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INFLUENCE OF TEACHERS' INSTRUCTIONAL STRATEGIES ON STUDENTS' INTEREST IN MATHEMATICS IN NORTH-CENTRAL ZONE OF NIGERIA

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ABSTRACT

This study examined the influence of teachers' instructional strategies on students' interest in Mathematics in the North-Central Zone of Nigeria. A total of 1,400 participants (200 teachers and 1,200 students) were sampled. Data were collected using questionnaires assessing teachers' use of five instructional strategies; lecture, cooperative learning, ICT integration, manipulatives, and formative assessment and students' interest in Mathematics. Descriptive, correlational, and multilevel analyses were conducted. Results indicated that cooperative learning, formative assessment, ICT integration and manipulatives significantly predicted students' interest, while lecture method had minimal effect. Findings underscore the importance of active, technology-driven and assessment- oriented strategies in enhancing Mathematics interest among secondary school students in the region.

KEYWORDS: Teachers' Instructional Strategies, Students' Interest, North-Central Zone, correlation analysis. academic performance.

INTRODUCTION

Mathematics plays a crucial role in technological, economic, and scientific advancement (Usman & Okafor, 2022). However, the persistent decline in students' interest in Mathematics in Nigerian schools remains a national concern (Adebayo, 2021). Teachers' instructional strategies are key determinants of students' engagement, motivation, and interest in Mathematics learning (Akinsola & Awofala, 2020). Inadequate or monotonous instructional methods often discourage learners from developing a positive attitude toward

Mathematics (Ogunleye & Ajayi, 2019). The North-Central Zone, comprising states like Benue, Kogi, Kwara, Nasarawa, Niger, and Plateau, faces unique educational challenges linked to resource availability and instructional quality (Yakubu, 2020). Therefore, investigating how teachers' instructional strategies influence students' interest is imperative for sustainable improvement in Mathematics education.

Review of Related Literature

Research has consistently shown that instructional strategies strongly influence students' interest and achievement in Mathematics. According to Awofala (2020), cooperative learning enhances peer interaction and promotes positive attitudes toward Mathematics. Similarly, Oladipo and Adeniran (2021) observed that ICT integration supports conceptual understanding and increases learners' curiosity. Manipulative use, such as visual aids and hands-on materials, enables students to relate abstract concepts to real-world experiences (Eze & Okeke, 2020). Formative assessment strategies, as argued by Black and Wiliam (2018), foster continuous feedback and reflective learning, which sustain interest. Conversely, lecture-based teaching often results in low participation and reduced enthusiasm among students (Ibrahim & Musa, 2019). Thus, effective instructional strategies remain vital for cultivating student interest in Mathematics.

Concept of Students' Interest in Mathematics

Interest is a psychological state characterized by focused attention, curiosity, and positive emotion toward a subject or activity (Hidi & Renninger, 2019). In educational settings, student interest plays a critical role in engagement, persistence, and achievement. When students find a subject meaningful, they are more likely to invest time and effort in understanding it.

Mathematics, by its abstract nature, often requires sustained cognitive effort. However, many students in Nigeria exhibit low interest, viewing the subject as difficult, irrelevant, or anxiety-provoking (Achor et al., 2020; Salifu, 2022). The Federal Ministry of Education (FME, 2021) emphasized that lack of motivation and inadequate teaching approaches contribute significantly to waning interest in Mathematics, especially at the senior secondary level.

Research by Olaoye and Yusuf (2023) found that students with high intrinsic interest in Mathematics tend to perform better academically compared to those who study the subject out of obligation. This finding aligns with Deci and Ryan's (2020) Self-Determination Theory,

which posits that internal motivation enhances persistence and performance in learning tasks.

Concept of Academic Performance in Mathematics

Academic performance refers to the measurable outcomes of students' educational attainment, often represented through grades, test scores, and examination results (Hassan & Awoleye, 2021). In Mathematics, performance reflects students' mastery of computational, reasoning, and problem-solving skills.

According to WAEC (2023**)** reports, the proportion of students in the North-Central Zone who obtained credit passes in Mathematics has remained below 40% for the past five years. This trend underscores the need for continuous evaluation of the underlying causes of poor performance. Studies by Agbo and Usman (2022**)** suggest that performance in Mathematics is not only influenced by cognitive ability but also by affective factors such as interest, self-efficacy, and anxiety.

