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An Analytical Study of Mathematics Achievement among Rural Secondary School Students

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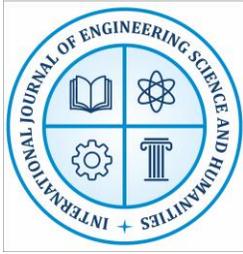
ABSTRACT

Mathematics is one of the most important school subjects because it develops logical thinking, problem-solving ability, precision, and analytical power among learners. It is also essential for higher education, competitive examinations, and vocational advancement. Yet, mathematics achievement among rural secondary school students often remains below expected levels due to a combination of personal, family, school, and environmental factors. The present paper analytically examines the mathematics achievement of rural secondary school students by focusing on the major determinants that shape their academic performance. These include socio-economic background, parental education, teaching methods, school infrastructure, student attitude, mathematics anxiety, availability of learning resources, peer influence, and study habits. The paper also discusses the unique challenges faced by rural learners such as limited access to quality teaching, inadequate educational facilities, irregular attendance, language barriers, and lack of academic support at home. The study highlights that mathematics achievement is not determined by intelligence alone; rather, it is the outcome of multiple interacting variables operating within the learner's social and educational environment. The paper concludes that improvement in mathematics achievement among rural secondary school students requires a collaborative approach involving teachers, parents, school administration, and educational policymakers. Suggestions are offered for strengthening classroom teaching, enhancing learner motivation, improving school conditions, and providing remedial and guidance support.

Keywords: Mathematics achievement, rural students, secondary education, academic performance, teaching methods, socio-economic status, mathematics anxiety

Introduction

Education plays a central role in the development of individuals as well as society. Among all school subjects, mathematics occupies a unique position because it is both a discipline of knowledge and a tool for understanding the world. It helps students develop reasoning, accuracy, objectivity, and systematic thinking. In modern society, mathematics is required not only for



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academic progression but also for everyday life, commerce, science, technology, and decision-making. Despite its importance, mathematics is often perceived as a difficult subject by many students, particularly those studying in rural areas. Rural secondary school students face various obstacles that affect their learning outcomes in mathematics. These may include lack of qualified teachers, inadequate school facilities, poor family support, low socio-economic status, limited exposure to learning materials, and negative attitudes toward the subject. In many rural schools, mathematics teaching remains examination-oriented and mechanical, with insufficient emphasis on conceptual understanding and practical application. As a result, students may memorize procedures without understanding the underlying principles. The secondary school stage is particularly important because it forms the basis for higher education and future career opportunities. Achievement in mathematics at this stage often influences subject choices in higher secondary education and shapes students' confidence in academic pursuits. Therefore, an analytical study of mathematics achievement among rural secondary school students is highly relevant. It helps identify the factors responsible for low or high achievement and suggests ways to enhance educational quality in rural settings. This paper attempts to examine the mathematics achievement of rural secondary school students in a systematic manner. It analyses the academic, psychological, social, and institutional factors that influence learners' performance and discusses possible measures for improvement.

Meaning of Mathematics Achievement

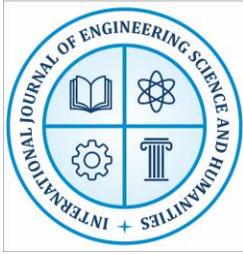
Mathematics achievement refers to the level of knowledge, understanding, skill, and competence acquired by students in mathematics as measured through tests, examinations, classroom performance, and practical application. It reflects how effectively a student has learned mathematical concepts, formulas, operations, and problem-solving methods. Mathematics achievement is generally judged through marks or grades, but it also includes conceptual clarity, speed, accuracy, reasoning ability, and confidence in solving mathematical problems.

Achievement in mathematics is not a single-dimensional outcome. It depends on cognitive abilities, instructional experiences, emotional conditions, and environmental support. A student may perform well in routine arithmetic but struggle with algebra or geometry if conceptual foundations are weak. Hence, mathematics achievement should be understood as a broad educational outcome influenced by multiple factors.

Need and Significance of the Study

The study of mathematics achievement among rural secondary school students is significant for several reasons.

1. Rural students constitute a large segment of the school-going population. Their academic progress is essential for educational equity and national development. If rural learners remain



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weak in mathematics, they may face disadvantages in higher education, employment, and participation in a knowledge-based society.

