondary stages in Birbhum District.
- To examine the teacher-related factors that intensify or reduce mathematics phobia in these students.
- To analyse effective pedagogical practices through which teachers can reduce mathematics phobia in a rural, resource-constrained context.
- To formulate context-sensitive recommendations for teachers, teacher educators and educational administrators in the district.

Correspondingly, the study addressed three research questions. First, what are the main causes of mathematics phobia as experienced by students in Birbhum? Second, in what ways do teachers' attitudes, methods and classroom behaviour contribute to the intensification or reduction of that phobia? Third, which specific, feasible teacher interventions are most effective in reducing mathematics phobia in this setting?

The significance of this enquiry lies in its practical orientation. By locating the problem of mathematics phobia not in the supposed deficiencies of learners but in modifiable features of teaching and classroom life, the study reframes the issue as one that ordinary teachers, working with ordinary resources, are equipped to address. This is especially valuable in a district such as Birbhum, where large-scale infrastructural transformation may be slow but where changes in pedagogical conduct are immediately achievable. The study is delimited to the upper primary and secondary stages, where the abstraction of the subject makes phobia most acute, and it concentrates on the teacher as the proximate agent of change, while acknowledging that curricular, familial and systemic factors also operate.

6. METHODOLOGY

The study adopted a descriptive survey design supplemented by qualitative interviews, an approach well suited to documenting attitudes, perceptions and self-reported experiences in a natural educational setting. The population comprised upper primary and secondary school students of Birbhum District together with their mathematics teachers. A purposive and stratified sampling procedure was used to include government and government-aided schools from both rural blocks and the more urbanised areas around Bolpur and Suri, so that variation in resources and locality could be represented.

Two principal instruments were employed. Student mathematics phobia was assessed through an adapted mathematics anxiety scale, translated into Bengali and simplified for comprehension, in which respondents indicated their agreement with statements describing physical, cognitive and emotional reactions to mathematical situations such as tests, homework, being asked to answer at the blackboard, and studying the subject. A separate structured questionnaire and an interview schedule gathered information from teachers and a subset of students on classroom practices, methods of instruction, treatment of errors, feedback, and perceived causes

of fear. Classroom observation was used to corroborate self-report where feasible.

Data were analysed using descriptive statistics for the quantitative items—frequencies, percentages and mean scores across sub-groups—while responses to open-ended and interview questions were examined thematically to identify recurring patterns in the relationship between teacher behaviour and student anxiety. Ethical safeguards included informed consent, anonymity and the assurance that participation would not affect students' standing. It should be noted that self-report instruments measure perceived rather than observed anxiety, and that a district-level study of this kind supports analytical generalisation to comparable rural contexts rather than strict statistical generalisation to all populations.

7. Sources of Mathematics Phobia among Students in Birbhum

The evidence, read alongside the wider literature, points to a cluster of interacting sources of mathematics phobia in the district. These can be grouped into cognitive-curricular, socio-cultural and, most importantly for this paper, teacher-related sources.

7.1 Cognitive and Curricular Sources

Mathematics is cumulative; each stage depends on the mastery of the previous one. When foundational concepts such as number sense, place value, fractions and basic operations are not securely established in the early grades, later topics become incomprehensible, and incomprehension breeds fear. The abrupt increase in abstraction and symbolic notation at the secondary stage, combined with an overloaded syllabus and a premium on covering content rather than securing understanding, leaves many students permanently behind and convinced of their own incapacity.

7.2 Socio-Cultural and Structural Sources

First-generation learners lack domestic support for mathematics and often absorb the belief, widespread in their surroundings, that mathematics is inherently hard and reserved for a gifted few. The linguistic distance between the home language of Santhali-speaking children and the language of instruction adds cognitive load. Examination pressure, the social prestige attached to marks, and the fear of family disappointment convert mathematics from a subject to be learned into a threat to be survived.

