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Determinants of Attitude of Undergraduate Students towards Algebra in Niger State, Nigeria

Bashir A. U.

D Department of Science Education, School of Science and Technology Education, Federal University of
Technology Minna, Niger State, Nigeria.

bashir.au@futminna.edu.ng, +2348065542625

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Abstract

The study examined the determinants of attitude among undergraduate students towards algebra in Niger State, Nigeria. Specifically, the study sought to determine the influence of pedagogical approaches, mathematics anxiety, and peer group pressure on students' attitudes towards algebra. The study adopted a cross sectional research design. The target population consisted of full-time undergraduate students in the Mathematics and Mathematics Education departments in public universities in Niger State. The researcher sampled 120 students using a multi-stage sampling technique for the study. The sampling technique involved purposive and stratified random sampling methods to ensure representative coverage. The instrument for data collection was a structured questionnaire titled "Determinants of Students' Attitude towards Algebra Scale" (DSATAS), adapted from the Fennema-Sherman Mathematics Attitude Scale. The instrument's validity was established by experts in Mathematics Education and Measurement and Evaluation, while its reliability was confirmed via a pilot test using an internal consistency measure. Data were analyzed using Multiple Regression Analysis. The results revealed that pedagogical approaches and mathematics anxiety have a significant negative influence on student attitudes, suggesting that traditional methodologies and emotional barriers impede learning. The study concluded that while traditional methodologies and anxiety are detrimental, peer collaboration serves as a positive catalyst for improving dispositions. It was recommended that institutions adopt student-centered models such as the 7Es and 4MAT strategies, integrate anxiety-management workshops, and encourage collaborative learning environments.

Keywords: Algebra, Attitude, Mathematics Anxiety, Pedagogical Approach, Peer Group, Undergraduate Students

*Corresponding Author: Bashir A. U., bashir.au@futminna.edu.ng

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INTRODUCTION

The attitude of undergraduate students toward mathematics in Niger state is highly discouraging. In tertiary institutions, algebra, remains a strong determinant of academic engagement, cognitive development, and professional trajectory in the 21st-century global economy. In Nigerian tertiary institutions, proficiency in algebra is not merely an academic requirement but is considered a fundamental prerequisite for success across diverse disciplines including engineering, economics, and the pure sciences. Despite its importance, a significant number of students in Niger State exhibit a profound and persistent aversion to the subject. This negative disposition is frequently characterized by a lack of interest, diminished self-efficacy, and high levels of cognitive frustration when navigating abstract mathematical structures. Such a trajectory often results in poor grades or recurring carry-overs, which ultimately compromises the cumulative grade point average (CGPA) and the overall graduation success of students within the state. Conceptually, attitude is defined as a learned predisposition to respond either positively or negatively to a specific object, situation, or concept (Aiken, 1970). It is a psychological orientation students adopt by mathematics students when manipulating algebraic variables and structural proofs. Empirical evidence from Mwakapenda (2008) suggests that this orientation is heavily influenced by the pedagogical approach employed in the classroom. The prevailing instructional environment according to the author which often leans heavily toward rote memorization at the expense of conceptual understanding, has been identified as a major barrier to positive learning attitudes. In another related study conducted by Mustapha and Aminu (2023), it was reported that the lack of student-centeredness in Nigerian classrooms is a primary driver of the poor academic trajectory seen in recent years. The authors emphasized that the use of conventional teacher centered teaching approach fail to account for student cognitive diversity, which results in a significant drop in positive attitude toward quantitative sciences.