2. Mathematics is often considered a gateway subject. Performance in mathematics affects students' confidence, overall academic record, and future academic choices. Poor achievement in mathematics may lead to fear of education, low self-esteem, school dropout, or avoidance of science-related careers.
3. Rural schools often function under difficult conditions. They may have shortages of trained teachers, limited infrastructure, insufficient teaching aids, and weak parental awareness about education. An analytical study helps identify how these conditions influence achievement and what interventions may be effective.
4. The study is useful for teachers, school heads, curriculum planners, and policymakers. It provides insights into the educational needs of rural students and supports the development of targeted strategies such as remedial teaching, teacher training, community involvement, and learner-centered pedagogy.

Objectives of the Paper

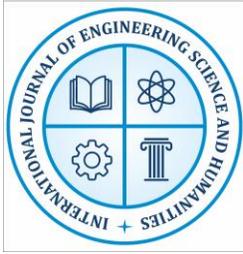
1. To examine the concept and nature of mathematics achievement among rural secondary school students.
2. To analyse the major factors affecting mathematics achievement in rural secondary schools.
3. To identify the educational and environmental challenges faced by rural learners in mathematics.
4. To suggest measures for improving mathematics achievement among rural secondary school students.

Rural Secondary School Students: Educational Context

Rural secondary school students often study in environments that differ considerably from those of urban students. Their schools may be located in geographically remote areas with fewer facilities and limited academic exposure. In many cases, families are engaged in agriculture, daily wage labour, or seasonal occupations. This affects children's attendance, study time, and educational aspirations.

Students in rural areas may also face linguistic and cultural barriers. The language used in textbooks and instruction may not always match the home language or local dialect of learners. As mathematics requires precise understanding of terms, symbols, and instructions, language mismatch can become a serious obstacle.

In addition, rural students may not have access to private tuition, digital learning tools, reference books, or supportive academic environments at home. Some students may be first-generation learners whose parents are unable to guide them in schoolwork. These contextual realities strongly influence mathematics learning and achievement.

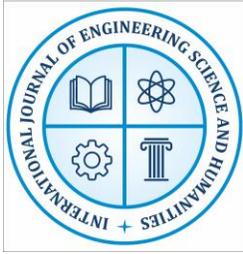


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Major Factors Affecting Mathematics Achievement

- 1. Socio-Economic Status of the Family:** Socio-economic status is one of the major determinants of academic achievement. Students from economically weaker families may not have adequate study materials, separate study space, proper lighting, nutritious food, or access to extra coaching. Financial stress in the family may create emotional pressure on children and reduce their concentration on studies. In rural settings, many parents depend on uncertain income sources such as farming or labour work. During harvesting seasons or family crises, students may be required to assist in household or agricultural work. This reduces their time for homework and revision. Thus, poverty directly and indirectly affects mathematics achievement.
- 2. Parental Education and Home Support:** Parental education has a strong influence on children's academic performance. Educated parents usually understand the importance of regular study, school attendance, homework, and discipline. They may monitor progress, communicate with teachers, and motivate children to perform well. By contrast, parents with little or no formal education may be unable to help with mathematics assignments or provide academic guidance. In rural areas, even when parents value education, they may lack the confidence or knowledge to support their children's learning. As mathematics often requires regular practice and error correction, absence of home support can weaken student achievement.
- 3. School Infrastructure and Learning Environment:** A good learning environment promotes achievement. Rural schools with adequate classrooms, blackboards, electricity, seating arrangements, libraries, laboratories, and teaching-learning materials are better positioned to support mathematics learning. However, many rural schools suffer from infrastructural limitations. Overcrowded classrooms, multi-grade teaching, lack of mathematical instruments, and poor maintenance can make mathematics teaching less effective. If the classroom environment is not stimulating, students may lose interest in the subject. School infrastructure does not guarantee achievement by itself, but it creates the conditions necessary for better teaching and learning.
- 4. Availability and Quality of Mathematics Teachers:** The teacher is one of the most powerful influences on student achievement. A knowledgeable, enthusiastic, and patient mathematics teacher can make difficult concepts understandable and interesting. Effective teachers explain concepts clearly, use examples from daily life, encourage questions, and provide practice and feedback. In many rural secondary schools, however, there may be a shortage of trained mathematics teachers. Some schools rely on temporary or non-specialist teachers. Frequent teacher transfers and absenteeism also affect continuity in learning. When students do not receive proper guidance in mathematics, their achievement naturally suffers.



