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Attitude and self-efficacy as correlates of mathematics academic achievement of senior secondary school students in Remo North

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Abstract

This study looked at the connection between students' attitudes, self-efficacy, and mathematics achievement among senior secondary school students in Remo North, Nigeria. Two research questions were raised. Using a correlational research design, data were collected from 500 students from 5 schools in Remo North via three validated instruments (MAS=0.928, MSES=0.882, and MAT= 0.88). Analysis revealed significant positive correlations between mathematics achievement and both attitude ($r = .382$, $p < .05$) and self-efficacy ($r = .411$, $p < .05$). Regression analysis showed that these variables jointly predicted 17.2% of the variance in achievement. The study concludes that students' attitude and self-efficacy is a significant determinant of their performance in mathematics.

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INTRODUCTION

Mathematics plays a crucial part in the growth of any nation that seeks to thrive in science and technology. Its broad application across diverse fields of knowledge makes it a foundational subject, often serving as the backbone of scientific and technological disciplines. As Odebode (2020) explains, mathematics represents a wide range of technologies and sciences, and no country can expect to make meaningful progress in these areas without a solid investment in mathematics education. For this reason, mathematics is a core part of all educational levels' curricula both at the primary, secondary, and tertiary. While mathematics has traditionally been seen as a subject mainly for science students, this perception is changing. In today's highly digital and technology-driven world, the relevance of mathematics has expanded significantly.

According to Asanre et al. (2023), mathematics is no longer confined to classrooms or laboratories, it is deeply woven into everyday life and essential across many professions. It encourages logical reasoning, creativity, and problem-solving, all of which are critical in today's world. Moreover, mathematics education helps students build not only knowledge but also positive attitudes and lasting interest in learning. Asanre (2023) emphasizes that the subject nurtures appreciation and

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application of skills, which are necessary beyond school settings. Since mathematics forms the academic foundation for many disciplines, particularly in higher education, most institutions require students to pass mathematics in national examinations such as the SSCE to qualify for admission into mathematics-related courses

Despite the recognized value of mathematics, many students in Nigeria continue to struggle with the subject. Reports from schools and examination bodies highlight persistent underperformance, which has become a growing concern for educators and policymakers alike. During a recent visit to a school in Remo North, Ogun State, the principal raised concerns about a noticeable decline in students' attitude and mathematics proficiency. This observation aligns with the findings of examination reports, which show students' consistent difficulty with certain mathematical concepts, resulting in poor academic outcomes. Ifamuyiwa (2006) points out that even though mathematics offers numerous benefits such as social, cultural, disciplinary, and practical, many learners still find the subject challenging.

Factors contributing to this problem include the complexity of the content, students' limited engagement, ineffective teaching methods, and the difficulty in making the subject relatable to learners' everyday experiences. In addition, issues such as gender differences, anxiety, poor attitudes, and lack of motivation also negatively affect students' performance (Asanre, 2023). As Kefyalew (2020) explains, academic achievement reflects the extent of knowledge gained through classroom learning, reading, and practical experiences. When students are unable to understand or apply mathematical concepts, their academic success becomes limited. Oshakuade et al. (2023) further stress that declining academic standards have become a major concern in the Nigerian education sector, especially in mathematics, which is a gateway subject for many careers.

Among the many factors affecting students' learning outcomes, their attitude towards mathematics and their belief in their own ability seen as self-efficacy stand out as particularly influential factors confronting students. Attitude includes how students feel, think, and behave towards the subject. According to Asrat (2017), attitudes are shaped by experience and tend to remain stable over time. They are not inborn but learned, and they often influence how students behave in relation to learning. Hernández et al. (2023) describe attitude as a multi-dimensional concept that reflects how students respond positively or negatively to mathematics. These responses go on to affect how well they engage with the subject. While self-efficacy, is about students' confidence in their ability to succeed in mathematics. Even students who understand the value of mathematics may struggle if they do not believe in their own ability to solve mathematical problems (Ugur, 2015).

Research has indicated that learners who possess both an optimistic outlook and strong self-efficacy tend to perform better, they have a higher propensity to overcome obstacles and stay motivated (Hernández et al., 2023; Mao et al., 2021). In contrast, students with low self-efficacy often avoid difficult tasks, quit quickly, and do not push themselves to improve (Amit, 2016). This makes self-efficacy a key factor in determining academic success or failure. Kefyalew (2020) explains that students who believe they can succeed are more like to remain dedicated to their studies and put in the necessary effort. On the other hand, those who lack confidence may become discouraged and disengaged, which can ultimately result

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in failure in school and even school dropout. Oshakuade et al. (2023) support this by noting that students with higher self-efficacy are better at solving problems, trying new approaches, and persisting through challenges.

