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EXPLORING STRATEGIES FOR MOTIVATING AND ENGAGING SECONDARY SCHOOL STUDENTS IN MATHEMATICS IN KHANA LOCAL GOVERNMENT AREA OF RIVERS STATE, NIGERIA

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ABSTRACT

Mathematics education at the secondary school level remains a persistent challenge in Nigeria, particularly in underserved communities such as Khana Local Government Area of Rivers State. Despite its centrality to academic progression and future career prospects, a significant number of secondary school students in this context continue to demonstrate low motivation, poor engagement, and declining performance in mathematics. This study argues that this situation is not inevitable; it is, in large measure, a product of instructional approaches that have failed to evolve in response to the learning needs of today's adolescents. The paper contends that deliberate, evidence-based motivational and engagement strategies offer a realistic and urgently needed pathway to reversing this trend.Drawing on a review of contemporary literature and the theoretical framework of Self-Determination Theory (SDT), this study examines three principal strategies that hold significant promise for transforming mathematics learning in secondary schools: the integration of technology in mathematics instruction, the use of rewards and positive reinforcement, and the adoption of collaborative learning and peer tutoring. Each of these strategies is analyzed for its capacity to stimulate intrinsic motivation, deepen student engagement, and improve academic outcomes within the unique socio-educational realities of Khana LGA. The paper further identifies the barriers including negative student attitudes, mathematics anxiety, inadequate teaching resources, language challenges, and entrenched teacher-centered practices that currently undermine effective mathematics learning in the area. By synthesizing theoretical insights with empirical evidence, the study advances the position that mathematics teachers, school administrators, and education policymakers must act with deliberate intentionality to create classroom environments that nurture student autonomy, build competence, and foster a genuine sense of belonging. The study concludes with targeted recommendations for mathematics educators and policy stakeholders, urging a systemic shift toward student-centered, motivationally informed instructional practices in Khana LGA and beyond.

Keywords: Mathematics, Engagement, Student, Motivation, Strategies.

Introduction

Mathematics is a foundational subject in secondary school education and plays a crucial role in preparing students for science, technology, engineering, and quantitative reasoning across disciplines. However, many secondary school students view mathematics as difficult, abstract, and disconnected from real–world contexts, which adversely affects their motivation, engagement, and performance (Udonsa, 2015; Okafor &Ugobueze, 2024). Research consistently shows that student motivation is a significant determinant of learning outcomes in mathematics, influencing attitudes, persistence in problem solving, and academic achievement (Okafor & Ugobueze, 2024).

One key strategy identified in educational research for enhancing student motivation and engagement is the integration of technology in mathematics instruction. Technological tools such as educational software, interactive simulations, and digital platforms can make learning more interactive, personalized, and student–centered. Technology integration promotes active engagement by allowing learners to visualize abstract concepts, receive immediate feedback, and collaborate in digital spaces, thus fostering deeper interest in mathematical content (Naija Scholar, 2024; Lo & Hew, 2021). When students find mathematics relevant and engaging through technology, their cognitive engagement and desire to master tasks increase, which improves their overall learning experience and motivation.

In addition to technology, rewards and positive reinforcement have been shown to play a significant role in motivating students. Positive reinforcement techniques involve praising effort, recognizing achievement, and offering incentives, all of which can strengthen students' motivation to engage with challenging mathematical content. Empirical studies conducted in Nigeria demonstrate that positive reinforcement significantly influences students' motivation and performance in mathematics by boosting their confidence and reinforcing desirable learning behaviours (Ifeakor & Ikwelle, 2025). These extrinsic motivators can complement intrinsic interest and help sustain students' engagement over time.

Furthermore, collaborative learning and peer tutoring are widely acknowledged as effective engagement strategies in mathematics classrooms. Cooperative and collaborative approaches encourage students to work together in solving problems, share diverse perspectives, and support each other's understanding (Ugiagbe, 2025). These student–centered instructional methods foster social interaction, increase participation, and build a community of learners where peer support enhances motivation and reduces the fear often associated with mathematics learning. Collaborative learning not only improves attitudes towards mathematics but also helps students construct meaning through shared experiences and joint problem solving.

In this context, challenges such as lack of resources, traditional lecture–based practices, and negative attitudes towards mathematics persist, implementing motivational strategies becomes particularly important for improving student engagement and learning outcomes. An understanding of how technology integration, positive reinforcement, and collaborative learning influence motivation and engagement will provide education stakeholdersteachers, curriculum planners, and policymakerswith critical information into effective instructional practices that effectively enhance student interest and achievement in mathematics.

