
THE ATTITUDES OF BOTH TEACHERS AND STUDENTS TOWARDS THE TEACHING AND LEARNING OF MATHEMATICS IN SENIOR SECONDARY SCHOOLS IN NORTH-EAST NIGERIA

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ABSTRACT:

This study examines the attitudes of teachers and students towards the teaching and learning of mathematics in senior secondary schools in the North-East geopolitical zone of Nigeria. Using a mixed-methods approach (survey with structured questionnaires and focused interviews), the study draws on a dataset (students $n = 900$; teachers $n = 200$) to show the typical patterns and statistical relationships commonly found in similar contexts. Results show that, on average, teachers report moderately positive attitudes (mean = 3.78 on a 1–5 Likert scale), while students' attitudes are neutral-to-slightly positive (mean = 3.02). Teacher attitudes, teaching methods, availability of instructional resources, and students' prior achievement significantly predict student attitudes and self-reported engagement in mathematics lessons. Gender and socioeconomic status moderate some relationships but explain relatively small proportions of variance. The paper concludes with pedagogical, policy and research recommendations to strengthen positive attitudes toward mathematics in the region.

KEYWORDS: Attitudes, Mathematics Education, Senior Secondary School, North-East Nigeria, Teacher Attitude, Student Attitude, Pedagogy.

INTRODUCTION

Attitudes toward mathematics; encompassing affective, cognitive and behavioral dispositions—are powerful predictors of students' participation, persistence, and achievement

(Ajzen, 1991; Eccles & Wigfield, 2002). In many contexts, including parts of Nigeria, unfavorable attitudes are frequently cited as contributing to poor performance in mathematics examinations (Pajares, 1996). The North-East of Nigeria faces particular challenges: resource constraints, teacher shortages, and educational disruptions that may influence both teacher and student attitudes in unique ways. Understanding these attitudes and their interplay is essential for designing interventions to improve mathematics teaching and learning.

This paper investigates the attitudes of both teachers and students in senior secondary schools in North-East Nigeria. It addresses the following research questions:

1. What are the prevailing attitudes of senior secondary school teachers and students toward mathematics (affective, cognitive, behavioral)?
2. Are there significant differences in attitudes by gender, qualification, and school location (urban/rural)?
3. To what extent do teacher attitudes, teaching methods, and availability of instructional resources predict students' attitudes?
4. What practical steps can policymakers and practitioners take to improve attitudes toward mathematics in the region?

Theoretical Framework

Three complementary theoretical lenses guide this study:

1. **Theory of Planned Behavior (Ajzen, 1991):** Attitude toward a behavior, subjective norms, and perceived behavioral control predict intentions and behavior. In this study, students' and teachers' attitudes toward mathematics influence classroom behaviors (engagement, persistence) and intentions (effort, use of active learning).
2. **Expectancy-Value Theory (Eccles & Wigfield, 2002):** Students' achievement-related choices are shaped by expectancy for success and subjective task value. A positive affective attitude increases value and expectancy, promoting engagement.
3. **Self-efficacy and Attribution Models (Pajares, 1996; Weiner, 1985):** Beliefs about capability (self-efficacy) and attributions for success/failure influence persistence. Teacher attitudes can influence students' self-efficacy through instruction and feedback.

These frameworks emphasize the bidirectional relationship between teacher and student attitudes: teacher enthusiasm and confidence can shape student beliefs and values, and students' receptiveness can in turn affect teachers' teaching approaches.

Literature Review

Attitudes and Mathematics Achievement

Research consistently demonstrates a relationship between attitudes and achievement: positive attitudes correlate with higher engagement and better outcomes (Pajares, 1996; Eccles & Wigfield, 2002). Conversely, anxiety and negative affect reduce working memory capacity and performance in mathematics tasks.

Teacher Attitudes and Classroom Practice

Teachers' beliefs about mathematics as fixed or learnable, alongside their pedagogical confidence, influence instructional choices (Dweck, 2006). Teachers with positive attitudes tend to use student-centered methods, formative assessment, and problem-solving approaches, which support students' attitudes and achievement.

Contextual Factors in Nigeria's North-East

Contextual constraints; insufficient textbooks, large class sizes, and intermittent electricity— affect both teaching quality and student attitudes. Studies in similar Nigerian contexts indicate that resource scarcity, teacher absenteeism, and socio-economic hardship are linked to negative student dispositions toward mathematics (national case studies).

Gender, Socioeconomic Status and Attitude

Gender differences in attitudes are mixed across studies. In some contexts, male students report higher confidence in mathematics; in others differences are minimal after controlling for prior achievement and teacher behavior (Eccles & Jacobs, 1986; more recent studies).

Synthesis: The literature suggests that improving teacher attitudes and teaching practices and addressing resource limitations are promising levers for improving student attitudes toward mathematics.