Relationship Between Interest and Academic Performance

A substantial body of evidence supports a positive correlation between students' interest and academic achievement in Mathematics (Eccles & Wigfield, 2020; Hidi & Renninger, 2019; Ahmad, 2024). When learners are interested, they are more engaged, more likely to practice independently, and better able to retain learned concepts.

Schiefele (2021) argues that interest enhances both the quality and quantity of learning, leading to deeper comprehension and longer-term retention. Similarly, Achor et al. (2020) found that Nigerian students who enjoyed Mathematics demonstrated higher levels of achievement and perseverance even when confronted with difficult problems.

In contrast, low interest is associated with avoidance behavior, poor concentration, and reduced participation (Igbokwe & Obi, 2023). Students with negative attitudes toward Mathematics tend to disengage early, resulting in declining performance over time.

Factors Affecting Students' Interest and Performance in Mathematics Teacher Instructional Strategies

Teaching methodology plays a pivotal role in shaping students' attitudes and interest in Mathematics. Research shows that learner-centered pedagogies—such as problem-based learning, cooperative learning, and the use of ICT—can significantly enhance engagement (Shang & Wang, 2022).

Nwoke and Nwankwo (2021) observed that when teachers employ practical and relatable examples, students' motivation to learn Mathematics increases. Conversely, traditional lecture-based approaches discourage exploration and limit understanding.

Availability of Instructional Materials

The presence of instructional resources, such as visual aids, mathematical models and educational software facilitates conceptual understanding. Okafor (2020) reported that schools with adequate instructional materials recorded higher Mathematics scores than those without. In many North-Central schools, however, inadequate facilities and poor maintenance culture continue to hinder effective teaching and learning (Adamu & Mohammed, 2023).

Interest and Performance in Mathematics

Interest can be reflected in individuals' likes and dislikes. Hornby (2006) defines interest as the state of wanting to know or learn about something or someone. Ochiagha (1995) emphasizes that interest is crucial for learning and training because it serves as a motivating factor that stimulates deeper engagement, rooted in fundamental emotions and desires. This suggests that a student's performance in mathematics can be strongly influenced by their level of interest in the subject.

Ngwoke (1995) notes that interest encourages strong personal involvement in a task, making the learner less prone to distractions, enhancing memory retention, and fostering a strong intent to learn and achieve competence. Akunbue (1991) adds that an interested individual is attentive, and attentive learners tend to perform better. When students are interested, learning becomes more meaningful, enjoyable, and significant, with intrinsic motivation driving participation in class activities. Offorma (1991) further emphasizes that active engagement in lessons, fueled by interest, promotes effective learning, which ultimately reflects in improved performance in both internal and external examinations.

Strategies for Increasing Interest

An individual's interest in a particular course or program is influenced by several factors, including the methods and approaches used to present the material to learners (Akunbue, 1991). To foster students' interest in science and mathematics and cultivate a scientific attitude, teachers should carefully plan their instructional objectives (Odubunmi, 1983).

In science education, presenting concepts in overly abstract terms can bore learners and

diminish their interest in the subject (Igba, 2006). Ngwoke (1995) suggested several strategies to engage students and stimulate interest in the subject matter:

1. Introducing lessons with questions that require student responses.
2. Beginning lessons with demonstrations from which students can make their own notes.
3. Taking students on observation or demonstration trips, such as when teaching topics like sequences, sets, or constructions.

Odubunmi (1983) emphasized that attitudes cannot develop in isolation. Students should engage with "attitude objects," meaning they need hands-on experiences with concepts to understand facts, theories, and their real-life applications. Gayne (1976) noted that being scientific involves traits such as curiosity, rationality, open-mindedness, critical thinking, objectivity, honesty, and humility.

Motivation plays a key role in capturing learners' interest, keeping them focused, and fostering a positive attitude toward learning (Ngwoke, 1995). According to Ngwoke, motivation is an internal psychological state that energizes and directs behavior toward achieving a goal. Once students' interest is stimulated, a significant part of the learning challenge is already addressed.