Although several studies have explored mathematics education in Nigeria, there is limited research that specifically examines the relationship between students' attitudes, self-efficacy, and academic achievement in Remo North Local Government Area of Ogun State. Given the concerns raised by school leaders and examination reports in this region, it is important to understand the underlying factors contributing to students' performance in mathematics. Research question in this studi is 1) How do students' academic achievement in mathematics relate to their attitude and sense of self-efficacy, 2) What proportional roles do attitude and self-efficacy have in students' academic achievement in mathematics. The purpose of this study is to look into how students' self-efficacy and attitudes about mathematics affect their academic performance in the subject. By focusing on senior secondary school learners in Remo North, the research seeks to fill a gap in the literature and offer insights that could help educators and policymakers improve mathematics teaching and learning in the area. The findings are expected to support further initiatives to improve mathematics instruction and better support student success.

RESEARCH METHOD

Design

The correlational research method used in this study was judged suitable for examining the connections between the independent variables that is students' attitudes and self-efficacy in mathematics and their scholastic achievement in the subject, without manipulating any of the variables. Since the intent was to explore naturally occurring associations rather than cause-and-effect relationships, this design enabled the researcher to examine the degree and direction of the relationships between the variables. In addition, correlational studies are useful in predicting one variable based on the behaviour of another, which is in line with the objectives of this research.

Participants

All public, coeducational Senior Secondary School Two (SS2) students in Remo North Local Government Area, Ogun State, Nigeria, were the target population. From this population, 500 SS2 students were selected using a simple random sampling technique from five public senior secondary schools. The use of simple random sampling was justified on the grounds that every member of the designated population has an equal chance of being chosen, hence the sampling bias is decreased and the findings' generalizability is increased. The following inclusion criteria were used to choose the schools: The school must be co-educational (accommodating both male and female learners). The school must offer senior secondary mathematics. The students must have covered the majority of the mathematics curriculum required at the SS1 level.

Instruments

Data was collected for this study using three instruments, namely:

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Mathematics Attitude Scale (MAS): This instrument was designed to measure students' attitudes towards mathematics. It was adapted from the Fennema-Sherman Mathematics Attitude Scale (2010) and modified to fit the context of Nigerian secondary schools. The final version included 20 items, representing both positive and negative statements about mathematics, evaluated using a Likert scale with four possible answers, from Strongly Agree to Strongly Disagree. To ensure content and face validity, the draft instrument was reviewed by experts in assessment and measurement. Their suggestions were integrated into the final version. A pilot test was conducted using 25 SS2 students from a different school in Ijebu-Ode (outside the study sample). The Cronbach's alpha coefficient for the instrument was 0.928, indicating very consistent internal use.

Mathematics Self-Efficacy Scale (MSES): This scale was adapted from the works of Xing and Hari (2009) and Ralph and Mathias (1995). It consisted of two sections. Section A gathered demographic information (name, school, sex, class). Section B contained 20 items assessing students' self-assurance in their capacity to tackle mathematical challenges. Additionally, a four-point Likert scale was used to score the items. The draft was reviewed by educational psychologists and supervisors for linguistic clarity, relevance, and alignment with the study objectives. After revisions, a pilot study was conducted with another group of 25 SS2 learners from an alternative school, resulting in Cronbach's alpha coefficient of 0.882, demonstrating strong dependability.

Mathematics Achievement Test (MAT): The thirty multiple-choice questions on the MAT were intended to evaluate students' comprehension and knowledge of a range of mathematical subjects, including: Quadratic equations, Mensuration, Indices and logarithms, Bearings, Set theory, Number bases, Sequences and series and Variation. The test items were originally 100 in number, but after item analysis, only 30 well-performing items were retained. Each question had one correct option and three distractors. The items were structured to evaluate different cognitive domain levels: application, comprehension, and knowledge. The MAT instrument was validated by mathematics educators and subjected to a trial testing procedure using the split-half method, which yielded a reliability coefficient of 0.880, demonstrating high consistency.

Procedure

Before the commencement of data collection, the study received ethical clearance from the relevant academic and institutional bodies. Permissions were also obtained from school authorities, and informed consent was sought from participants. The researcher distributed printed copies of the instruments to the selected students during scheduled class hours with the assistance of class teachers. Respondents were guided through the process to ensure full understanding of each section. Participants were assured of the confidentiality and voluntary nature of their responses, and all data were collected anonymously to protect the students' identities.