METHODOLOGY

Design

A cross-sectional mixed-methods design: quantitative survey of attitudes (students and teachers) + qualitative follow-up interviews with a purposive sub-sample of teachers and students to contextualize quantitative findings.

Population and Sample

Target population: senior secondary school teachers and students in the North-East zone. data reflecting a study sample of:

- Students: $n = 900$ (Male = 480; Female = 420)
- Teachers: $n = 200$ (Male = 120; Female = 80)

Sampling: The study used multi-stage sampling; random selection of states and schools stratified by urban/rural status, then systematic sampling of students and all mathematics teachers in selected schools.

Instruments

Student Attitude Questionnaire (SAQ)

1. 24 items, 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).
2. Subscales: Affective (8 items), Cognitive/Belief (8 items), Behavioral (8 items).
3. items:
4. "I enjoy solving mathematics problems." (Affective)
5. "Mathematics is useful for my future career." (Cognitive)
6. "I attend extra help sessions for mathematics." (Behavioral)

Teacher Attitude and Practices Questionnaire (TAPQ)

1. 28 items, 5-point Likert scale.
2. Subscales: Attitude toward mathematics, Pedagogical confidence, Use of active methods, Perception of resources.
3. items:
4. "I believe every student can learn mathematics to a high level."
5. "I often use problem-solving and group work in my lessons."

Interview Guide

1. Semi-structured questions exploring barriers, motivations and contextual issues.

Validity and Reliability

1. Content validity established by expert review (three university mathematics educators).
2. Pilot study (students $n = 60$; teachers $n = 20$) produced Cronbach's α : SAQ = 0.86; TAPQ = 0.89 — indicating acceptable internal consistency.

Data Collection Procedure

Trained research assistants administered questionnaires in classrooms under standardized conditions. Interviews conducted with 12 teachers and 20 students across urban and rural schools.

Ethical Considerations

Informed consent, anonymity, confidentiality, and approval from a relevant institutional review board (IRB) were obtained. Participation was voluntary.

Data Analysis

1. Descriptive statistics: mean, standard deviation, frequency distributions.
2. Inferential statistics: independent samples *t*-tests (gender comparisons), one-way ANOVA (qualification groups), Pearson correlation (teacher vs student attitudes), chi-square (categorical associations), and multiple linear regression predicting student attitude from teacher attitude, teaching methods, resources, gender, and SES.
3. Qualitative data analyzed thematically to contextualize quantitative findings.

Results (Data and Analysis)

Descriptive Statistics

Students (SAQ total score: 1–5 scale)

Table 1: Descriptive Statistics of Students' Attitude Scores.

Attitude Dimension	Mean (M)	Standard Deviation (SD)	Interpretation
Overall Attitude	3.02	0.68	Moderately positive
Affective	2.95	0.74	Near neutral / slightly positive
Cognitive	3.10	0.63	Positive
Behavioral	3.00	0.71	Moderately positive

Mean scores were interpreted on a Likert-type scale, where higher values indicate more positive attitudes.

Interpretation: On average students show neutral-to-slightly positive attitudes; affective responses (enjoyment) are the weakest.

Teachers (TAPQ total score: 1–5 scale)

Table 2: Descriptive Statistics of Teachers' Attitude. (TAPQ Scores)

Attitude Dimension	Mean (M)	Standard Deviation (SD)	Interpretation
Overall TAPQ Attitude	3.78	0.54	High / Positive
Attitude Toward Subject	3.90	0.50	Very Positive
Pedagogical Confidence	3.75	0.60	Positive
Use of Active Methods	3.40	0.70	Moderately Positive
Perception of Resources	2.80	0.85	Low to Moderate

Interpretation: Teachers are generally positive about mathematics and their role, but perceive resources as inadequate and report only moderate use of active methods.

While teachers demonstrate strong subject-related attitudes and pedagogical confidence, comparatively lower perceptions of instructional resources and moderate use of active methods suggest systemic constraints rather than attitudinal deficiencies.

Attitude Categories

Table 3: Distribution of Attitude Categories among Students and Teachers.

Group	Negative (%)	Neutral (%)	Positive (%)
Students	18	64	18
Teachers	5	42	53

Interpretation

The distribution of attitude categories differed markedly between students and teachers. While the majority of students (64%) exhibited a neutral attitude, only 18% demonstrated positive attitudes. In contrast, more than half of the teachers (53%) displayed positive attitudes, with a relatively small proportion categorized as negative (5%). The chi-square analysis confirms that attitude disposition is significantly associated with respondent group, suggesting that teachers hold more favorable attitudes than students.

Inferential Result

A chi-square test of independence revealed a statistically significant association between respondent group (students vs. teachers) and attitude category,

$$\chi^2(2) = 26.44, p < 0.001$$

indicating that teachers were significantly more likely to exhibit positive attitudes compared to students.

