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# Predictive Power of Test Anxiety and Students' Achievement in Mathematics in Oruk Anam, Akwa Ibom State, Nigeria

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## ABSTRACT

*This study investigates the predictive power of test anxiety and students' achievement in mathematics in Oruk Anam, Akwa Ibom State, Nigeria. Two research hypotheses were formulated to guide the study. The study adopted correlational research design. The population of the study was all the SSII mathematics students in the 15 government secondary schools in Oruk Anam. The sample size of the study was 234 students. Multi-stage sampling technique was used for a selection of five co-educational schools for the study. Mathematics test anxiety scale (MTAS) and a proforma were used for data collection. Data were subjected to Pearson's Product Moment Coefficient (r) and test of significance of correlation coefficients. The results revealed a significant relationship between test anxiety and students' achievement in mathematics and a significant relationship between test anxiety and students' achievement in mathematics as moderated by gender. Consequently, mathematics teachers should do everything within their reach to reduce students' anxiety in the class.*

***Keywords:*** *Test anxiety, mathematics and students' achievement*

## INTRODUCTION

Anxiety is a general feeling of apprehension or dread accomplished by predictable physiological changes. Anxiety is an aspect of emotions in which there is fear and uncertainty about the future. Anxiety is a painful uneasiness of mind concerning impending or anticipated ills on the part of the students (Olah and Utibe 2022). It is marked by uneasiness and apprehension form which the students cannot escape. It is

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accompanied by feeling of helplessness because the anxious student feels blocked, unable to find a solution to the problem. For students who suffer from mathematics anxiety, psychological symptoms such as sweaty palm, nausea, muscle contractions, difficult breathing, tiredness in the throat, headaches, heart palpitations, restless behaviors, forgetfulness and a temporary boost in one's heart rate are familiar (Alakayleh, 2017), when anxiety is associated with questions structured to elicit behaviour, it becomes test anxiety. Test anxiety is the feelings of fear and nervousness associated with bodily symptoms that interfere with solving mathematical problems in classes, examination, tests and also in daily activities that may involve geometric calculation. From all indication test anxiety appears to be a force confronting students.

Rana and Mahmood (2011) note that students with anxiety attempt to manage the devastating effects of their anxiety by playing truancy in school. This led to a few number of students in mathematics and ultimate few career choices in discipline that are mathematically dependent. Indeed, according to Syokwaa, Aloka and Ndunge (2014) findings, many students in their final examinations at the end of secondary school education have the most anxiety-inducing experiences in their programmes of study. The study added that this is because throughout their secondary education they managed their test anxiety by playing truancy and in their final examination truancy was not possible, their phobia for this final test confronted them with anxiety.

Owan, Nwannunu and Madukwe (2018) define test anxiety in mathematics as feelings of tension and worries that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations which cause one of forget and loose one's self-confidence in a test condition. Test anxiety is a learned behaviour, which can be unlearned. Factors that can create test anxiety are: parents, friends or teachers that may pass their biased ideas to the students to make them believe that there is a connection between grade and self-worth. The fear of alienation by parents, family or friends due to poor performances induces, anxiety on the students making them feel that they are not in control.

Guo, Parker, Marsh and Morin (2015) conducted a thorough meta-analysis of several studies concerning anxiety in mathematics in general of which geometry is core part and reported that anxiety is related to achievement. The study also asserted that test-anxious students are more likely to receive poorer grade, repeat classes, and perform more poorly on tasks requiring new learning and on those administered in a highly evaluative manner. Robert and Owan (2019) state that much of the research on test anxiety have focused on the differential impacts of emotionality and worry factors as the effect achievement in academics, according to them emotionally refers to the physiological reactions such as arousal, trembling, sweating that are experienced in an evaluative

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situation. Since anxiety is an emotionally based trait capable of arousal, trembling sweating experienced especially in an evaluative situation, a counter trait like interest may likely reverse the default outcome.

Another factor influencing achievement in mathematics is gender. Gender is psychological aspect of maleness and femaleness. As a factor in mathematics achievement, gender has remained inconclusive because Rodríguez, Regueiro, Piñeiro, Estévez and Valle (2020) reported that male students achieved a higher level in mathematics than female students; that is gender differences in favour of male students. Ganley and Lubienski (2016) report that female performed better than male in a mathematics achievement test that is indicating gender differences in favour of female students. Males perform better than females in a mathematics achievement test; that is indicating gender difference in favour of male students (Agah, Sule and Utibe 2013).