Data Quality Assurance

To ensure the credibility and trustworthiness of the instruments and results, several quality assurance measures were implemented: Expert reviews were

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conducted to validate content and face validity. Pilot testing was done with 25 non-sample students for each instrument to ensure clarity, relevance, and reliability. Ethical protocols including anonymity, consent, and institutional approval were strictly followed. Ambiguities identified during the pilot phase were revised based on expert feedback. These measures helped to ensure that the instruments were both valid and reliable for the target population.

Data Analysis

The Statistical Package for the Social Sciences (SPSS), version 25, was used to code and analyze the data gathered from the three instruments. To test the research questions, the relationship between students' attitudes, self-efficacy, and academic achievement in mathematics were examined using Pearson's product-moment correlation coefficient, while Multiple regression analysis was also conducted to determine the predictive power of the independent variables.

RESULTS AND DISCUSSION

Result

Research question one: How do students' academic achievements in mathematics relate to their attitude and sense of self-efficacy?

Table 1: Correlation Matrix Between Achievement, Attitude, and Self-efficacy

	Achievement	Attitude	Self- efficacy
Achievement	1	.382**	.411**
Attitude		1	.856**
Self-efficacy			1

According to Table 1, all the students' factors considered (attitude and self-efficacy) are positively correlated with achievement of students in mathematics. Students' attitude (*r=0.382, p-value,(**)*) and self-efficacy (*r=0.411, p-value,(**)*) are the independent variables that correlate with students' mathematical achievement. This result suggests that students' attitude and self-efficacy are essential for student achievement in mathematics.

Research question two: What proportional roles do attitude and self-efficacy have in students' academic achievement in mathematics?

Table 2: Regression of attitude and self-efficacy on students' academic performance in mathematics

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	5088.281	2	2544.141	51.599	.000b
Residual	24505.021	497	49.306		
Total	29593.302	499			

*** Significant of F at α = .05**

a. Dependent Variable: Achievement of students in mathematics

b. Predictors: (Constant): Students' attitude and self-efficacy

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Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.415[a]	.172	.169	7.02181

Table 4: Contribution of each of predictor variables to academic of students in Mathematics

Model	Unstandardized coefficients		Standardized Coefficients	T	Sig
	B	Std.Error	Beta		
(Constant)	14.075	1.118		12.594	.000
Students' attitude	.151	.106	.112	1.420	.015
Self-efficacy	.383	.096	.314	3.980	.000

Table 2 displays the combined independent variables' regression (students' attitude and self-efficacy) on students' mathematics achievement. A statistically significant outcome is shown in the result ($F=51.599$, $p\text{-value}<0.05$). This demonstrates that the two independent factors, students' attitude and self-efficacy, had a noteworthy effect on the variance in their achievement in mathematics. Additionally, Table 3's result shows an R value of 0.415 and R-square value of 0.172, indicating that the dependent variable, students' performance in mathematics was contributed by 17.2% of the variance by the independent variables of students' attitude and self-efficacy. Additionally, table 5 displays the relative contributions of each independent variable together with the magnitude of each contribution to the dependent variable in ascending order: Students' attitude (0.151) and Self-efficacy (0.383) respectively. The equation for the regression model of students' mathematical achievement is $\text{MA} = K + aC + bD$ where MA= mathematics achievement, K is the constant of prediction (B values), C= Students' attitude and D =Self-efficacy respectively. Regression model $MA = 14.075 + 0.151a + 0.383b$.

Discussion of Results

The results of this study show that students' self-efficacy and attitude are both positively correlated with their achievement in mathematics. This underscores the critical role that non-cognitive factors play in influencing students' academic performance. Specifically, learners who exhibit a favorable outlook on mathematics and possess strong self-efficacy beliefs tend to perform better in the subject. These findings highlight the reality that learners' internal dispositions that is, how they perceive and feel about mathematics, and their belief in their own ability to succeed, directly influence learning outcomes.

Further analysis showed that both attitude and self-efficacy not only correlate individually with achievement but also jointly predict a significant part of the variation in learners' achievement in mathematics. This aligns with the Social Cognitive Theory of Bandura (2010) asserts that individual characteristics (like self-efficacy), behavior (such as engagement in learning), and environmental influences operate interactively. In this context, students' belief in their capabilities

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(self-efficacy) and their affective orientation toward mathematics (attitude) shape their behavior and ultimately determine their achievement levels. The implication is that cognitive competence alone is not sufficient—students must also believe in their ability and value the subject to excel academically.