Akunbue (1991) highlighted that students' responses and participation in learning tasks are closely linked to their level of motivation. Low motivation may lead students to seek other, more engaging pursuits, indicating that motivation is essential for enhancing learning in subjects like mathematics. Although motivation is a psychological construct, it can be strengthened through positive reinforcement (Ngwoke, 1995).

Okeke (1995) defines positive reinforcement as any stimulus that encourages an individual to repeat a desired behavior. For example, if a student performs well in mathematics and receives a reward, such as a scholarship, a good textbook, or a high grade, it increases the

likelihood that the student—and others—will strive to excel in the subject. Positive reinforcement, therefore, can effectively enhance students' interest in mathematics.

Popoola (1990) observed that activities such as problem-solving, practical exercises, graphical work, and self-testing expose students to learning experiences that promote cognitive, affective, and psychomotor development. Durojaye (1976) argued that effective teaching should incorporate available cultural resources and build upon students' prior experiences, rather than relying solely on textbooks or rote methods. This approach allows learners to relate lessons to their environment and develop a scientific mindset. Fafunwa (1967) further emphasized that early exposure to science exploration nurtures children's natural curiosity and eagerness to learn.

Role of The Teacher in Mathematics Education

Teachers are central to effective mathematics instruction. Okwori (2002) defines a teacher as someone committed to making children literate while also developing their physical, moral, and social character so that they grow into healthy, responsible, self-reliant, cooperative members of society. Hornby (2006) similarly describes a teacher as a person who demonstrates how to do something, enabling others to perform it independently. From these definitions, it is clear that teachers serve as the primary facilitators in the teaching and learning process.

Ango (1991) emphasizes that learners' behaviors are shaped by teachers' attitudes, skills, and instructional methods. Students depend heavily on their teachers not only to cultivate proper learning attitudes but also to ensure effective learning. Okwori (2002) further highlights the necessity of professionally trained mathematics teachers to successfully implement the national mathematics curriculum, as these teachers possess both the knowledge of the national philosophy of mathematics and the skills to translate curriculum objectives into meaningful classroom outcomes.

Robinson (1980) warns that assigning unqualified personnel to teach a subject risks superficial and ineffective instruction. Responding to such concerns, Adamaechi and Romaine (2002) argue that all graduate science teachers lacking professional training should undergo proper teacher preparation. As a long-term solution, Maduabum (1989) suggests that universities should adopt more supportive attitudes and programs toward mathematics and the professional training of mathematics teachers.

Beyond qualifications, a mathematics teacher's personality and role as a knowledge custodian are essential for fostering student interest. Ngwoke (1995) notes that to sustain students' interest, teachers must demonstrate genuine concern for their progress and performance, ensuring that students' work is valued, appropriately challenging, and achievable. Mallum et al. (2004) describe the teacher as a motivator of learning, asserting that students' ability to learn largely depends on how effectively the teacher engages their interest and helps them appreciate the value of education.

Creating the right learning environment is also critical for nurturing student interest. Carroll and Porter (1997) recommend that teachers show acceptance, respect, warmth, love, and sincerity toward learners. Mallum et al. (2004) further stress that teachers should avoid ridiculing students, as maintaining students' self-esteem encourages positive attitudes toward learning and sustains their interest in the subject.

Instructional Materials in Mathematics Education

Instructional materials are tools that make learning experiences more concrete, realistic, and engaging. In essence, they enhance a teacher's efforts in transmitting knowledge, attitudes, and skills by allowing a more effective multi-sensory approach to learning than words alone can achieve (Igba, 2006). He further notes that since science is inherently abstract, the absence of suitable instructional materials, especially in subjects like mathematics, exacerbates the challenge of teaching.

Butts (1973) emphasized that for teaching and learning to be effective, the teacher's role must go beyond simply transmitting textbook knowledge; they should help students interpret and apply concepts to real-life situations. This process, he asserts, cannot be accomplished without the support of instructional materials.

Fadamario (2000) categorized instructional materials into three types: audio, visual, and audio-visual. Audio-visual resources, such as videos and television, are particularly valuable in teaching mathematics, as they can stimulate interest, modify attitudes, clarify concepts, encourage critical thinking, summarize content, demonstrate processes, and concretize knowledge that might otherwise remain abstract. Early research (1977) recommended the use of television, pictograms, charts, and moving pictures in classrooms, noting that students tend to enjoy these visual aids and grasp information more quickly from them.

