

## Centralized Secondary School Examination and Mathematics Test Anxiety Scores as Predictors of Students Achievement Among Senior Secondary Certificate in Mathematics in Imo State.

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### ABSTRACT

The importance of mathematics cannot be over-emphasized, so the Federal Government of Nigeria has made mathematics a compulsory subject at all levels of education to stimulate and promote the interest of Nigerian science students (FRN, 2004). Many research works have been carried out on test anxiety and predictive validity on students' academic achievements, but there seems to be scanty research connecting Mathematics Test Anxiety and CSSE with students' academic achievement. These present study takes its bearing from the theory introduced by John Dewey's theory of learning. The study was guided by two (2) research questions and one (1) hypothesis at 0.05 level of significance. Correlational research design was adopted; population was made up of all the senior secondary 3 students of 2017/18 Academic session drawn from 297 public secondary schools. The sample comprised 850 senior secondary 3 students from 8 schools, 8 local governments, and 4 educational zones in Imo state using stratified random sampling technique and simple random sampling technique. Three instruments were used for this study namely Mathematics Test Anxiety Questionnaire, CSSE 2017 result sheet and SSCE 2018 result sheet. The results of the analysis show generally, that the combination of CSSE and mathematics test anxiety scores significantly predicts achievement of students' in SSCE in mathematics. it was recommended that CSSE should be taken as a core component of the assessment process in mathematics at the senior secondary 3, and as it prepares the student to face examination situation before certificate examination.

**KEYWORDS:** Mathematics Test Anxiety Questionnaire (MTAQ), CSSE, Senior Secondary Examination (SSCE), Correlation research design, assessment process.

### I. INTRODUCTION

The development of a nation, which is linked on educational cannot be achieved without due attention on science and technology. Basic discipline in the sciences must reasonably be encouraged. In doing this attention must be given to mathematics which is the bedrock of all sciences. Because of the importance of mathematics, the Federal government of Nigeria has made mathematics a compulsory subject at primary, secondary and tertiary levels of education (FRN, 2004). This is to promote the interest of Nigeria science students in order to afford them equal opportunity with its' foreign counterpart (Ubi & Okoi, 2015). At the end of three-year senior secondary programme, senior secondary certificate examination (SSCE) is taken and which serves as an end of course evaluation for all secondary school graduates. Examination bodies are charged with responsibility of setting questions and conducting examinations for certification of senior secondary school students. The candidate scores in West African Examination Council (WAEC) Examination are graded in such a way that the distinction grades are represented by A<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub>, the credit grades are represented by C<sub>4</sub> to C<sub>6</sub>; the ordinary pass grade is represented by D<sub>7</sub> and D<sub>8</sub> while Failure is represented by F<sub>9</sub> (WAEC, 2002). One of the factors that contribute to poor performance of students in mathematics is lack of preparation by students' before writing public examinations organised by examination bodies like WAEC, NECO, NABTEB etc.

Mathematics test anxiety is developed when students fail to prepare adequately for evaluation programmes (Fraud & Olango, 2006). To that effect the government of Imo State introduce centralized secondary school examination (CSSE) in 2016 in order to prepare the students for public examination. CSSE is taken in senior secondary school

2 in third term and its serves two major purposes namely promotional examination into senior secondary school 3 and preparation of the students for public examinations. It is taken throughout the state and under the same examination conditions as those in public examination and marked centrally by the various subject teachers like examiners in the public examination. Mathematics test anxiety seems to induce some kind of facilitating or impending effect on engagement in mathematical tasks and achievement. Many research works have been carried out on test anxiety and predictive validity on students' academic achievement, but there seems to be scanty research connecting mathematic test anxiety and CSSE with students' academic achievement. These present study takes its bearing from the theory introduced by John Dewey's theory of learning by doing in 1960 and Seymour Sarason and George Mandler in 1952. John Dewey's theory of learning by doing states that learning occurs by learning. This theory implies that performance in mathematics can be influenced by their prior achievement (Prior-Knowledge). The theory introduced by Seymour Sarason and George Mandler in 1952 simply states that anxious students performed more poorly on intelligence test than students with low test anxiety and that decrements in the performance of highly anxious students were most pronounced when test are administered under stressful, ego investing conditions.