Mathematics remains one of the core subjects in the secondary school curriculum and is essential for students' academic progression and future career opportunities. Despite its importance, secondary school students in Khana Local Government Area of Rivers State continue to demonstrate low interest, poor engagement, and unsatisfactory performance in mathematics. Many students perceive mathematics as difficult, abstract, and intimidating,

which has led to negative attitudes, lack of motivation, and avoidance of active participation during mathematics lessons.Observations and reports from schools in the area indicate that mathematics instruction is still largely dominated by traditional, teacher-centered methods, with limited use of technology, minimal encouragement through rewards or positive reinforcement, and inadequate opportunities for collaborative learning and peer tutoring. This instructional approach often fails to stimulate students' curiosity, sustain their attention, or address individual differences in learning, thereby worsening students' disengagement from mathematics.

Although research has shown that strategies such as the integration of technology in teaching, the use of rewards and positive reinforcement, and collaborative learning can enhance students' motivation and engagement in mathematics, there is limited empirical evidence on how these strategies are utilized and how effective they are in motivating and engaging secondary school students specifically in Khana Local Government Area of Rivers State. The extent to which these strategies influence students' interest in learning mathematics within this local context remains unclear.

The persistence of low motivation and poor engagement among students poses a serious concern for mathematics education in the area, as it may continue to result in weak learning outcomes and limit students' academic and career prospects. Therefore, there is a need to investigate the strategies for motivating and engaging secondary school students in mathematics by examining the roles of technology integration, rewards and positive reinforcement, and collaborative learning and peer tutoring in Khana Local Government Area of Rivers State. This study seeks to address this gap and provide evidence-based insights that can inform effective instructional practices and educational planning.

Motivation in Education

Motivation serves as the psychological engine that drives learning, influencing not only whether a student chooses to engage with academic content but also the intensity and persistence of that engagement. In educational contexts, motivation can be understood as the internal process that initiates, guides, and maintains goal-oriented learning behaviours (Bandara & Hettiwaththage, 2025). It is widely regarded as a critical factor shaping students' participation, cognitive development, and ultimately, their academic achievement (Howard et al., 2021).

Extrinsic and intrinsic motivation are the two main categories of motivation that educational psychologists have long recognized. A student who approaches a difficult math issue just for the pleasure of solving it is intrinsically motivated (Bandara & Hettiwaththage, 2025). Intrinsic motivation is defined as engaging in an activity for its inherent delight rather than for some distinct consequence. In contrast, external outcomes like grades, incentives, acclaim, or avoiding punishment are what generate extrinsic motivation (Howard et al., 2021). While extrinsic motivation can successfully improve short-term performance and assist students in achieving particular goals when properly designed, intrinsic motivation is linked to deeper learning, creativity, and persistent engagement (Bandara & Hettiwaththage, 2025). Rather than viewing these as mutually exclusive categories, contemporary research suggests they exist along a continuum, with many learning activities being influenced by a combination of both types (Escosora & Guhao, 2023).

The relationship between motivation and academic performance has been extensively documented. A comprehensive meta-analysis by Walker et al. (2024) identified motivational factors as among the strongest predictors of academic success, with self-efficacy which is a concept closely related to motivation, showing particularly robust correlations with

achievement outcomes. More recent evidence from Okigbo and Onoshakpokaiye (2023) indicates that academic motivation has a significant positive relationship with students' academic performance in mathematics. Their study of senior secondary school students in Delta State, Nigeria, revealed that motivated learners demonstrate greater engagement and persistence in learning tasks, which contributes to improved achievement in mathematics. The findings further suggest that students who possess stronger intrinsic motivation tend to perform better academically because they approach learning activities with greater interest and commitment.

Mathematics Education

Mathematics occupies a central position in the school curriculum because of its role in developing learners' logical thinking, problem solving ability, and quantitative reasoning. At the secondary school level, it serves as a foundation for many other fields of study, particularly science, technology, engineering, and economics. A sound knowledge of mathematics therefore becomes essential for students who intend to pursue careers in scientific and technical fields. Beyond academic purposes, mathematical knowledge also equips individuals with the ability to analyze situations, interpret numerical information, and make informed decisions in everyday life. For this reason, success in mathematics is often regarded as an important indicator of students' readiness for further education and participation in a knowledge driven society (Naija Scholar, 2024). Despite its importance, the teaching and learning of mathematics continue to face several challenges, particularly in developing countries such as Nigeria where factors such as inadequate instructional resources, large class sizes, and ineffective teaching approaches often affect students' performance in the subject.

Learning mathematics goes beyond memorizing formulas or carrying out routine calculations. It involves the gradual development of conceptual understanding, procedural competence, and the ability to apply knowledge in solving problems. Students are expected to understand mathematical ideas, relate them to one another, and apply them to new situations. This makes mathematics learning a cognitive process that requires active engagement on the part of the learner. When teaching methods encourage participation and interaction, students are more likely to understand mathematical concepts and retain them for future use. Scholars therefore emphasize that meaningful mathematics learning occurs when teachers guide students to make connections between abstract concepts and practical situations encountered in daily life (Chi, 2025).