Robinson (1980) highlighted several advantages of using audio-visual materials in teaching and learning:

1. They support both group and individualized instruction.
2. They allow students to learn at their own pace.
3. They encourage students to develop initiative to the fullest extent.

Visual materials such as graph sheets, charts, models, photographs, pictograms, and filmstrips, along with audio materials like radios, record players, and cassettes, are all important in mathematics instruction. Adejoh (2008) notes that these materials provide concrete learning experiences, reinforce theoretical knowledge, and help students develop both scientific and mathematical skills.

Okwori (2002) asserts that the philosophy and objectives of mathematics teaching in Nigeria emphasize activity-based and student-centered approaches. Failing to use instructional aids in lessons contradicts these objectives and undermines the intended purpose of introducing mathematics in schools.

Theoretical Framework

Self-Determination Theory (SDT) — Deci and Ryan (2020)

This theory emphasizes that human motivation is driven by three basic psychological needs: autonomy, competence, and relatedness. When these needs are fulfilled, students are intrinsically motivated and interested in learning. In the context of Mathematics education, teachers who promote autonomy and competence can foster deeper student interest and engagement.

Expectancy-Value Theory (EVT) — Eccles and Wigfield (2020)

This theory posits that students' motivation to learn is determined by their expectations for success and the value they attach to the subject. A student who believes that success in Mathematics is achievable and useful will likely demonstrate higher interest and performance.

Constructivist Learning Theory — Piaget (1972) & Vygotsky (1978)

Constructivism emphasizes that learners actively construct knowledge through interaction with their environment. Applying this theory to Mathematics implies that teachers should provide engaging, hands-on activities that stimulate curiosity and problem-solving skills, thereby sustaining student interest.

Empirical Review

Empirical studies in Nigeria and beyond have consistently linked interest and academic performance in Mathematics.

1. Achor et al. (2020) found that students with high interest in Mathematics outperformed peers with low interest in both cognitive and problem-solving tests.
2. Salifu (2022) reported that low interest accounted for 35% of the variance in Mathematics achievement among SS3 students in Kwara State.
3. Ogunbiyi and Adebayo (2023) identified socio-economic background and teacher motivation as mediating factors between interest and achievement.
4. Ahmad (2024)**,** in a comparative study of Northern and Southern Nigeria, concluded that improving teaching strategies could raise interest levels and reduce regional disparities in Mathematics performance.
5. Shang and Wang (2022) emphasized that technology-assisted instruction promotes interest and enhances comprehension in Mathematics across different ability levels.

Methodology

The study adopted a correlational and multilevel quantitative research design. A total of 1,400 participants; 200 Mathematics teachers and 1,200 students were selected across secondary schools in the North-Central Zone using stratified random sampling. Two instruments were used: The Teachers' Instructional Strategies Questionnaire (TISQ) and the Students' Mathematics Interest Scale (SMIS). The reliability coefficient for the SMIS was Cronbach's alpha = 0.87, indicating high internal consistency. Data were analyzed using descriptive statistics, Pearson correlations, multiple regression, and mixed-effects modeling (students nested within teachers).

Results and Discussion Descriptive Statistics

Table 1: presents the mean and standard deviation of teachers' instructional strategies and students' Mathematics interest.

Variable	Mean	SD
Lecture Method	3.18	0.71
Cooperative Learning	3.56	0.64
ICT Integration	2.75	0.83
Manipulatives Use	3.04	0.78
Formative Assessment	3.49	0.54
Students' Interest	3.62	0.66

Source: SPSS Fieldwork (2025)