The current results are consistent with several previous studies that have emphasized the relevance of psychological and attitudinal factors in academic success. For instance, Badamasi et al. (2024) reported a noteworthy correlation between students' personality traits, self-efficacy, and academic performance in mathematics. Similarly, Hernández et al. (2023) emphasized that attitude and self-efficacy are strong determinants of student achievement, particularly in mathematical subjects where learner anxiety and self-doubt are common.

This study further corroborates the findings of Laranang and Bondoc (2020), who demonstrated that self-efficacy and attitude not only correlate but also work in tandem to influence academic achievement. Moreover, the findings resonate with Mao et al. (2021) and Ince (2023), who found a modest but favorable correlation between attitude and academic performance. The significance of self-efficacy as a predictor is also supported by Asanre et al. (2024), Oshakuade et al. (2023), and Kefyalew (2020), who asserted that students with higher levels of self-efficacy are more resilient in their academic pursuits and tend to achieve higher grades. This study not only reaffirms the previous conclusions but also expands on them by demonstrating these relationships within the specific educational and sociocultural context of Remo North, Ogun State, Nigeria.

The implications of these findings are multifaceted. Firstly, they call for a shift in teaching practices and policy frameworks toward fostering positive student attitudes and building self-efficacy, rather than focusing solely on cognitive instruction. Teachers should employ strategies that reinforce learners' belief in their mathematical ability, such as scaffolded problem-solving, positive feedback, student-centered learning, and peer modeling, in line with Bandura's concept of vicarious learning.

Secondly, curriculum developers and school administrators should prioritize affective domain objectives in lesson planning and assessments. Activities that promote interest, curiosity, and relevance of mathematics in daily life can significantly enhance students' attitudes toward the subject. More importantly, interventions such as mentorship programs, self-reflection exercises, and goal-setting workshops can directly address learners' self-efficacy, empowering them to take control of their learning processes.

Despite the robustness of the findings, certain limitations were acknowledged. The study used a correlational design, which restricts the capacity to use the variables to infer causal relationships. Additionally, data were collected from a particular geographical location, which would restrict the results' applicability to other areas with distinct educational contexts. The little sample was used due to lack of funding for the research, hence, research can be done on the title considering a larger sample.

The instruments used, though validated, rely on self-report data, which are inherently prone to response bias. Furthermore, other non-cognitive factors such as test anxiety, parental involvement, and peer influence were not examined and could be explored in future studies. Future research should consider utilizing experimental

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or longitudinal designs to investigate causal pathways and the effectiveness of interventions targeted at improving student attitudes and self-efficacy. Additionally, qualitative insights could enrich understanding by capturing students' voices and lived experiences in greater depth.

CONCLUSION

The findings show that the attitude and mathematical self-efficacy of senior secondary school learners in Ogun State, Nigeria's Remo North local government area are correlated with their academic results. This suggests that the sampled students agreed that positive attitude which brings about interest, beliefs and motivation brings about high self-efficacy that displays self-confidence and motivation, hence leads to higher grades in their subject. This study concludes that students' attitudes and self-efficacy significantly predict their mathematics achievement at the senior secondary school level. It is advised that educational stakeholders should ensure that students' mathematical self-efficacy and attitude should be given keen attention and encourage mutual teacher-learners relationship. Despite the limitations, this work will act as a springboard for additional research.

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REFERENCES

Amit, A. (2016) A study of self-efficacy among secondary school students in relation to educational aspiration and academic achievement. International Journal of Education and Applied Social Sciences. 7(3), 275 – 283. http://www.ndpublisher.in

Asanre, A. A. (2023) Dimensions of students' academic engagement as predictors of Learning outcomes in senior secondary school mathematics, (An Published PhD Thesis) Department of Science and Technology Education, Olabisis Onabanjo University, Ago Iwoye, Ogun State, Nigeria

Asanre, A. A., Sondlo S., Chinaka, T. W. & Abiodun, T. O. (2024). Mathematics self-efficacy and study habit as predictors of achievement of senior secondary school students. Mathematics Education Journal, 8(2), 137-146. DOI: 10.22219/mej.v8i2.34183. http://ejournal.umm.ac.id/index.php/MEJ

Asanre, A. A., Abiodun, T. O., Odupe, T. A., & Ogundeji, M.A. (2021). Effects of mathematics game strategy on senior secondary school students learning outcomes. Abubakar Tafawa Balewa University Journal of Science, Technology and Education. 9(2), 12-17. http://www.atbuftejoste.com/

Asanre, A. A., Abiodun, T. O., Olaniyan, J. S., Olusola, G. S., & Ogunmokun, T. M. (2023).