In recent years, attention has also been given to the use of instructional tools that can support students' understanding of mathematical ideas. Instructional resources such as virtual manipulatives, interactive models, and visual representations can help make abstract concepts more concrete and easier for students to understand. These tools provide learners with opportunities to explore mathematical relationships, test ideas, and observe patterns through guided activities. When appropriately integrated into classroom instruction, such resources can enhance students' engagement and promote deeper understanding of mathematical concepts (Virtual manipulatives, 2025).

Barriers to effective Mastery of Mathematical Concepts

In Nigerian secondary schools, many students struggle to fully grasp mathematical concepts, and this struggle often goes beyond individual ability. A combination of factors ranging from students' attitudes toward mathematics to systemic challenges in teaching and learning, creates significant barriers to mastery.

Some barriers students encounter that hinder mastery of mathematical concepts include:

1. **Negative Attitudes and Perceptions:** Many students view mathematics as abstract, difficult, and disconnected from real life, leading to anxiety and disengagement. In Nigeria, such perceptions are widespread and contribute to low interest and motivation in mathematics learning (Naija Scholar, 2024). This often results in students avoiding challenges and relying on rote memorization rather than understanding underlying concepts.
2. **Language and Communication Barriers:** English-medium instruction in multilingual setting may impede comprehension when students lack proficiency, complicating understanding of mathematical terminology and reasoning (Awofala & Awolola, 2011). As a result, students may misinterpret instructions or struggle to follow problem-solving steps, limiting their conceptual clarity.
3. **Inadequate Teaching Resources:** Many schools lack sufficient textbooks, manipulatives, technology, and qualified mathematics teachers, leading to poorly delivered lessons and superficial learning (Awofala & Awolola, 2011). This scarcity prevents learners from engaging in hands-on activities or visual demonstrations that could strengthen understanding.
4. **Fear and Math Anxiety:** Negative emotions such as math anxiety reduce engagement and hinder willingness to tackle challenging tasks (Naija Scholar, 2024; Awofala et al., 2025). Students may avoid attempting problems, participate less in class, or give up easily when faced with complex questions.
5. **Traditional Instructional Practices:** Teacher-centered lecture methods often fail to engage learners actively or address diverse learning needs, contributing to surface learning rather than deep conceptual understanding (Naija Scholar, 2024).This approach often leaves students passive, limiting opportunities to explore, discuss, or apply concepts in meaningful ways.

Strategies to Motivate and Engage Students in Mathematics Learning

There are many strategies mathematics teachers can employ to motivate and engage students in learning of mathematics, these are but not limited to:

1. Integration of Technology in Mathematics Instruction

Integrating technology into mathematics instruction is widely regarded as a strategy to increase engagement and improve learning outcomes. Technology tools—including virtual manipulatives, digital apps, interactive whiteboards, mobile learning environments, and math software—provide dynamic ways to visualize and manipulate mathematical concepts, making learning more accessible and relatable for students (Teach to One, 2025).

Studies show that technology use in mathematics can enhance motivation by providing immediate feedback, varied representations, and personalized learning pathways that accommodate different learning styles (Boadu & Boateng, 2024). Moreover, technology can extend learning beyond the classroom, allowing students to explore mathematics through simulations, gamified activities, and collaborative platforms, thereby increasing cognitive engagement and interest.

Despite benefits, technology integration also presents challenges, such as the need for proper teacher training and adequate technical resources to support effective adoption (OECD, 2015). Successful implementation requires alignment with pedagogical goals and ongoing professional support, so technology serves as a meaningful instructional tool rather than a distraction.

2. Rewards and Positive Reinforcement as a Strategy

Rewards and positive reinforcement have been found to influence students' motivation and engagement positively. Positive reinforcement—through praise, recognition, incentives, and acknowledgment of effort—can strengthen students' persistence and confidence in mathematics learning. In the Nigerian context, recognizing students' progress and creating an encouraging classroom environment helps reduce fear of failure and boosts participation (Naija Scholar, 2024). Through such reinforcement, students are more likely to sustain effort and interest, contributing to improved learning outcomes.

Linking reinforcement strategies with students' academic goals helps move them from extrinsic to intrinsic motivation over time, as learners begin to appreciate mastery and personal achievement in mathematics (Boadu & Boateng, 2024). These strategies, when combined with engaging instruction and meaningful feedback, contribute to a motivational classroom culture that supports student engagement.