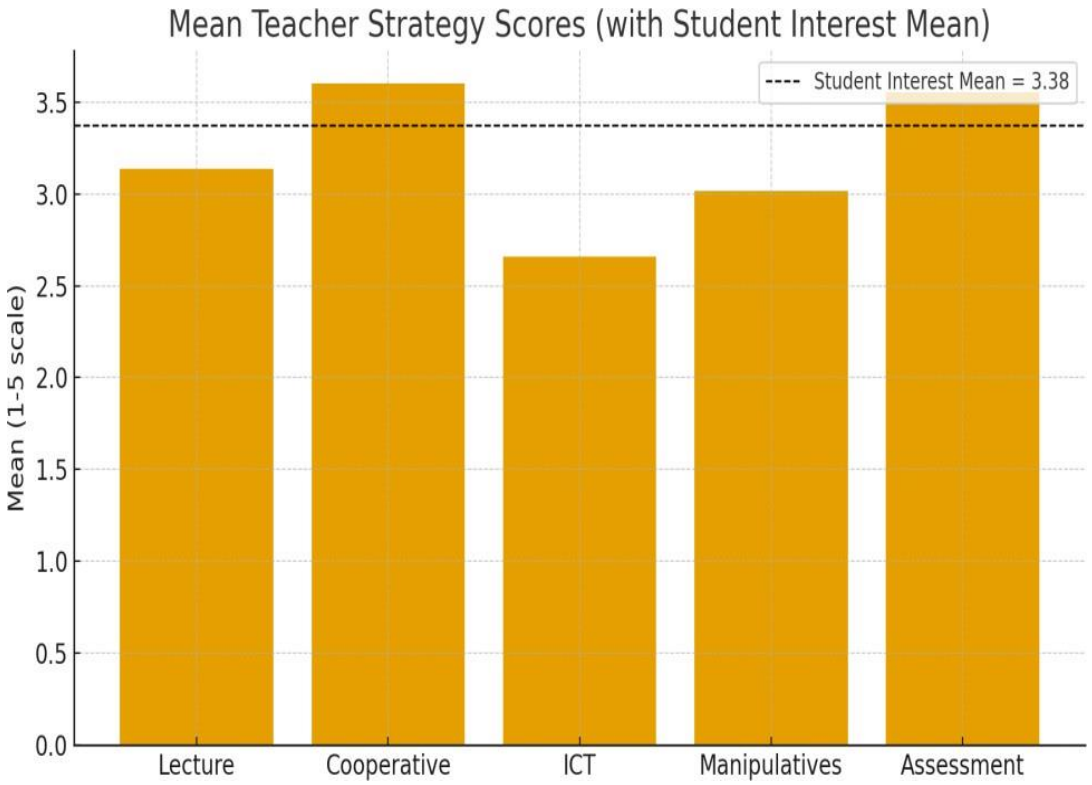

Figure 1: Mean Teacher Strategy Scores with Student interest mean.