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- 5. Teaching Methods and Classroom Practices:** Traditional lecture-based teaching is often insufficient for mathematics learning. Students need active engagement, step-by-step explanation, problem-solving practice, and opportunities to discuss errors. Teaching methods greatly influence how students understand and retain mathematical concepts. If teachers focus only on rote procedures and final answers, students may not develop conceptual understanding. On the other hand, activity-based teaching, use of concrete examples, peer learning, visual aids, and problem-centered instruction can improve achievement. Rural students especially benefit when mathematics is connected with familiar local situations such as farming, measurement, budgeting, and market transactions.
- 6. Attitude towards Mathematics:** Student attitude is a psychological factor closely related to achievement. Learners who view mathematics as useful, interesting, and manageable are more likely to persist in solving problems. Positive attitude increases effort, confidence, and regular practice. Many rural students develop negative attitudes toward mathematics because they consider it difficult, abstract, or frightening. This attitude may arise from past failure, harsh correction, poor teaching, social stereotypes, or lack of encouragement. Once a learner begins to believe that mathematics is beyond his or her ability, achievement tends to decline further.
- 7. Mathematics Anxiety:** Mathematics anxiety refers to feelings of fear, tension, nervousness, or helplessness while dealing with mathematics. It is a common problem among school students and has a direct negative effect on performance. An anxious student may forget learned steps during examinations, avoid attempting difficult sums, and lose concentration. Rural secondary school students may experience mathematics anxiety due to weak foundational knowledge, pressure to pass examinations, lack of remedial support, and fear of criticism. When anxiety becomes strong, even capable students underperform. Therefore, emotional factors must be considered alongside intellectual factors.
- 8. Study Habits and Practice:** Mathematics requires regular practice. Unlike some subjects that can be managed through reading alone, mathematics learning depends on continuous solving of problems, revision of rules, and checking of errors. Students with good study habits—such as maintaining notebooks, revising daily, practicing sums, and seeking clarification—generally achieve better results. Poor study habits are common where students lack supervision or time management skills. In rural households, domestic responsibilities or social distractions may interfere with regular study. If mathematics is practiced only before examinations, achievement remains weak.
- 9. Medium of Instruction and Language Difficulty:** Language plays an important role in mathematics learning. Though mathematics uses symbols and numbers, understanding word problems, instructions, definitions, and explanations depends on language proficiency. Rural



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students who study in a medium different from their home language may misunderstand questions or concepts. For example, students may know how to perform operations but fail to understand what a word problem asks. This language-related barrier can reduce test performance even when basic mathematical ability is present. Teachers need to use simple, familiar language and explain technical terms carefully.

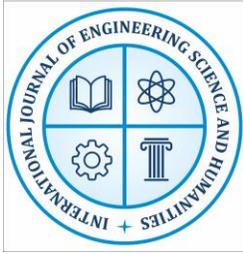
10. Peer Group and Academic Climate: Peer influence is another important factor. Students who interact with serious and motivated classmates often develop better academic habits. Group study, discussion, and mutual encouragement help learners overcome difficulties in mathematics. In some rural schools, however, the academic climate may be weak. If many students show low interest in education or expect to leave school early for work, this may reduce collective motivation. A positive peer environment can therefore support mathematics achievement, whereas a discouraging environment can hinder it.

11. Attendance and Continuity in Learning Regular attendance is essential in mathematics because concepts are sequential. Missing one topic may create difficulty in understanding the next. Rural students may be absent due to family work, illness, transport problems, weather conditions, or social obligations. Irregular attendance leads to gaps in learning, especially in topics such as algebra, geometry, mensuration, and arithmetic operations. Once these gaps accumulate, students lose confidence and achievement falls. Therefore, attendance is a critical factor in mathematics performance.