Table 4: Gender Differences. (Students)

Gender	n	Mean	SD
Male	480	3.10	0.65
Female	420	2.92	0.70

T-Test Result

$$t(898) = 4.12, \quad p < 0.001$$

Male students report a statistically higher attitude score than female students; effect size small (Cohen's $d \approx 0.26$), suggesting practical differences are modest.

An independent samples t-test was conducted to examine gender differences in students' attitudes. Results showed that male students ($M = 3.10$, $SD = 0.65$, $n = 480$) reported significantly more positive attitudes than female students ($M = 2.92$, $SD = 0.70$, $n = 420$). This difference was statistically significant, $t(898) = 4.12$, $p < .001$. The effect size was small to moderate (Cohen's $d \approx 0.27$), indicating a meaningful but not large gender difference in attitudes.

Interpretation

The findings suggest that male students exhibit slightly more favorable attitudes than female students. Although the magnitude of the difference is modest, its statistical significance implies that gender-related factors may influence students' attitudinal dispositions. This result underscores the importance of gender-responsive instructional strategies aimed at fostering more positive attitudes among female students.

Teacher Qualification and Attitude**One-Way ANOVA Analysis****Table 5: Descriptive Statistics of Teacher Attitude by Qualification.**

Qualification	n	Mean (M)	SD	Interpretation
NCE	80	3.50	0.60	Moderately positive
B.Ed / B.Sc	90	3.78	0.52	Positive
M.Ed / MPhil / PhD	30	4.05	0.45	Highly positive

ANOVA Results

$$F(2, 197) = 8.64, \quad p < 0.001$$

This result indicates a statistically significant difference in teachers' attitudes based on highest qualification.

Post Hoc Analysis

Table 6: Summary of the Results.

Comparison	Mean Difference	p-value	Interpretation
NCE vs B.Ed/B.Sc	-0.28	< .01	Significant
NCE vs Postgraduate	-0.55	< .001	Significant
B.Ed/B.Sc vs Postgraduate	-0.27	< .05	Significant

Teachers with higher qualifications reported significantly more positive attitudes than NCE holders.

A one-way analysis of variance (ANOVA) was conducted to examine differences in teachers' attitudes based on highest academic qualification. The results revealed a statistically significant effect of qualification on attitude scores, $F(2,197) = 8.64, p < .001$. Post hoc comparisons using the Tukey HSD test indicated that teachers with postgraduate qualifications (M.Ed/MPhil/PhD) reported significantly more positive attitudes than those with NCE qualifications. Additionally, teachers holding a bachelor's degree also demonstrated significantly higher attitude scores compared to NCE holders. The effect size was moderate ($\eta^2 \approx 0.08$), suggesting that teacher qualification accounts for a meaningful proportion of variance in attitude.

Interpretation

The findings suggest that higher academic training is associated with more favorable teacher attitudes. This may be attributed to increased pedagogical exposure, subject mastery, and professional confidence among higher-qualified teachers. The results underscore the importance of continuous professional development and advanced training in enhancing teacher attitudes.

Correlation Analysis: Teacher Attitude vs. Student Attitude

Table 7: Pearson Correlation between Teacher and Student Attitude Scores.

Variables	Teacher Attitude	Student Attitude
Teacher Attitude	1.00	
Student Attitude	0.46*	1.00

$p < .001$

Pearson correlation between mean teacher attitude in a school and aggregated student attitude: $r = 0.46, p < .001$.

Interpretation: Schools where teachers report more positive attitudes tend to have students with more positive attitudes.

Pearson correlation analysis was conducted to examine the relationship between mean teacher attitude scores and aggregated student attitude scores at the school level. The results revealed a moderate positive and statistically significant relationship between teacher attitude and student attitude, $r = 0.46, p < .001$. This finding indicates that schools with more positive teacher attitudes tend to have students with more favorable attitudes.

Interpretation

The moderate positive correlation suggests that teacher attitudes play a meaningful role in shaping students' attitudinal dispositions. While teacher attitude alone does not fully explain variations in student attitude, it constitutes a significant contextual factor that may influence classroom climate, instructional practices, and student engagement.

Table 8: Regression Results Table

Multiple Regression Predicting Student Attitude. (N = 900)

Predictor	β (Standardized)	SE	t	p-value
Teacher Attitude	0.32	0.04	8.41	< .001
Use of Active Methods	0.21	0.03	6.92	< .001
Availability of Resources	0.17	0.03	5.88	< .001
Prior Achievement	0.18	0.02	6.15	< .001
Gender (Male = 1)	0.06	0.02	2.32	.020
Socioeconomic Status	0.05	0.02	2.05	.040
Constant	—	—	—	—

RESULTS

A multiple regression analysis was conducted to examine the predictors of students' attitudes. The overall model was statistically significant and explained a substantial proportion of variance in student attitude scores ($R^2 = 0.38$, Adjusted $R^2 = 0.36$). Teacher attitude emerged as the strongest predictor ($\beta = 0.32, p < .001$), followed by teachers' use of active instructional methods ($\beta = 0.21, p < .001$). Availability of instructional resources ($\beta = 0.17, p < .001$) and prior academic achievement ($\beta = 0.18, p < .001$) also made significant contributions. Gender and socioeconomic status were statistically significant but weaker predictors.

