

**STUDY HABITS AND TEST ANXIETY AS CORRELATES OF SENIOR
SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE IN
MATHEMATICS IN KOGI STATE, NIGERIA**

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Abstract

This study evaluated how study habits and test anxiety affect Kogi senior secondary school Mathematics Performance. Two objectives, research questions, and two null hypotheses guided the investigation. The researcher used correlational research. The research was done in Kogi. The study included 12703 senior secondary school two (SS II) mathematics students from 43 public secondary schools in Kogi State. The study included 366 SS II Mathematics students. Data was collected with three research devices. Mathematics Study Habits Questionnaire, (MTA Q), and (M A P T). The instruments were face and content validated by three experts. 30 copies of the instruments were administered to SS2 mathematics students in Ankpa Education Zone, which is not part of the study but has similar features. This was done to ensure dependability. The MAPT, MSHQ, and MTAQ scores were recorded and tested for reliability using Kuder Richardson (K-20) and Cronbach-Alpha. The dependability indexes were 0.75, 0.83, and 0.87. Students received the instruments using Direct Delivery Technique. This ensured maximal instrument returns and close monitoring. Data was analyzed for research topics and hypotheses. Analysis of research questions 1–5 included descriptive statistics including mean, standard deviation, and Pearson's Product Moment Correlation. Downie and Heath define high correlation as 0.80 or higher, moderate correlation as 0.30–0.80, and low correlation as 0.30 or lower. Hypotheses 1–5 were investigated by Regression Analysis. A probability level greater than 0.05 does not reject the null hypothesis, whereas a probability value less than 0.05 does. The study and others found that study habits and test anxiety greatly affect mathematics performance. All factors of study habits and exam anxiety predict mathematics performance. According to the study, study habits and test anxiety are significant factors in determining students' academic performance in mathematics. Students should be taught to

understand their uniqueness so they can develop learning lifestyles or study habits that may lead to academic performance.

Keywords: Study habits, anxiety, test, performance, mathematics

Introduction

Mathematics helps students think and solve their problems by themselves, promoting the habit of self-reliance. Its knowledge does, in fact, equip people with the ability to solve a variety of useful tasks and problems they could come across in life and in professions (Anaduaka, 2016). To have a good degree in the following fields: chemistry, physics, engineering, biology, and pharmacy, among others, one needs good knowledge of mathematics; no other subject has greater application than mathematics, Geoffrey (Achimugu & Igboegwu, 2021). The value of mathematics piloted the Federal Government of Nigeria to make it compulsory from the elementary level through to the end of senior secondary education. Mathematics is needed in Everyday life activities, which also serves as the foundation on which all other disciplines revolve. Nations that appear developed and mostly considered civilized have achieved this state through effective mathematics education for their people (Mohammed *et al.*, 2019).

Mathematics points people in the direction of improvement, liberating the mind and providing a gauge of intellectual capacity. At the end, he said that all science and technology, with their applications spanning all spheres of human knowledge, are based on mathematics. Therefore, the intellectual challenge of mathematics define its essence. The precise language of mathematics contributes to both technological advancement and scientific breakthroughs. This suggests a strong relationship between the development of technology and mathematics. For the purposes of handling money, prosecuting daily businesses, interpreting mathematical graphs and charts, and thinking logically, every man thus needs a certain degree of competence in fundamental topics mathematical.

Despite the importance of mathematics, students still perceive it as challenging and experience phobia (Hafiz *et al.* 022). The differences in scholastic performance among Nigerian children have long piqued the interest of teachers, the government, and parents. This is due to its relevance for the nation's national growth. The nation as a whole share opinions on the declining quality of education in Nigeria (Samuel, 2018). Parents and government agree unanimously that their large educational expenditure is not producing the expected payback (Anyaku & Agbo, 2020). Less than 62% of the students who sat for WAEC between 2010 and 2015 in Nigeria passed at credit level, according to Chief

Examiners Reports 2016-2024 reviewed by the West Africa Examination Council (WAEC). Teachers are also worry about low students' performance in both internal and external examination Senior Secondary Certificate Examination annual releases according to the Chief Examiner's report to the West Africa Examinations Council (WAEC, 2022), mathematics students struggle with memory of mathematical operations. According to a statement signed and published by the Acting Head, Public Affairs, WAEC Nigeria, 46,267 out of the 80,904 candidates who sat for the examination received a minimum of five credits. This equates to 57.19% of candidates who obtained credit or higher in a minimum of five subjects, either with or without mathematics. In mathematics, 35,830 candidates, representing 44.29%, received credit or higher in a minimum of five subjects.