7.3 Teacher-Related Sources

The most consequential sources for this study are those under the teacher's control. Students consistently associate their fear with specific teacher behaviours: instruction that is purely procedural and delivered too fast; an emphasis on speed and rote memorisation over understanding; public reprimand, ridicule or corporal correction following mistakes; the labelling of certain children as weak; and cold, distant or intimidating classroom manner. Where the teacher treats an error as evidence of failure rather than as a normal step in learning, the classroom becomes an arena of evaluation and exposure, and the fear of humiliation attaches itself permanently to the subject. Significantly, a teacher's own discomfort with mathematics can be transmitted to students, so that anxiety propagates from one generation of learners to the next through the teacher who was once an anxious student.

8. The Role of Teachers in Reducing Mathematics Phobia

If teacher behaviour is among the strongest determinants of mathematics phobia, then the teacher is also the most powerful instrument for reducing it. The role of the teacher in this respect is best understood along several interrelated dimensions.

8.1 The Teacher as Creator of a Psychologically Safe Classroom

The foundation of any reduction in mathematics phobia is emotional safety. A teacher who establishes a classroom in which questions are welcomed, confusion is treated as normal and mistakes are received without ridicule removes the evaluative threat that drives the anxiety. In the Birbhum context, where many learners are already vulnerable, the deliberate creation of such a climate—speaking gently, prohibiting mockery among peers, and never using humiliation or physical punishment as a response to error—is the single most important intervention available to the teacher. Tagore's pedagogic legacy in the district offers a local vocabulary for this: learning without fear, in an atmosphere of warmth and freedom.

8.2 The Teacher as Reframer of Error and Effort

Central to reducing phobia is a transformation in how errors are understood. When the teacher openly treats mistakes as informative and expected—analysing them without blame, showing that competent people also err, and praising the effort and strategy rather than only the correct answer—the child's relationship to error changes from shame to inquiry. This aligns with a growth-oriented view of ability, in which mathematical competence is presented as something built through practice rather than a fixed gift possessed by a lucky few. For first-generation learners who have internalised the belief that they simply "cannot do maths," the teacher's persistent message that ability grows with effort is quietly revolutionary.

8.3 The Teacher as Builder of Self-Efficacy

Mathematics phobia feeds on the conviction of incompetence. The teacher counters it by engineering experiences of success. Breaking problems into manageable steps, beginning from what the child already knows, providing scaffolded practice, and ensuring that every learner experience genuine achievement early and often, gradually replaces the expectation of failure with a memory of success. Each small success is evidencing the anxious learner can no longer easily dismiss, and the accumulation of such evidence is what steadily dismantles the phobia.

8.4 The Teacher as Translator of the Abstract into the Concrete

Much fear arises from the sudden abstraction of the subject. Teachers reduce it by grounding mathematical ideas in the concrete and the familiar before moving to symbols. In a rural district, the material of everyday life is rich with mathematics: measuring fields and grain, calculating market prices and wages, the geometry of local craft and construction, the arithmetic of the agricultural calendar. When the teacher draws examples from the learner's own world, mathematics ceases to be an alien symbolic game and becomes a description of a reality the child already understands, which lowers both the cognitive load and the fear.

8.5 The Teacher as Manager of Pace, Language and Assessment

The teacher reduces phobia by slowing instruction to the pace of understanding rather than the pace of the syllabus, by explaining in the child's language and, where possible, being sensitive to Santhali-speaking learners, and by reforming assessment. Replacing an exclusive reliance on timed, high-stakes, publicly ranked tests with regular, low-stakes, formative assessment—the kind that informs teaching rather than merely judging the child—removes a major source of anxiety. Feedback that is private, specific and constructive protects the dignity of the learner and keeps the focus on improvement rather than exposure.

8.6 The Teacher as Communicator and Relationship-Builder

Finally, the teacher reduces phobia through the quality of the personal relationship offered to the student. Warmth, patience, individual attention to the struggling learner, the communication of high but supportive expectations, and the simple act of believing in a child who has stopped believing in themselves, together create the conditions in which fear can dissolve. Where the teacher also works to reassure anxious parents and to enlist their encouragement rather than their pressure, the effect extends beyond the classroom. In sum, the teacher functions as the affective mediator of mathematics: not only explaining the subject, but shaping the emotional meaning it carries for the child.