According to Etuk (2019), there are no gender differences in mathematics achievement in relation to test anxiety. It is possible that if students were highly motivated despite their gender differences and test anxiety, they can record high level of academic achievement in mathematics. In other words, the phobia for mathematics may likely and naturally increase anxiety any time test in mathematics is mentioned, indicating test anxiety. Bassey and Effiom (2018) used a multifarious model to examine gender differences in students. The study discovered academic performance average was higher in female than male. It was confirmed that female's advantage is partially due to their characteristic of greater responsiveness to school cues and compliance with adult direction. This advantage was partially offset in this model by male's greater visual-spatial skill which as was a predictor of academic achievement.

Mathematics has grown beyond ordinary numeration. Mathematics help us on how to count, arrange objects, record events present issues using words, shapes, size, and relative position of figures. According to Utibe and Agwagah (2015), mathematics is much more than arithmetic and algebra. It has metamorphosed into statistics, calculus, geometry, etc. Mathematics as one of the secondary school subjects is concerned with order and numeration.

From the above explanations, it is obvious that the importance of mathematics in everyday life cannot be over emphasized. It is because of this importance that mathematics is included as one of the compulsory subjects in secondary school (FME, 2014). To gain admission to study a course in the Nigerian University, a student/candidate must secure a credit pass in mathematics (NUC, 2023). Mathematics is taught fewer than five themes as follows: Number and numeration, algebraic processes, geometry, statistics and introductory calculus (NERDC, 2007). Teaching of mathematics is of great importance, but difficulties abound. Utibe and Agwagah (2016) point out that students have serious

problems when symbols as in geometrical representations and models are used. The study also states that many students have natural fear about mathematics; the mention of mathematics is seen as something that the students must think seriously about. Mathematics is more challenging for some students than others.

Rana and Mahmood (2011) point out that a student with problems in a subject like mathematics, of which calculation is a major part, finds it very difficult to cope, this problem may have spilt to other subjects resulting in general poor performance of the students in school. This is because this problem will lead to bad study habits, and these bad study habits will likely generate anxiety and thus translate into low confidence should there be any mathematics test. In other word the phobia for mathematics will likely and naturally aggravate anxiety any time a test on mathematics is mentioned.

Achievement in its true sense, according to Utibe and Agwagah (2015), is the act of accomplishment of attainment of educational goal. It is performance through a standardized test for measuring an individual's progress in the mastery of a subject to be learned. It is therefore in a bid to authenticate the above beliefs and support existing findings by aforementioned researchers that this present study is geared towards establishing the effect of test anxiety on students' achievement in mathematics in Oruk Anam, Akwa Ibom State, Nigeria.

There is generally poor performance by students in mathematics and this has been a thing of great concern to mathematics students. This is in line with the observation of National Bureau of Statistics (NBS, 2023). The Bureau expressed concern over the continual poor performance of candidates in Mathematics in West African Senior School Certificate Examination (WASSCE). Though mathematics teachers have put noble efforts in promoting mathematics teaching in the schools, the academic achievements of students in mathematics is still very poor. The second problems are that student's show great sign of anxiety whenever test in mathematics is given to them. The problem of this study therefore can be summarized in a question: what is the relationship between test anxiety and academic achievement of senior secondary school students in mathematics in Oruk Anam, Akwa Ibom State, Nigeria?

The purpose of this study is to determine the predictive power of test anxiety and students' achievement in mathematics in Oruk Anam, Akwa Ibom State, Nigeria. The study focuses on the relationship between test anxiety and academic achievement of SS2 students in mathematics in senior secondary schools for 2022/2023 academic session in Oruk Anam LGA, Akwa Ibom State. It will also include the students' gender. Specifically, it seeks to determine:

1. The relationship between test anxiety and students' achievement in mathematics.

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2. The relationship between test anxiety and students' achievement in mathematics as moderated by gender.

**Research Questions**

In order to guide the researchers in the study, the following research questions were presented and answer in the course of this study:

1. What is the relationship between test anxiety and students' achievement in mathematics?
2. What is the relationship between test anxiety and students' achievement in mathematics as moderated by gender?

**Hypotheses**

To guide the researchers in the conduct of the study, the following null hypotheses were tested at a 0.05 level of significance.

1. There is no significant relationship between test anxiety and students' achievement in mathematics.
2. There is no significant relationship between test anxiety and students' achievement in mathematics as moderated by gender.

The findings of the study are of immense benefits to the students, parents, teachers, counselors, examination bodies and government. The result of the study are beneficial to the secondary school teachers because their awareness of the relationship between test anxiety and academic achievement in mathematics will not only make them identify students with anxiety problems in class but also get them concerned about possible ways of reducing it in different ways, first by devising a way to get the students interested in the study of mathematics and secondly eschewing every negative variable in schools that will necessitate test anxiety..