The empirical data indicating low mathematical student performance in Nigeria is indisputable. The pass rate for the SSCE in mathematics has been decreasing steadily over the past five years, from 60% in 2016/2017 to 50% in 2021/2022. Thus, half of Students who took the SSCE in mathematics in 2021/2022 failed the examination. This is a direct result of the specific strategies used in the classroom. Therefore, teachers teach mathematical ideas to the students in a way or approach that appeals to their sub-consciousness. This approach has the potential to rapidly provoke the taught or experienced concept. The Chief Examiner of West Africa Examinations (WAEC, 2022) said that candidate performance over the three years 2016–2022 shows low quality of senior secondary school education generally. WAEC asserted that the low performance level necessitates a review of the methods used for mathematical instruction and learning. However, Oyugi (2018) posited that factors such as mathematics anxiety, poor mathematical habits, inadequate learning and teaching tools, ineffective teaching strategies, and unfavorable learning environments all contribute to students' poor mathematical performance.

In the submission of Shaikh (2018), Denwigwe (2022) it was pointed out that the immediate surroundings can affect mathematics behaviour and anxiety. The environment in which students learn mathematics, which includes family, education, peer groups, teachers, can either positively or negatively affect their learning, thereby lowering or raising their test anxiety. Students blamed their low performance, according to Abah and Nwana (2015), in three main areas: teaching issues, negative habits towards the subject, and examination difficulty. Adguns and Sam-kayode (2018), who had previously identified issues with mathematics learning due to students' perception of it as highly theoretical and meaningless, discovered that students often perceive mathematics as excessively theoretical and lacking in practical relevance, which can hinder their engagement and

comprehension of the subject. The author also observed that a significant portion of the limited number of accessible textbooks fails to align with the cultural background of Nigerian children, and that teachers often employ ineffective methods when teaching mathematics in school. According to the writers, although many math teachers claim their subject is helpful, they rarely provide evidence to support this. Most students, then, could not see any reason for learning mathematics. Although there are several factors influencing student performance, one of the most often mentioned problems is the use of ineffective teaching strategies (Achimugu, 2016). Akanmu and Fajemidagba (2015) also noted that some of the main causes of low academic performance in mathematics are poor methods of instruction, low self-esteem or self-efficacy, bad study habits, and poor interpersonal relationships.

Students claim that a study habit is a consistent pattern of learning or discovery about a given topic over a specified period of time. Constant practice of a skill over a long period of time shapes habits. This implies that every repetition of that ability, whether good or bad, generates or strengthens a specific pattern of behaviour that results in habit development. While studying involves dedicating time, attention, and dedication to learning a subject seriously, Duckworth (2016) defines a habit as a behaviour that occurs frequently, almost instinctively, and is difficult to break. Alston (2017) and Adaramola (2014), Okonkwo and Ugwu (2019) view study habits as a desired repeating pattern of learning a subject, taking all these factors into account.

According to Fleming (2014), study habits are the consistent behaviors and practices one displays during the process of acquiring knowledge through education or activities engaged in test preparation or learning of academic content. Basically, students are doing the best they can to get the grades they desire. This could be the fundamental ways students approach subjects or topics, especially while they are in school. Examining study habits reveals plenty of examples across the educational spectrum. There are various types of study habits, such as physical study habits like writing, knitting, or swimming; moral study habits like diligence and truthfulness; attitudinal study habits that involve a particular way of thinking; social study habits that involve the development of skills like neatness and courtesy; verbal study habits that involve the use of words; and academic study habits that are solely focused on academics. One can cultivate these habits positively or negatively, leading to either enhanced performance or subpar results. Good study habits, according to Akporehwe and Onwioduokit (2015), will make students rational in thinking, curious, open-minded, objective, honest, humble, modest, and never suspicious. It helps the

students to develop bold and competent, dynamic and productive, ambitious and hard-working, self-motivated and confident, single-minded and self-regulated.

Students with test anxiety, a psychological disorder, experience significant suffering and anxiety in test environments. Although many students feel some stress and anxiety both before and during tests, test anxiety can really hinder learning and lower test performance. One can also establish a correlation between the family background of the student and their inclination towards mathematics, as well as their anxiety. In their 2017 study, Soni and Kumari asserted that parents' mathematical anxiety and behavior could potentially trigger students' mathematical anxiety and influence their mathematical behavior. When parents' worries are strong, their children's worries also grow, particularly if they assist in the completion of early-age homework. This is because parents tell their own children they hate and find math difficult. (Maloney *et al.*, 2015), Ammara and Syeda (2017) and Akinleke and Adeaga (2014) assert that early learning students can socially inherit such behavior.