It is worth stressing that these dimensions are mutually reinforcing rather than separate techniques to be applied in isolation. A safe classroom makes it possible to reframe error; the reframing of error enables the risk-taking through which self-efficacy is built; concrete and contextualised instruction supplies the early successes on which that efficacy depends; humane assessment protects the gains from being undone by public judgement; and the underlying relationship of trust holds the whole structure together. A teacher who attends to only one dimension—who, for instance, uses friendly language but still relies on speed drills and public ranking—will find the phobia persists. The reduction of mathematics phobia is thus less a matter of any single method than of a coherent affective stance that pervades the teacher's entire practice.

9. Pedagogical Strategies and Recommendations

On the basis of the foregoing analysis, the following practical strategies are recommended for teachers, teacher educators and administrators in Birbhum District.

9.1 For Classroom Teachers

- Establish and protect an emotionally safe classroom where questions are welcomed and errors are never met with ridicule or punishment.
- Reframe mistakes explicitly as part of learning, and praise effort, persistence and strategy rather than speed or innate talent.
- Diagnose and repair foundational gaps in number sense and basic operations before advancing, since unaddressed gaps are a primary root of fear.
- Use concrete materials and locally rooted, real-life examples—farming, markets, measurement, craft—to introduce abstract ideas.
- Adopt continuous, low-stakes formative assessment and give private, constructive feedback rather than relying only on public, timed testing.
- Employ cooperative and peer-supported learning so that struggling students learn in a non-threatening group rather than in isolated exposure.
- Slow the pace to the pace of understanding and be linguistically sensitive to first-generation and Santhali-speaking learners.

9.2 For Teacher Education and Administration

- Include the psychology of mathematics anxiety and its remedies as an explicit component of pre-service and in-service teacher training in the district.
- Help teachers confront and reduce their own mathematics anxiety, so that discomfort is not transmitted to students.
- Provide low-cost teaching aids, mathematics kits and activity resources suited to rural classrooms, and reduce class sizes where feasible.
- Draw deliberately on the local Tagorean tradition of fear-free, joyful learning as a cultural resource for reform.
- Engage parents and the community to shift the prevailing belief that mathematics is inaccessible to ordinary children.

10. CONCLUSION

Mathematics phobia is one of the most serious and least visible obstacles to educational achievement among school students in Birbhum District. It is not an inevitable feature of the subject nor a fixed limitation of the learner; it is a learned emotional response nurtured by particular classroom conditions and interactions, and it can therefore be unlearned. This paper has argued that the teacher stands at the centre of both the problem and its solution. Teacher behaviours—procedural and speed-driven instruction, the public shaming of error, negative labelling, and the transmission of the teacher's own discomfort—intensify the phobia, while a psychologically safe classroom, a reframing of error and effort, the deliberate

building of self-efficacy, the grounding of abstraction in the concrete, humane assessment, and warm relationships substantially reduce it.

In a rural, resource-constrained but culturally rich district, where many learners are first-generation and structurally vulnerable, the teacher is frequently the only person able to interrupt the cycle of fear and avoidance. Reducing mathematics phobia in Birbhum therefore depends less on new technology or additional content than on a change in the emotional and pedagogical conduct of the classroom—a change the district's own heritage of fear-free learning already invites. If teachers are supported through training, resources and administrative reform to become the affective mediators the subject requires, mathematics can be restored to the students of Birbhum not as a threat to be survived, but as a way of thinking to be enjoyed.

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About the Author

Srikanta Sahu is an Assistant Teacher at Taloya High School, Birbhum, West Bengal, India. Dedicated to quality education and student development, he is committed to fostering academic excellence through innovative teaching practices. His interests include educational research, curriculum development, and promoting holistic learning to support the intellectual and personal growth of students.