## METHOD

The study adopted a correlational survey research design. The study established the nature of relationship among the criterion variable (students' test anxiety) and the predictor variables (Academic Achievement of senior secondary school mathematics students). According to Nworgu (2015), correlational survey study is the type of study that seeks to establish what relationship exists between two or more variables. Nworgu also stated that it indicates the direction and magnitude of the relationship between the variables. It employs a special group of statistics known as correlation coefficient for data analysis. This study was conducted in Oruk Anam local government area. Oruk Anam is located in

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the southwestern part of Akwa Ibom State, Nigeria. The reason for choosing the area is because the sample needed by the researchers for this study is present.

The population for this study consists of all the male and female students in senior secondary two in all the 15 public secondary schools in Oruk Anam local government area (LEC, Oruk Anam, 2023). The reason why SSII mathematics students were chosen for this study was because they wrote a common examination for promotion to SSIII which form part of the data used for the study. The sample for this study comprised of 234 mathematics students selected from five schools in the local government. The researchers used a multi-stage sampling technique to select the sample. The researchers divided the population into cluster (clans). One public secondary school that is co-educational was randomly selected, because of the researchers' interest in relationship between test anxiety and academic achievement of male and female students.

The instruments that were used for data collection in this study were: mathematics test anxiety scale (MTAS) and a proforma of mathematics students' performance in the SSII State Joint examination conducted by Akwa Ibom State Ministry of Education (AKSMOE, Test and Examination Unit, 2023). MTAS is a twenty item, four-point Likert type scale that the researchers constructed to measure mathematics test anxiety. The instrument was scored in this order: strongly agree (SA) - 4, Agree (A) - 3, Disagree (DA) - 2, and Strongly disagree (SD) - 1. The proforma was developed by the researchers in order to assess the performance of students in mathematics. It covered the students score in mathematics extracted from the State Joint SSII promotion to SSIII for 2022/2023 academic session, gender and test anxiety rating. Copies of the MTAS and the proforma were sent to a lecturer in Mathematics Department, a lecturer in Mathematics Education and a lecturer in Research Measurement and Evaluation all from Akwa Ibom State University for face validations. All the comments and recommendations were utilized in the final version of MTAS and the proforma.

The researchers administered copies of the instruments to 30 SSII mathematics students in these public secondary schools that would not be part of the population for the final study. The data obtained were used for the calculation of the reliability index. Cronbach's Alpa (a) was used in the calculation of the reliability index of Mathematics Test Anxiety Scale (MTAS). Reliability index was 0.79. This was considered to be enough for a good internal consistency and usage in the research. The researchers visited the schools and collaborated with the regular school mathematics teachers to administer the copies of MTAS to be students in the five selected secondary schools involved in the study. All the copies of the instrument administered were collected back on the spot. Relevant approval was obtained from the State Ministry of Education for use of the SSII joint promotional examination results in mathematics for 2022/2023 school session. The

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reason for using the State Ministry of Education SSII joint promotional examination results in mathematics was to ensure uniformity in standard of the test. The students' responses were inputted on the proforma and used for statistical analysis. The data collected was analyzed using Pearson's Product Moment Coefficient (r) for research questions. Test of significance of correlation coefficients were used in the hypotheses at a 0.05 level of significance.

## RESULTS AND DISCUSSION

**Table 1:** Regression analysis of test anxiety on students` achievement in mathematics

| **Variables** | **N** | **R** | **$R^2$** | **Adjusted R-Square** |
|---|---|---|---|---|
| Test anxiety | 234 | 0.385 | 0.148 | 0.142 |
| Students` Achievement | | | | |

Predictor Constant: Test Anxiety

Table 1 shows the R and $R^2$ for the strength of the correlation between test anxiety and students` achievement in mathematics. This is shown by R value of 0.385* ($R^2$) of .148 between test anxiety and students` achievement. The $R^2$ value of .148 which is the coefficient of the determination indicates that test anxiety contributes only 14.8% to the variations in students` achievement in mathematics. This further indicates that there is a relationship between test anxiety and students' achievement in mathematics.

**Table 2:** Regression analysis of test anxiety and students' achievement in mathematics as moderated by gender

| **Variables** | **N** | **R** | **$R^2$** | **Adjusted R-Square** |
|---|---|---|---|---|
| Test anxiety | 234 | 0.493 | 0.243 | 0.240 |
| Students' gender | | | | |
| Students` Achievement | | | | |

Predictor Constant: Test Anxiety, Gender

Table 2 shows the R and $R^2$ for the strength of the correlation between test anxiety and students` achievement in mathematics as moderated by students' gender. This is shown by R value of 0.493* ($R^2$) of 0.243 between test anxiety and students` achievement as moderated by gender. The $R^2$ value of 0.243 which is the coefficient of the determination indicates that test anxiety contributes only 24.8% to the variations in students` achievement in mathematics as moderated by gender. This further indicates that

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there is a relationship between test anxiety and students' achievement in mathematics as moderated by gender.