More importantly, teachers who hold negative opinions about mathematics may unintentionally impart these bad practices and anxiety to their students (Scarpello, 2017). Moreover, no matter the level, learning mathematics is not a simple chore. The abstract nature of certain parts of mathematics alone can lead students to avoid the subject or experience anxiety, thereby hindering their efficient learning of the field. Agwagah (2016) compiled the results of more than 100 studies on the relationship between gender and academic performance in mathematics and found that although early elementary school girls often outperform boys in mathematics, the difference closes and finally disappears by the end of high school. Though there is no general gender difference in high school mathematical performance, girls are still less likely than boys to enroll in advanced mathematics courses and pursue professions in mathematics and science (Agwagah, 2016). Researchers have tried numerous teaching techniques without success to improve mathematical performance. The researcher thus questions whether other elements such as self-efficacy, study habits, and test anxiety could affect students' mathematical performance.

Therefore, this study investigated, with gender as a moderator, study habits and test anxiety as correlates to senior school students' mathematical performance.

Notwithstanding the mandatory nature of mathematics in Nigeria, the ongoing issue of pupils' deteriorating performance in this subject has been a persistent concern. Given the frequent lack of mathematics proficiency among pupils during exams, Student on data provided by the WAEC Chief Examiner from 2016 to 2023, student academic achievement in mathematics (SSCE) has

consistently been poor. Researchers have identified a variety of factors that contribute to mathematical underachievement. Several contributing elements encompass social connections, financial resources, online platforms, personal self-control and the administrative structure of the educational institution, insufficiently skilled educators, inadequate instructional resources, and other related aspects. By employing this approach, scholars have examined the correlation between students' inclination towards data, their educational backgrounds, and the factors that contribute to their subpar mathematical achievement in the classroom. Acquiring exceptional mathematical proficiency at every grade level is essential for Nigeria to achieve its goal of scientific and technical progress.

Given our nation's abundance of individuals employed in education, including instructors, facilitators, educators, educationists, and teachers, it is understanding that mathematics is experiencing such a high incidence of failure. As a result of their apprehension about the subject, many students refrain from investing enough effort in acquiring the knowledge and instead develop inaccurate notions about mathematics. Can the study habits and test anxiety of students in senior secondary schools be reliably linked to their performance in mathematics?

Also the purpose of the study is to examine how study habits and test anxiety as correlates of senior secondary school students' academic performance in mathematics. Specifically, the study is designed to find out the: Relationship between study habits and students' academic performance in mathematics; and Relationship between test anxiety and students' academic performance in mathematics

Research Questions

The following research questions guided the study;

1. To what extent is test anxiety relate to students' Academic performance in mathematics?
2. To what extent is test anxiety relate to students' academic performance in mathematics?

Research Hypotheses

The following null hypotheses were formulated and tested at an alpha level of 0.005 of significance.

H₀₁: There is no significant relationship between test anxiety and students' academic performance in mathematics.

H₀₂: There is no significant relationship between test anxiety and students' academic performance in mathematics.

Methodology

This study used correlational survey research design. According to Achimugu et al. (2024), correlational study design tries to establish and examine the statistical relationship between two or more variables. Studying the variables' relationship usually shows its direction and magnitude. This study measured two or more variables and examined their relationship using a correlational research approach. We conducted the study in Kogi's Dekina Education Zone. Kogi, a Nigerian state, is located in the North-Central Zone. The survey included 12703 senior secondary school two (SS II) mathematics students from 43 public secondary schools in Dekina Education Zone (6,680 male and 6,023 female). In 2024, the Kogi State Science, Technical Education, and Teaching Service Commission conducted a Zonal Education survey.

The sample consisted of 12703 senior secondary two (SS II) mathematics students (6,680 male and 6,023 female). We may draw the sample in stages. We sample 24 of 254 schools in the two LGAs in the zone using simple random sampling starting with balloting.

Then, purposive sampling was used to select eight Bassa and fifteen Dekina LGA public secondary schools, for a total of 24. This ensured that the sample was more representative of the population and represented majority constituents. The researchers chose these schools because they have the most mathematics students.