Mathematics test anxiety in this study is when test anxiety is exposed in mathematics. Atkinson in Njoku (2016) described mathematics test anxiety as a complex construct consisting of affective, behavioural and cognitive response to a perceived threat to self-esteem which occurs as a response to a situations involving mathematics. Similarly, in Eniayeyu and Azuka (2010) described mathematics test anxiety as feelings of tension and apprehension that interferes with the manipulation of numbers and the solving of mathematics problems in a wide variety of ordinary and academic situations. Josiah (2014) says that mathematical test anxiety affects students' confidence in the subject there by leading to poor performance of students in the subject. Sieber (2015) conducted a study on the relationship between mathematics test anxiety and achievement of students in mathematics in middle school Northern Colorado and found out that, there is a significant difference between mathematics test anxiety and achievement on Transitional Colorado Assessment Programme (TCAP) and further stated that, students who have mathematics test anxiety tend to have low mathematics achievement. Ogbu (2007) also carried out a study on relationship between students' test anxiety levels and academic achievements in English language and mathematics of secondary schools in Igbo-Eze south local government area Enugu state and found out that, Mathematics test anxiety influences academic achievement of secondary school students. In similar studies by Chamoro and Furnhan (2003), Morakinyo (2006) and Ugal (2004) it was equally discovered that test anxiety influenced students' CGPA scores.

Rizward and Nasir (2010) investigated on the relationship between test anxiety and academic achievement of students at post graduate in a Pakistan University. Result of the study showed a significant inverse relationship between test anxiety and students' academic achievement. Oniha (2017). Carried out a study to ascertain the process of teaching and administration of the exams as well as the ability of the exam to predict performance in WAEC and found out that Unified exams could not significantly predict their performance in chemistry achievement test. It was recommended that examination should be conducted by the state examination boards with a mandate to establish a uniform standard for construction, administration, and scoring of the examinations, but on the contrary, Omiri and Ale (2008), investigated on the predictive validity of English and Mathematics mock examinations results of senior secondary school students performance in WAEC in Ekiti, Nigeria and found out there is significant relationship between mock and WAEC mathematics, in similar study by Ubi (2001) and Okoi (2015), it was equally discovered that Mock examination is significantly related with academic achievement of students in Mathematics. Literature seems, generally, to support that test anxiety influence academic achievements, and mock examinations significantly relates with academic achievement at all levels of academic endeavours. And this forms the basis of the curiosity of the present research.

**Statement of the problem:** The current poor performance of students in mathematics in senior secondary examinations in Imo state has become alarming and has posed a serious concern to Imo state government, teachers and parents (Okoi & Ubi, 2015) despite government effort in retraining of teachers. While one ponders whether government effort would yield positive change, the present study is attempting to ask whether the combination of CSSE and Mathematics test anxiety predict mathematics performance in SSCE in Imo state. The study was guided by two (2) research questions and one (1) hypothesis at 0.05 level of significance.

#### **Research questions**

1. What is the nature of regression equation for predicting students' achievement scores in mathematics using CSSE and mathematics test anxiety scores as predictors?

2. What proportion of variance in academic achievement score accounted by predictor variables?

**Hypothesis :** CSSE and Mathematics test anxiety scores do not significantly predict achievement scores in Mathematics.

## II. METHODOLOGY

This study adopted the correlation research design based on the fact that correlation research design seeks to re-establish relationship existing between two or more variables. Also, all studies involving prediction are conducted with correlation research design. The population was made up of all the senior secondary 3 students of 2017/2018 Academic session drawn from 297 public secondary schools in Imo state. The sample comprised 850 senior secondary three students from 8 schools, 8 local governments, and 4 education zones in the state using stratified random sampling technique and simple random sampling technique. Schools were first stratified into educational zones; afterwards, education zones were further stratified into local government areas. Simple random sampling technique was used to select 4 education zones from 6 education zones in the state. 2 local governments were selected from each of the sampled education zones. Through simple random sampling technique 1 secondary school was selected from each of the local governments sampled for the study which yielded to 8 secondary schools. It was however, discovered that the population of senior secondary 3 in the selected schools significantly differed and this made sampling of the student into a uniform number impossible. The researcher therefore, decided to use all the SS3 students in each sampled school. Three instruments were used for this study named mathematics test anxiety Questionnaire, CSSE 2017 result sheet and SSCE 2018 result sheet on mathematics from which the students' scores were obtained. The MTAQ consists of two sections A and B, and section A consists of 4 items which solicits for personal data of the students. Section B consists of 18 items on a likert type scale eliciting information on mathematics test anxiety. The mathematics test anxiety questionnaire was trial tested for internal consistency using Cronbach Alpha reliability method. The estimate reveals the reliability coefficient of 0.71. the data were collected by the researcher and some research assistants.

Research Question 1 was answered using multiple regression analysis while research question 2 was answered using model summary of multiple regression. The hypothesis was answered using multiple regression analysis.