**Hypothesis One:** There is no significant relationship between test anxiety and students' achievement in mathematics. The independent variable in this Hypothesis is test anxiety, while the dependent variable is student` achievement.

**Table 3:** Regression analysis of test anxiety on students` achievement in mathematics

| Source of Variance | Sum of Square | df | Mean Square | F | Sig |
|---|---|---|---|---|---|
| Regression | 637.13 | 1 | 637.138 | 45.74 | 0.000 |
| Residual | 1461.668 | 232 | 18.470 | | |
| Total | 2398.807 | 233 | | | |

$R = 0.385$, $R^2 = 0.148$*
*Significant at 0.05 level of significance

Table 3 shows that the relationship between test anxiety and students' achievement in mathematics is statistically significant at 0.05 level of significance ($F = 45.74$; $p = 0.000$, $R=0.385$, $R^2 = 0.148$*). This means the criterion could be predicted by the predictor variable thereby justifying the regression analysis presented in Table 1. Thus the null Hypothesis that there is no significant relationship between test anxiety and students' achievement in mathematics is rejected at a 0.05 level of significance.

**Hypothesis Two:** There is no significant relationship between test anxiety and students' achievement in mathematics as moderated by gender. The independent variable in this Hypothesis is test anxiety, while the dependent variable is student` achievement and the moderating variable is gender.

**Table 4:** Regression analysis of test anxiety and students' achievement in mathematics as moderated by gender

| Source of Variance | Sum of Square | df | Mean Square | F | Sig |
|---|---|---|---|---|---|
| Regression | 976.776 | 1 | 976.776 | 54.434 | 0.000 |
| Residual | 1222.03 | 232 | 17.263 | | |
| Total | 2398.807 | 233 | | | |

$R = 0.493$, $R^2 = 0.243$*
*Significant at 0.05 level of significance

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Table 4 show that the relationship between test anxiety and students' achievement in mathematics as moderated by gender is statistically significant at 0.05 level of significance ($F = 54.43$; $p = 0.000$, $R = 0.493$, $R^2 = 0.243$*), This mean that the criterion could be predicted by the predictor variable thereby justifying the regression analysis presented in Table 2. Hence the null Hypothesis which states that there is no significant relationship between test anxiety and students' achievement in mathematics as moderated by gender was not statistically significant is rejected at a 0.05 level of significance.

The study sought to determine the relationship between test anxiety and students' achievement in mathematics. The results revealed that the relationship between test anxiety and students' achievement in mathematics is statistically significant. This means that there exists a relationship between test anxiety and students' achievement in mathematics. It signifies that students who are less anxious achieve highly in mathematics. This goes further to corroborate the work of Agah, Sule and Utibe (2013) which study was on determinants of senior secondary school students' logical reasoning in problem-solving and mathematics achievement in Olamaboro local government area of Kogi State, Nigeria. The results of the study show statistical significant effect of logical reasoning on students' achievement in mathematics. The reason for this result is that the more stable the students are the more the students can perform in a test resulting in higher achievement.

It was also found that there exists a relationship between test anxiety and students' achievement in mathematics as moderated by gender. This is sequel to the fact that both male and female students who are emotionally stable achieve significantly in their academic and otherwise. This study affirms the findings of Olah and Utibe (2022) which study was on emotional intelligence and psychological wellbeing of civil servants in Federal Capital Territory, Abuja, Nigeria.

## CONCLUSION

On the bases of the findings, there is a significant relationship between test anxiety and students' achievement in mathematics. There is also a significant relationship between test anxiety and students' achievement in mathematics as moderated by gender. Anxiety is a strong determinant of students' achievement in mathematics. The level of students' achievement given gender is closely related to the level of anxiety developed by the students. The mathematics teachers should adopt measures that would make the class friendlier thereby reducing tension which connotes anxiety and affecting their overall achievement.

## RECOMMENDATIONS

Based on the results of the study, the following recommendations were made:

1. Due to the relationship between test anxiety and students' achievement in mathematics it is recommended mathematics teachers should do everything within their reach to reduce students' anxiety in the class.
2. Anxiety of whatever form should not be allowed in the classroom as it will affect both male and female students alike.

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