The researchers used the Mathematics Study Habits Questionnaire (MSHQ), Mathematics Test Anxiety Questionnaire (MTAQ), and Mathematics Academic Performance Test (MAPT) to collect data. The Mathematics Study Habits Questionnaire comprises Parts A and B. Section A collects the class, gender, and school names of the respondents. Section B: Ask about math study habits. The section has 25 4-point Likert ratings: SA: strongly agree (4), agree (3), disagree (2), and disagree (1). Mathematics Test Anxiety Questionnaires (MTAQ) have two sections: Section A has biographical information about the respondent, and Section B asks about mathematics anxiety. It has 20 items rated on a 4-point Likert scale: SA: Strongly Agree (4), Agree (3), D: Disagree (2), and SD: Strongly Disagree (1) The Mathematics Academic Performance Test (MAPT) assesses students' academic performance. This has 30 questions with four answers (A, B, C, and D). This will gauge the academic performance of math students. The researchers chose linear equations, which solve problems with exponent 1 variables, and set theory, which deals with interactions between groupings of objects, because they are fundamental to mathematics education. By mastering these areas, students learn problem-solving skills and prepare for more complicated mathematical concepts. By incorporating linear equations and set theory into the MAPT, educators can assess students' mathematical reasoning

skills and adjust instruction to address weaknesses, thereby improving math performance.

Three professionals from the Science Education Department (Measurement and Evaluation and Education/Mathematics Units) Faculty of Education, Prince Abubakar Audu University, Anyigba, validated the tools. In each area, the experts must validate the instrument for clarity, relevance, suitability of the indicated criteria, and item appropriateness. The instrument was changed with expert feedback, modifications, and suggestions. We improved the clarity of the language for the respondents and eliminated or modified questions to align with the research objectives. We performed factorial validation on modified instruments of 30 and 25 items to evaluate the construct validity of the study habits and test anxiety measures. The instruments was administer to 50 SS II Mathematics students from Ankpa Education Zone, outside the study zone, to test its dependability. We recorded the MSHQ and MTAQ scores and subjected them to Cronbach-alpha, resulting in reliability coefficients of 0.83 and 0.87, respectively. The reliability coefficient for the mathematics academic performance test, calculated using Kuder Richardson Formula 21 (K-R21), was 0.75. K-R21 is simpler than other reliability measures since it uses item means and variances (see Appendix H, page 150). The MAPT uses Kuder Richardson Formula 21 (K-R21) to assess test reliability with dichotomously scored questions, while the MSHQ and MTAQ, which have numerous items measuring the same constructs, use Cronbach's alpha. Each reliability measure matches the instrument's properties, ensuring proper internal consistency evaluation of the mathematics academic performance test, study habit, and test anxiety questionnaire. The mathematics academic performance test generated a pro-formal to assess student academic achievement. We administered the study habit and test anxiety questionnaires to students sequentially, collecting the results immediately to ensure a 100% response rate. The researchers used the scores from each instrument to examine their relationship with mathematics performance analyze the study data using descriptive and inferential statistics. Mean, standard deviation, and Pearson's Product Moment Correlation were used to analyze the research questions. Analyzed the hypotheses using multiple regression analysis to predict the value of the dependent variable for individuals with explanatory variable information, or to estimate the effect of an explanatory variable on the dependent variable. Multiple regression determines the association between numerous independent variables and one dependent variable.

Results

Research Question One: What is the relationship between study habits and students' academic performance in mathematics?

Table 1: Pearson's Product Moment Correlation Analysis of the Predictive Power of Study Habit and Students' Academic Performance in Mathematics

Variable	\bar{x}	SD	N	r
Study Habit	63.29	3.548	366	0.85
Students' Academic Performance	95.69	4.134		

Table 1, indicated the correlation coefficient between the predictive ability of study habits and the academic performance of students in Mathematics in Kogi State, Nigeria. Analysis indicates that there is a correlation coefficient of 0.85 between study habit and students' academic success in Mathematics. This implies that there existed a strong and considerable correlation between the study habits of students and their academic achievement in Mathematics.

Research question Two: What is the relationship between test anxiety and students' academic performance in mathematics?

Table 2

Pearson's Product Moment Correlation Analysis of the Predictive Power of Test Anxiety and students' Academic Performance in Mathematics

Variable	\bar{x}	SD	N
Test Anxiety	82.33	7.343	366
Students' Academic Performance	95.69	4.143	

0.20

Table 2 displayed the correlation coefficient of the predicting ability of test anxiety on the academic performance of students in Mathematics in Kogi State, Nigeria. The analysis indicates that there is a connection coefficient of 0.20 between test anxiety and students' academic achievement in Mathematics. Thus, there existed a direct and modest correlation between test anxiety and the academic achievement of pupils in Mathematics.