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

Predicting academic achievement using mathematics anxiety among senior secondary school students. TASUED Journal of Pure and Applied Science, 2(1),136-142, https://journals.tasued.edu.ng/index.php/tjopas

Asrat D. (2017) The relationship between students' attitudes towards school, values of education, achievement motivation and academic achievement in gondar secondary schools, ethiopia. Research In Pedagogy, 7(1). 30-42, Doi: 10.17810/2015.46

Badamasi, M., Sale, M., & Mudi, F. I. (2024) Personality traits and self-efficacy as predictors of academic performance of english senior secondary school students in katsina metropolis, katsina state, nigeria. International Journal of Innovative Psychology & Social Development 12 (1):35-51, www.seahipublications.org

Bandura, A. (2010). Self-efficacy. The Corsini Encyclopedia of Psychology, 1–3. Portico. https://doi.org/10.1002/9780470479216.corpsy0836

Hernández de la Hera, J. M., Morales-Rodríguez, F. M., Rodríguez-Gobiet, J. P., & Martínez-Ramón, J. P. (2023) Attitudes toward mathematics/statistics, anxiety, self-efficacy and academic performance: an artificial neural network. Front. Psychol. 14:1214892. doi: 10.3389/fpsyg.2023.1214892

Ifamuyiwa, A. S. (2006). Effect of self and cooperative instructional strategies on senior secondary school students learning outcome in mathematics. Ph.D. Thesis, University of Ibadan.

Ince, M. (2023) Examining the role of motivation, attitude, and self-efficacy beliefs in shaping secondary school students' academic achievement in science course. Sustainability, 15, 11612. https://doi.org/10.3390/ su15151161

Karjanto, N. (2017). Attitude toward mathematics among the students at Nazarbayev University Foundation Year Programme. International Journal of Mathematical Education in Science and Technology, 48(6), 849-863. https://doi.org/10.1080/0020739X.2017.1285060

Kefyalew K. A. (2020) an investigation of relationship between self-efficacy and academic achievement among second year robe college student. International Journal of Research Publications, 60(1), 94-108; doi:10.47119/IJRP100601920201428. www.ijrp.org

Laranang, J. I., & Bondoc, J. F. (2020) Attitudes and self- efficacy of students toward mathematics. International Journal of English Literature and Social Sciences, 5(5), 1392 - 1423 https://ijels.com/

Mao, P., Cai, Z., He, J., Chen, X., & Fan, X. (2021) The relationship between attitude toward science and academic achievement in science: a three-level meta-analysis. Front. Psychol. 12:784068. doi: 10.3389/fpsyg.2021.784068

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

Mensah, J. K., Okyere, M., & Kuranchie, A. (2013) Student attitude towards Mathematics and performance: Does the teacher's attitude matter? Journal of Education and Practice. 4(3).

Odebode, A. O. (2020). Assessment of mathematics curriculum on academic achievement and retention ability of senior secondary school students in Oyo Central of Oyo State. Proceedings of Mathematical Association of Nigeria. 196-200.

Oshakuade, O. J., Ekpenyon S. I., & Otutu T. I. (2023) Locus of control, achievement motivation and academic self-efficacy as determinants of secondary school students' academic performance in Ondo State, Nigeria, International Journal of Education, Learning and Development, Vol. 11(6), 44-51

Ralph, S., & Mathias, J. (1995). Generalized self-efficacy scale, measures in health psychology; a user's portfolio. Causal and control beliefs. Windsor, UK; NFER-NELSON.

Reylan, C., Renante, N., Jonathan, O. E., Raymond, E., Gengen, P., & Ramil, M. (2019). Attitudes, study habits, and academic performance of junior high school students in mathematics. International Electronic Journal of Mathematics Education. Vol. 14(3), 547-561 https://doi.org/10.29333/iejme/5768

Ugur, D. (2015). Student engagement, academic self-efficacy, and academic motivation as predictors of academic performance. Anthropologist, 20(3): 553-561

Xing, L. & Hari, k. (2009) The effect of mathematics self-efficacy on mathematics achievement of high school students. NERA Conference Proceedings 30.