Interpretation

The findings indicate that teacher-related factors play a dominant role in shaping students' attitudes. In particular, positive teacher attitudes and the use of active teaching methods exert a stronger influence than student demographic characteristics. Although gender and socioeconomic status were statistically significant, their relatively small effect sizes suggest that instructional and school-level factors are more influential in determining students' attitudinal outcomes. Teacher attitude and active methods are the strongest predictors, with prior achievement and resources also important. Gender and SES contribute small but significant effects.

Model Summary

- $R^2 = 0.38$
- Adjusted $R^2 = 0.36$

The model explains approximately 36–38% of the variance in student attitude scores, indicating a substantial explanatory power for attitudinal research.

Summary of Findings

1. The regression model explains over one-third of the variance in student attitudes.
2. Teacher attitude is the most powerful predictor of student attitude.
3. Instructional practices and resources significantly enhance student attitudes.
4. Background variables (gender, SES) have smaller but meaningful effects.

Qualitative Findings

From interviews, recurrent themes included:

1. **Teacher enthusiasm matters:** Students describe motivated teachers as making mathematics “interesting and manageable.”
2. **Resource challenges:** Both teachers and students cite lack of textbooks, calculators, and teaching aids.
3. **Assessment pressure:** Frequent high-stakes testing leads to teacher focus on procedures rather than conceptual understanding, reducing students' enjoyment.
4. **Cultural beliefs and anxiety:** Some students attribute math difficulty to innate ability (“I’m not a math person”)—a mindset issue noted by teachers.
5. **Gendered expectations:** Female students report less encouragement at home for mathematics-related careers.

Qualitative data support quantitative findings: teacher attitude and instructional method are central levers.

DISCUSSION

The findings align with extant research: teacher attitudes and pedagogical approaches substantially influence student attitudes; resource availability and prior achievement also matter. Teachers in the simulation were generally positive, but their actual classroom practices (moderate use of active learning) and perceptions of resource paucity suggest a gap between belief and practice.

Gender differences in student attitude were present but small; this indicates that interventions focused on improving teaching practice and resources may reduce gendered disparities. The moderate R^2 (0.36) in the regression suggests additional unexplained factors (peer influence, out-of-school tutoring, psychological factors like math anxiety) warrant further study.

Implications and Recommendations

For Teachers and Teacher Educators

1. **Professional development:** Targeted training on active, student-centered methods (problem-solving, cooperative learning, formative assessment) to translate positive attitudes into practice.
2. **Reflective practice:** Encourage peer observation and reflective journals to link teacher beliefs with day-to-day strategies.

For School Leaders

3. **Resource allocation:** Prioritize procurement of basic instructional materials (textbooks, manipulatives, calculators) and create shared resource hubs.
4. **Mentorship:** Pair less-qualified teachers with experienced mentors to build pedagogical confidence.

For Policymakers

5. **Incentives and support:** Provide incentives for continued professional development and bridge qualification gaps among teachers.
6. **Curriculum alignment:** Ensure curriculum encourages conceptual understanding and reduces overemphasis on rote procedures.

For Researchers

7. **Longitudinal studies:** To unpack causal relationships between teacher attitude change and student outcomes.
8. **Intervention trials:** Randomized controlled trials testing professional development, resource interventions, and mindset interventions in the North-East context.

CONCLUSION

Attitudes of both teachers and students are central to mathematics teaching and learning. This study's simulated analysis underscores that positive teacher attitudes and the use of active pedagogies are strongly associated with more positive student attitudes. Addressing resource constraints, strengthening teacher preparation and ongoing professional learning, and implementing classroom practices that enhance student expectancy and value for mathematics are likely to yield the best returns for improving attitudes and, ultimately, mathematics achievement in senior secondary schools in North-East Nigeria.

REFERENCES

1. Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
2. Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, 53, 109–132.
3. Dweck, C. S. (2006). *Mindset: The new psychology of success*. Random House.
4. Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66(4), 543–578.
5. Ernest, P. (1989). The impact of beliefs on the teaching of mathematics. In P. Ernest (Ed.), *Mathematics Teaching: The State of the Art* (pp. 249–254). Falmer Press.
6. Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review*, 92(4), 548–573.
7. Federal Republic of Nigeria]. (2013). *National Policy on Education*. (Used as national policy background.