12. Examination Pattern and Evaluation Practices: The way students are assessed also affects achievement. When evaluation focuses only on rote steps and final marks, students may study mechanically. Fair and comprehensive evaluation should test understanding, application, reasoning, and problem-solving. Frequent class tests, oral questioning, unit tests, and diagnostic assessment can help identify learning difficulties early. In rural schools, such continuous evaluation is sometimes weak due to workload, large classes, or lack of training. Better evaluation practices can improve learning outcomes by guiding instruction.

Challenges Faced by Rural Secondary School Students in Mathematics

1. Rural students face several challenges that make mathematics achievement difficult. One major challenge is weak foundational knowledge acquired at the primary stage. If children move to secondary school without proper understanding of basic operations, fractions, decimals, and tables, they struggle with advanced topics.
2. Another challenge is shortage of academic support systems. In urban settings, students may receive private tuition, access online learning resources, or use guidebooks and apps. Rural students often depend entirely on classroom teaching. If classroom teaching is insufficient, they have limited alternatives.



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3. A further challenge is low self-confidence. Repeated failure in mathematics creates a sense of inferiority among students. They may begin to think that success in mathematics is only for “brilliant” students. This mindset reduces effort and willingness to ask questions.
4. There are also structural challenges such as poor transport, irregular electricity, limited internet access, and shortage of libraries. For girls in some rural areas, domestic responsibilities and social restrictions may additionally affect study time and continuity of education.

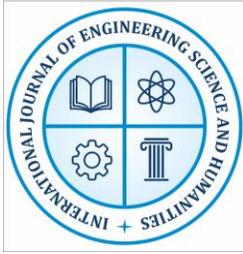
All these challenges indicate that mathematics achievement among rural students must be addressed through a comprehensive educational strategy rather than blaming students alone.

Measures to Improve Mathematics Achievement

1. Improvement in mathematics achievement among rural secondary school students requires joint efforts from teachers, parents, schools, and educational authorities.
2. Teachers should make mathematics teaching more activity-based, learner-centered, and concept-oriented. They should use local examples, visual aids, practical demonstrations, and group work to make the subject meaningful. Slow learners should receive remedial teaching and extra practice.
3. Schools should strengthen infrastructure by ensuring proper classrooms, teaching aids, mathematics kits, libraries, and regular supervision. A supportive academic climate must be created in which students feel safe to ask questions and make mistakes.
4. Parents should be made aware of the importance of regular attendance, homework, and a study-friendly home atmosphere. Even if parents are not educated, they can encourage discipline, motivation, and continuity in learning.
5. Educational authorities should ensure appointment of qualified mathematics teachers in rural schools and provide ongoing teacher training in innovative pedagogy and assessment. Scholarship support, bridge courses, and digital resources may also be introduced for disadvantaged learners.
6. Counselling and motivation programs are equally important. Students must be helped to overcome fear of mathematics and build confidence through success experiences. Recognition of effort, not only high marks, can encourage gradual progress.

Educational Implications

1. The findings of this analytical discussion have several implications. Mathematics achievement should be viewed as a multi-factor outcome rather than a reflection of innate ability alone. Rural students require context-sensitive support, and educational planning must address social and institutional inequalities.



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2. Teacher preparation programs should focus on rural classroom realities and mathematics pedagogy suited to diverse learners. Curriculum planners should also consider simplifying presentation and linking mathematical concepts with everyday rural life.
3. Most importantly, policies aimed at improving educational quality in rural areas must treat mathematics as a priority area. Without strengthening mathematics learning, rural students may remain excluded from many higher educational and occupational opportunities.

Conclusion

Mathematics achievement among rural secondary school students is influenced by a wide range of interacting factors including socio-economic status, parental education, school infrastructure, teaching quality, student attitude, anxiety, study habits, attendance, and language background. Rural learners often face unique educational disadvantages that reduce their opportunities for success in mathematics. Therefore, low performance in mathematics should not be understood merely as an individual weakness; it is closely connected with the broader learning environment. An analytical understanding of these factors reveals that improvement is possible when schools adopt supportive and effective teaching practices, parents provide encouragement, and educational authorities strengthen rural school systems. Mathematics can become a meaningful and enjoyable subject for rural students when it is taught with clarity, patience, relevance, and regular practice. Enhancing mathematics achievement at the secondary level is not only an academic necessity but also a step toward social justice, educational equality, and national progress.

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