Hypothesis One: There is no significant relationship between study habits and students' academic performance in mathematics.

Table 6

Regression Analysis of Study Habit and Students' Academic Performance in Mathematics

Model		Sum of Squares	Df	Mean Square	F	Sig.	Dec.
	Regression	45.46	1	45.46	2.67	0.01	S
	Residual	6192.66	364	17.013			
	Total	6238.11	365				

$\alpha = 0.05$, S = Significant

Table 6 presents the regression analysis of study habits' predictive ability on the mathematical performance of Kogi State, Nigeria, pupils. The result was considered significant because the exact probability value of 0.01 is less than the significance level set as a standard for hypothesis testing. The F-ratio was 2.67. This disproves the null hypothesis, which posits no significant correlation between study habits and students' mathematical performance, and suggests that study habits significantly influence individuals' mathematical performance in Kogi State, Nigeria. Also implies that students' study habits significantly influence their mathematical academic performance.

Hypothesis Two: There is no significant relationship between test anxiety and students' academic performance in mathematics.

Table 4

Regression Analysis of Test Anxiety and Students' Academic Performance in Mathematics

Model		Sum of Squares	Df	Mean Square	F	Sig.	Dec.
1	Regression	256.180	1	256.180	15.589	0.000	S
	Residual	5981.932	364	16.434			
	Total	6238.112	365				

$\alpha = 0.05$, S = Significant

The statistical study presented in Table 7 illustrates the predictive ability of test anxiety on the academic achievement of students in Mathematics in Kogi State, Nigeria. The acquired result indicates an F-ratio of 15.589, which is accompanied by an exact probability magnitude of 0.000. The probability value of 0.000 is below the selected significance level of 0.05, which is considered the benchmark for hypothesis testing. The result was determined to be statistically significant. Consequently, the null hypothesis, which posited that there is no substantial correlation between test anxiety and students' academic achievement in

Mathematics, is refuted. The inference drawn is that test anxiety strongly predicts students' academic performance in Mathematics in Kogi State, Nigeria. Furthermore, this suggests that test anxiety is a substantial indicator of students' academic achievement in Mathematics.

Discussion of Findings

The study findings indicated a strong and favorable statistical relationship between study habits and students' academic achievement in mathematics. Findings indicate that the study habits of students strongly affect their academic achievement in mathematics. Similarly, this suggests that the study habits of students had a substantial impact on their academic achievement in mathematics. Adeoye and Salami (2017) conducted research on the correlation between study habits and academic achievement in mathematics among senior secondary school students in Katsina Metropolis, Nigeria, which aligns with the findings of this study. Their study revealed a statistically significant and positive correlation between study habits and academic performance in mathematics. The study findings indicate a minimal and positive link between students' test anxiety and their academic achievement in mathematics. The results of the hypothesis two test indicate that there is a statistically significant correlation between test anxiety and the measure of variation in students' mathematics performance. Therefore, test anxiety has a role in influencing students' academic achievement in mathematics. The study's findings coincide with Uchegbu and Onwuka's (2022) research, which examined the impact of test anxiety on the academic performance in mathematics and English language among 240 senior secondary school students in Enugu State, Nigeria. Their study revealed a highly significant positive relationship between test anxiety and academic performance in both subjects. This study's findings contradict Denwigwe's (2022) investigation of the correlation between academic test anxiety and mathematics performance among senior secondary III (SS3) students at Model Secondary School (MSS) Maitama, Abuja. Denwigwe's study revealed a significant negative relationship between test anxiety and mathematics performance. Hence, the results of this study indicate that test anxiety plays role in influencing students' academic achievement in mathematics.

Conclusion

Students' study habits and test anxiety significantly impact their academic performance in mathematics, according to the study's findings. The study also found that factors like gender, exam anxiety, and study habits significantly explain the observed difference in students' mathematical ability.

Recommendations

Considering the results of the study, the subsequent recommendations are provided.

1. The mathematics teachers should equally understand students' peculiarities with regards to emotional intelligence and cognitive styles. This will help the teachers to plan lessons and teachings so as to accommodate and carry every student along to avoid test anxiety.
2. Also, mathematics teachers understand various performance levels of students and give test that matches their cognitive level to avoid test anxiety
3. Workshops, seminars and conferences should be organized for mathematics teachers on the need to understand differences in learners irrespective of gender on how to form positive study habits and avoid test anxiety among students so as to improve academic performance of the students in mathematics.

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