Correlation Analysis

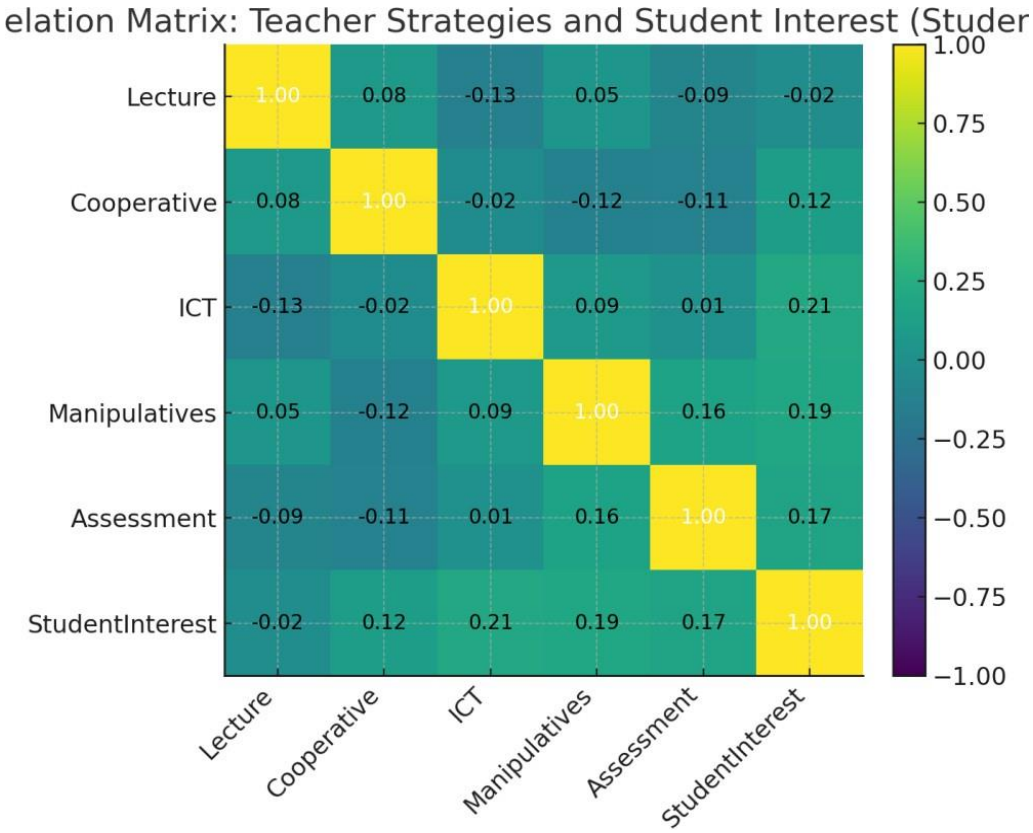

Figure 2: Correlational matrix showing Teacher Strategies and student Interest.

Regression and Multilevel Analysis

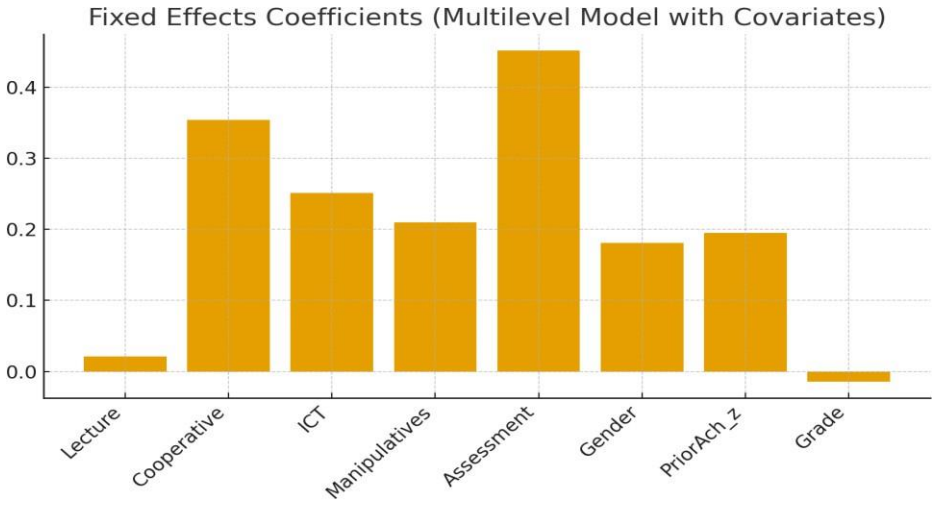

Figure 3: Fixed Effects coefficient (Multilevel model with covariates)

Table 2: Summary of Multilevel Model Fixed Effects

Predictor	**Coefficient**	**Interpretation**
Lecture Method	0.02	Small positive, non- significant
Cooperative Learning	0.35	Strong positive influence
ICT Integration	0.25	Moderate positive influence
Manipulatives Use	0.21	Positive influence
Formative Assessment	0.45	Strongest positive influence
Gender	0.18	Females show slightly higher interest
Prior Achievement	0.20	Higher achievers show more interest
Grade	-0.01	Slight decrease with higher grade level

Source: SPSS Fieldwork (2025)

DISCUSSION

The findings confirm that teachers' instructional strategies have a significant influence on students' interest in Mathematics. Specifically, cooperative learning and formative assessment emerged as the strongest predictors. These results are consistent with the constructivist learning theory which emphasizes collaboration and formative feedback (Vygotsky, 1978). The minimal influence of lecture-based methods aligns with prior research indicating that passive learning environments reduce motivation and engagement (Ibrahim &

Musa, 2019). The integration of ICT and manipulative resources also positively affected students' interest, reflecting modern trends in Mathematics instruction.

CONCLUSION AND RECOMMENDATIONS

This study concludes that active, student-centered, and technology-supported instructional strategies significantly enhance students' interest in Mathematics. Teachers should adopt cooperative learning, ICT integration, manipulative tools, and formative assessments to improve engagement. Teacher training programs should emphasize modern pedagogical practices that foster curiosity and long-term interest in Mathematics.

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