## III. RESULTS

Research Question 1: What is the nature of regression equation for prediction student achievement scores in mathematics using CSSE and mathematics anxiety score as predictors?

Table 1: Coefficient of CSSE and Mathematics test anxiety scores on achievement scores in mathematics.

Variables	B	Std Error	Beta	t	P-value
<b>Constant</b>	3.412	0.313		10.898	0.000
<b>CSSE</b>	0.068	0.003	0.584	22.199	0.000
<b>Maths Test Anxiety</b>	-0.081	0.008	-0.262	-9.951	0.000

Dependent variables: SSCE

Data in Table 1 show that, the nature of regression equation is  $ACC = 3.412 + 0.068CSSE - 0.081MTA$ .

The equation shows that, for every unit increase in the coefficient of CSSE scores, achievement increases by 0.086. for every unit increase in the coefficient of mathematics test anxiety, achievement in mathematics increases by -0.081.

Research Question 2: What proportion of variance in academic achievement accounted for by predictor variables?

Table 2: Model summary of adjusted R<sup>2</sup> on proportion of variance in mathematics achievement score accounted for by the predictor variable.

Table							
Model	R	R-Square	Adjusted R <sup>2</sup>	St Error estimate	R-Square Change	F	P-value
1	0.750	0.563	0.562	1.145	0.563	546.002	0.000

Predictors: CSSE and Mathematics Test Anxiety.

Table 2 shows that the multiple correlation index of the predictor variable of centralized secondary school examination and mathematics test anxiety is 0.56.

Hypothesis: Centralized secondary school examination and mathematics test anxiety do not significantly predict achievement scores in mathematics.

Table 3: Summary of composite effect of centralized secondary school examination and mathematics test anxiety on SSCE.

Model	Sum of Squares	df	Mean-square	F	P-value
Regression	1431.980	2	715.990	546.002	0.000
Residual	1110.697	847	1.311		
Total	2542.678	849			

Table 3 shows a regression and residual sum of square on CSSE and mathematics test anxiety scores as 143.980 and 1110.697 respectively. The obtained  $F_{(2,847)} = 546.002$  with the associated probability value of 0.000. since the obtained probability value (0.000) with the computed F value (546.002) was less than 0.05 level of significance. The null hypothesis was rejected. It implies that CSSE and mathematics test anxiety score significantly predicts students' achievement score in mathematics.

#### IV. DISCUSSION

As can be seen from equation 1, the estimated coefficient has the right sign. However, the coefficient attached to CSSE and mathematics test anxiety are statistically significant. In terms of overall fit, the F value estimated at 546.002 is statistically significant at 1 percent, although, the explanatory variables taken together only explain about 56 percent of the systematic variation in achievement. The Durbin-Watson (DW) statistics is close enough to the value of 2, implying that, there is no problem of the serial correlation in the errors. Thus, as shown by the result in equation 1, an increase in scores obtained from CSSE in mathematics by 1 percent will be accompanied by an increase on scores obtained at the SSCE by just 0.07 percent and an increase in scores obtained from mathematics test anxiety by 1 percent would be accompanied by an increase in score at the SSCE by -0.08 percent. In relationship with the formulated hypothesis for this study, given by the statistical significance of the coefficient attached to CSSE and mathematics test anxiety, particularly, the scores obtained in the third year (SSS3), the null hypothesis that, CSSE and mathematics test anxiety does not predict achievement scores in mathematics was rejected in favour of alternative hypothesis.

#### V. CONCLUSION AND RECOMMENDATIONS

The main objective of this study was to investigate the extent to which scores obtained in centralized secondary school examination and mathematics test anxiety predicts students' achievement in the senior secondary certificate examinations in the same subject. The study was based on the data obtained from selected secondary schools in Imo state, Nigeria. The results of analysis show generally, that the combination CSSE and mathematics test anxiety scores significantly predicts achievement of students' in SSCE in mathematics most especially at SS3 level. Although, the predictive power of the model estimate is relatively low, the results tend to confirm those obtained in a similar study by Oniha (2017) and Ogbu (2007). In view of the findings, it was recommended that CSSE should be taken as a core component of the assessment process in mathematics at the senior secondary 3, and as it prepares the student to face examination situation before certificate examination.

It was also recommended that individual schools can organise reduction activities for students. This they can do by involving the student in relaxation exercises such as jogging, training them on how to be thinking about calm and comfortable experiences. Teachers can also counsel students about the importance of mathematics, on one hand, and the possibility of passing mathematics examinations with ease on the other hand.

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