The psychological state of the learner, specifically mathematics anxiety is another factors that affects the attitude of students. This psychological barrier is widely understood not as an innate trait, but as a byproduct of socio-environmental stressors and suboptimal teacher-student interactions (Okafor & Anaduaka, 2013). In Niger State, the presence of "mathematics phobia" creates a cognitive block that prevents students from effectively processing algebraic logic. Aliyu, Adamu, and Bashir (2021) documented that motivation and attitude are significantly hampered when students perceive mathematics as a source of stress rather than a tool for problem-solving. These foundational anxieties often dictate the long-term psychological framework students bring to university-level mathematics, creating a cycle of failure (Sa'ad, Ngibi, & Uhumuavbi, 2014). Another factor that affects the attitude to students' words specific course in the peer group. Peer group plays a significant role in shaping the academic identity of undergraduate students. Damina, Bapeto, and Ibrahim (2026), the influence of peers is particularly potent in Northern Nigerian institutions, where collective avoidance or collaborative study groups can significantly shift the classroom climate. Consequently, understanding how the interplay of pedagogical approaches, anxiety levels, and peer group dynamics determines these attitudes is essential for revitalizing mathematics education and improving academic outcomes for undergraduate students in Niger State. The study specifically determines the influence of instructional strategy, mathematics anxiety and peer group pressure on undergraduate students' attitude towards algebra in Niger State.

Hypotheses

The hypothesis was tested at the 0.05 level of significance:
Instructional strategy, Mathematics anxiety and Peer group pressure have no significant influence on undergraduate students' attitude towards algebra.

METHODOLOGY

This study adopts a cross sectional survey research design. As noted by Nworgu (2015), a cross sectional survey research is ideal for assessing the opinions, attitudes, and beliefs of a large population by studying a representative sample. This design allows for the statistical testing of the strength and direction of the relationship between the identified determinants and student attitudes. The target population consists of all full-time undergraduate students in the Departments of Mathematics and Mathematics Education within public universities in Niger State. According to records from the 2024/2025 academic session, however, 120 students were sampled and used for the study. A multi-stage sampling technique will be employed: first, purposive sampling to select the two major universities (FUTMINNA and IBBUL), and second, stratified random sampling to ensure proportional representation across all levels of all the students. The primary tool for data collection is a structured questionnaire titled "Determinants of Students' Attitude towards Algebra Scale" (DSAAS). The instrument is adapted from the Mathematics Attitude Scale (MAS) developed by Fennema and Sherman (1976) but modified to suit the local context of Niger State. It utilizes a 4-point Likert scale ranging from "Strongly Agree" (4) to "Strongly Disagree" (1). The instrument underwent face and content validity, the draft instrument was scrutinized by two experts in Mathematics Education and one expert in Measurement and Evaluation from the Faculty of Education. Their feedback regarding the clarity and relevance of the items will be incorporated into the final version. For reliability, the instrument will be pilot-tested on 30 students at the undergraduate students in Federal University of Education Kontagora (affiliated with Ahmadu Bello University Zaria). The data obtained were subjected to the Cronbach Alpha internal consistency test and a reliability coefficient of 0.88 was obtained. According to Pallant (2011), a coefficient (α) of 0.70 or higher is considered reliable for social science research. The data were collected with the help of two research assistants for the period of 4 weeks using direct approach technique. The data collected were analyzed using the Statistical Package for Social Sciences (SPSS) version 23. The Multiple Regression Analysis was used for the test of the null hypotheses at 0.05 level of significance.

RESULTS

Hypothesis: Pedagogical approach, Anxiety and Peer group have no significant influence on attitude of undergraduate students towards algebra in Niger state, Nigeria

Table 1: Multiple Regression Analysis on influence of Pedagogical approach, Anxiety and Peer group on influence on attitude of undergraduate students towards algebra in Niger state, Nigeria

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
1 (Constant)	.061	.046			1.319	.191
Methodology	-.479	.077	-.508		-6.207	.000
Anxiety	-.719	.146	-.582		-6.097	.000
Peer	1.459	.081	1.477		18.029	.000

a. Dependent Variable: Attitude

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.986 ^a	.973	.972	.15006

a. Predictors: (Constant), Methodology, Anxiety, Peer group,

The results of the null hypothesis suggested that pedagogical approach, mathematics anxiety, and peer group have significant influence on the attitude of undergraduate students toward algebra in Niger State. The overall model demonstrated a very high predictive power, with an R-square value of .973, indicating that approximately 97.3% of the variance in student attitudes is explained by these three variables combined. The analysis revealed that the pedagogical approach has a significant negative influence on student attitude ($\beta = -.508$, $p = .000$), suggesting that traditional or teacher-centered methodologies currently in use may be contributing to the declining interest and poor perception of the subject. The Mathematics anxiety was also found to exert a significant negative influence on student attitude toward algebra ($\beta = -.582$, $p = .000$), confirming

that emotional and psychological barriers are critical impediments to learning. The peer group influence emerged as the strongest positive predictor in the model, with a highly significant coefficient ($\beta=1.477, p=.000$), suggesting that social dynamics and collaborative learning are paramount in shaping student attitudes.