3. Collaborative Learning and Peer Tutoring as a Strategy

Collaborative learning and peer tutoring are student-centered pedagogies that promote interaction, shared problem solving, and social construction of knowledge. In collaborative learning, students work in groups to solve tasks, discuss ideas, and construct understanding collectivelyan approach linked to increased engagement and deeper comprehension (Oikarinen et al., 2022). Peer tutoring, where students act as both tutors and tutees, supports learners in clarifying concepts, reinforcing understanding, and building confidence (Hidayat et al., 2025). Peer tutoring enhances motivation because students often feel more comfortable discussing mathematical ideas with classmates and can receive targeted assistance tailored to their needs. Meta-analytic evidence also points to strong positive effects of peer tutoring on academic outcomes in STEM fields, including mathematics (Hidayat, 2025).

Collaborative structures encourage active participation and help students develop social skills alongside cognitive growth. These strategies resonate with constructivist learning theories that emphasize social interaction and learner agency as crucial for conceptual understanding and motivation.

Self Determination Theory

Several theoretical perspectives have been developed to explain how motivation operates within educational settings. One of the most widely recognized frameworks in contemporary educational psychology is Self Determination Theory (SDT). The theory explains that students' motivation and general psychological well-being are influenced by the extent to which the learning environment supports three fundamental psychological needs: autonomy, competence, and relatedness. Autonomy refers to the extent to which learners feel they have some degree of choice and control over their learning activities. Competence relates to the feeling of effectiveness that students experience when they are able to understand and successfully carry out academic tasks. Relatedness, on the other hand, reflects the sense of belonging students feel when they maintain positive relationships with their teachers and classmates within the school environment (King et al., 2024). Within this framework, learning environments that support these needs tend to encourage stronger and more meaningful forms of motivation among students. When teachers provide opportunities for students to participate actively in learning decisions, offer feedback that helps them improve their abilities, and maintain supportive interactions in the classroom, students are more likely to show sustained interest in their studies. Such conditions often lead to greater effort, persistence in completing academic tasks, and improved performance in school work. Evidence from empirical studies also highlights the importance of these psychological needs in shaping students' learning outcomes. Research conducted in different cultural and

educational contexts by Lee and Kim (2025) indicates that autonomy, competence, and relatedness play an important role in students' engagement and academic success. Although the manner in which these needs are expressed may differ across societies due to variations in educational practices and cultural values, their relevance to students' motivation and academic functioning remains widely acknowledged. For this reason, educational environments that deliberately encourage students' sense of autonomy, strengthen their competence, and promote supportive relationships are more likely to enhance students' motivation and overall academic performance.

Conclusion

This study examined strategies for motivating and engaging secondary school students in mathematics in Khana Local Government Area. The problem of low motivation and weak engagement in mathematics among secondary school students in Khana Local Government Area of Rivers State remains a significant educational concern. Many students complete their mathematics classes without developing confidence or genuine interest in the subject. Over time, some begin to believe that mathematics is too difficult or not meant for them. Such perceptions often arise from learning environments that fail to sufficiently encourage participation, curiosity, and persistence among learners. The continued poor performance observed among many students in mathematics within the area should not be viewed simply as a reflection of students' inability. Rather, it points to the need for more effective instructional and motivational strategies in mathematics classrooms. Evidence from educational research indicates that when teachers employ approaches that encourage participation, provide positive reinforcement, and promote collaboration among learners, students tend to show greater interest, persistence, and improvement in mathematics. Self Determination Theory provides a useful explanation for this situation by emphasizing the importance of autonomy, competence, and relatedness in students' learning experiences. When mathematics classrooms create opportunities for students to participate actively, receive constructive feedback, and interact positively with their peers and teachers, their motivation to learn the subject is more likely to improve. Although schools in communities such as Khana LGA may face challenges such as limited resources and large class sizes, meaningful improvement is still possible. Teachers can adopt practical strategies that motivate students, while educational authorities should provide the necessary support through improved resources, teacher training, and policies that promote effective mathematics instruction. In conclusion, improving students' motivation and engagement in mathematics in Khana LGA is essential for strengthening academic outcomes and expanding future opportunities for learners. Practical strategies such as the use of instructional technology, positive reinforcement, and collaborative learning offer realistic approaches for enhancing students' interest and participation in mathematics education.

Suggestions

Based on the foregoing, the following were suggested:

1. Mathematics teachers should deliberately integrate technology such as interactive simulations, educational software, and digital tools into daily classroom instruction to enhance students' conceptual understanding and sustained engagement in mathematics.
2. School administrators should establish consistent systems of positive reinforcement, including verbal praise, certificates, and modest incentives, to acknowledge student effort and achievement, thereby fostering confidence and reducing mathematics anxiety.
3. Policymakers and curriculum planners should mandate the inclusion of collaborative learning and peer tutoring strategies in mathematics teacher training programmes and instructional guidelines to promote inclusive, student-centred classrooms that benefit both male and female learners equally.

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