DISCUSSION

This finding is consistent with the work of Aliyu, Adamu, and Bashir (2021), who noted that conventional instructional methods often stifle student engagement and lead to negative academic dispositions. Furthermore, Mustapha and Aminu (2023) observed that when teaching methods fail to account for student diversity, it results in a significant drop in positive attitude toward quantitative sciences. Similar observations were made by Obinna and Adebayo (2021), who emphasized that rigid instructional frameworks are often at the root of student dissatisfaction in secondary and tertiary mathematics. Umate (2018) also argued that the lack of student-centeredness in Nigerian classrooms is a primary driver of the poor academic trajectory seen in recent years. Finally, Damina, Bapeto, and Ibrahim (2026) highlighted that a shift toward innovative frameworks like 4MAT or 7Es is necessary to reverse the negative impact of traditional pedagogy on student attitudes. This result aligns with the findings of Alhadaybeh and Ambusaedy (2016), who reported that high levels of anxiety prevent students from developing the reflective thinking skills necessary for mastering complex scientific concepts. Sibel and Sabiha (2016) further supported this by demonstrating that emotional discomfort in the classroom significantly correlates with lower achievement and poor academic self-concept. In a similar vein, Osama, Fahad, and Ayman (2016) found that undergraduate engineering and mathematics students often struggle with attitude when anxiety levels are not effectively managed through supportive teaching strategies. Aliyu et al. (2021) also documented that motivation and attitude are significantly hampered when students perceive mathematics as a source of stress rather than a tool for problem-solving. Moreover, Bybee (2015) asserted that instructional models like the 7Es are essential for reducing anxiety by allowing students to elicit prior knowledge and engage with content in a non-threatening, exploratory manner. This finding is corroborated by Adamu, Bashir, and Haruna (2015), who demonstrated that cooperative learning techniques, such as Jigsaw, significantly improve the academic achievement and retention of university students in business mathematics by leveraging peer support. Mustapha and Aminu (2023) also found that peer interaction during active learning cycles helps students overcome individual learning hurdles and fosters a more positive collective attitude. Obinna and Adebayo (2021) noted that students often feel more comfortable exploring difficult concepts when they are encouraged to work within peer groups rather than in isolation. Additionally, Umate (2018) emphasized that the social dimension of learning is a key factor in catering to the cognitive diversity found in typical Nigerian classrooms. Finally, Damina et al. (2026) concluded that innovative, learner-centered frameworks that encourage peer participation are essential for enhancing the quality of education and ensuring better long-term outcomes in technical subjects.

CONCLUSION

The study concludes that the attitudes of undergraduate students toward algebra in Niger State are heavily influenced by the interplay of pedagogical methods, anxiety levels, and peer group dynamics. While current methodologies and high anxiety levels are significantly detrimental to student attitudes, the peer group serves as a powerful positive catalyst for change. The high R-square value confirms that addressing these three areas is essential for improving the academic climate. Therefore, a transition toward student-centered instructional strategies that incorporate peer collaboration and anxiety-reduction techniques is necessary to address the alarming trends in mathematics education.

RECOMMENDATIONS

1. Educational institutions in Niger State should prioritize the adoption of constructivist and student-centered models, such as the 7Es and 4MAT strategies, to replace conventional teacher-centered approaches that negatively impact student attitudes.

2. Mathematics departments should integrate counseling and anxiety-management workshops into their curriculum to help students overcome the psychological barriers associated with algebra and other quantitative subjects.
3. Lecturers should be encouraged to design lessons that maximize peer group interactions and cooperative learning, as these are proven to be the most influential positive factors in shaping student attitudes toward mathematics.

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