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Test Anxiety as a Predictor of Secondary School Students' Achievement in Computer Studies in Delta State

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ABSTRACT

The study investigated test anxiety as a predictor of secondary school students' achievement in computer studies. Two research questions guided the study and two hypotheses were tested at 0.05 level of significance. Correlation design was adopted for the study. The population of the study was 11, 789 senior secondary year two (SS2) students offering Computer studies in Delta North Senatorial district of Delta state. A sample of 600 students obtained using multi-stage sampling procedure was involved in the study. The instrument for data collection was Test Anxiety Questionnaire (TAQ) validated by lecturers in Departments of Science Education and Educational Foundations, from Nnamdi Azikiwe University, Awka. The reliability of the instruments were established using Cronbach Alpha which yielded coefficient values of 0.77. Data were generated for the study through the administration of the instruments with the aid of five research assistants. The data obtained were analyzed using simple and multiple linear regressions. The findings of the study revealed that 0.6% of the variance in computer studies achievement was predicted by students' test anxiety. Also, achievement in computer studies was significantly predicted by test anxiety. It was recommended that school teachers should ensure to cover the scheme of work at the appropriate time, to enable students study them in sequential order and in a way that will enable prepare for test. This should be done to reduce the study load that result in cognitive overload and test anxiety.

KEYWORDS: *Test, anxiety, achievement, computer, secondary*

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INTRODUCTION

The application of computers and its accessory technologies has become indispensable in all fields of life. According to Carlie (2018) computers play a pivotal role in education and with the rapid changes in computer applications, students are facing continuous challenges in learning and adapting to these applications. The current and advanced features of modern computer technology has made it impossible for students not to use applications such as the internet, e-mailing, word processing, excel spreadsheet and presentation packages. Thus, being computer literate has become essential for all students to advance academically. Graduate students also need to be computer literate in order to be employable in the post-modern world of today. It is for this importance of computer that computer studies was introduced as a subject in the primary and secondary level of education.

In the National Policy on Education (FRN, 2013), computer education/studies was defined as the knowledge, skills and abilities to manipulate and interpret the language of computer. Computer science studies is skill and craft oriented. It is work-based learning which perceives learning as a continuous process grounded in experience. The National Computer Education Curriculum for primary schools was developed by the Nigerian Educational Research and Development Council (NERDC) in 2002. Until now, computer studies subject matter contents at the primary and secondary level as well as computer studies courses at the university level are based on some document or compilation of topics that lack pedagogical basis and structure in few schools where it is taught. Thus, the National Computer Education Curriculum represents the first deliberate attempt, nationally, to provide guidance to primary and

secondary school teachers on what should constitute basic computer literacy concepts and skills to be acquired at that level.

The objectives of the curriculum which are drawn from the national objectives for computer education are to enable students to; Use the computer and thereby acquire basic skills such as using the keyboard, accessing and editing a file at the operating system level; Use the computer to facilitate learning; and Develop rudimentary skills in the use of computer for text writing, computation and data entry activities (National Educational Research and Development Council, NERDC, 2002).

Despite the importance and necessary objectives of computer studies, the West African Examination Council (WAEC) Chief Examiner's Reports have not indicated any excellence in the students' achievement in computer studies. Although, the subject is relative new with its first maiden examination held in 2014, by 2015 and 2016, when there was basis for comparism, the Chief Examiner reported that students' achievement in 2015 was at par with their achievement in 2014. In 2017, students' achievement was low compared to their achievement in 2016. Although, the students' achievement in 2018 was better than that of 2017, their achievement in 2019 was comparable to that of 2018. The students' weakness and strength after each examination are identified and noted by the Chief Examiner and presented to the Science Teachers' Association of Nigeria (STAN) and other educational Agencies like NERDC for deliberations. One recommendation that has continued to be made by the Chief Examiner in the light of students' weaknesses is that: teachers should ensure that there are sufficient practical classes and that students should practice well before examinations. The recommendation is suggestive of the fact there are some fundamental problems especially as it relates to the teaching and learning of the subject.

The problem of teaching and learning computer studies according to Nwachukwu and Ndunagu (2021) results from inadequacy ICT facilities/equipment, lack of time to adequately teach computer studies, large teacher/pupil ratio, unreliable or inadequate power supply, lack of trained teachers in ICTs, lack of technical support to maintain and upgrade computing equipment, limited financial resources and lack of internet connectivity. The worst of all the factors according to Nwachukwu and Ndunagu is poor instructional delivery and poor attitude of teachers towards the subject. These problems present some level of difficulty for the computer studies students resulting in issues of test anxiety.

Anxiety is mental health disorder characterised by feelings of worry, anxiety or fear that are strong enough to interfere with one's daily activities. For computer studies students, high anxiety could result from computer anxiety, another relatively new concept. Computer anxiety is defined as the fear expressed toward computers when one is using or is about to use them (Achim & Al -Kassim, 2015). Morales-Rodríguez and Pérez-Mármol (2019) believes that computer anxiety is a negative emotional state which can influence users' interaction with the computer. Computer anxiety has also been found to significantly affect computer-related activities such as; utilization of computer, skills related to computing, attitudes toward and perceptions of computers, benefits obtainable from computers or software applications, and perceived ease of computer use (Morales-Rodríguez & Pérez-Mármol, 2019). Moreso, a high level of computer anxiety according to Gomes, Soares, Kieling, Rohde and Gonçalves (2019).has been found to negatively correlate with learning computer skills, resistance to the use of computers, and poorer task achievement due to test anxiety.

Test anxiety according to Denwigwe and Jacks (2020) is a physiological condition in which people experience extreme stress, anxiety, and discomfort during and/or before taking a test. It is a combination of physical symptoms and emotional reactions that interfere with your ability to perform well on tests (Olisaemeka & Solarin, 2019). Test anxiety can be understood as a combination of physiological over-arousal, tension and somatic symptoms, along with worry, dread, fear of failure, and catastrophizing, that occur before or during test situations. Test anxiety according to Carlie (2018) is known to creates significant barriers to learning and performance. Research (Ali & Mohsin, 2013; Barrows, Dunn & Lloyd, 2013) suggests that high levels of emotional distress resulting to test anxiety have a direct correlation to reduced academic performance and higher overall student drop-out rates. Test anxiety can have broader consequences, negatively affecting a student's social, emotional and behavioural development, as well as their feelings about themselves and school. Highly test-anxious students according Olisaemeka and Solarin (2019) lead students to score about 12 percentile points below their low anxiety peers.

Some anxiety is normal and often helpful to stay mentally and physically alert. When one experiences too much anxiety, however, it can result in emotional or physical distress, difficulty in concentrating, and emotional worry affecting academic achievement. Low achievement arises not because of intellectual

problems or poor academic preparation, but because testing situations create a sense of threat for those experiencing test anxiety; anxiety resulting from the sense of threat then disrupts attention and memory function.

Thus, high test anxiety leads to poor academic achievement in computer studies.

Academic achievement or academic performance is the extent to which a student, teacher or institution has attained their short or long-term educational goals. Achievement may be measured through students' grade point average or grades at examinations and test. Achievement is widely known to be affected by test-anxiety of students. This is because, from the ongoing discourse, absence of knowledge about computers can generate psychological anxiety, thus, decreasing the development of confidence. This psychological anxiety, or fear of working with computer-based technology, embraces losing control, losing important information, and embarrassment of not being competent enough to learn computer technical vocabulary. The need arises therefore, that an investigation into the understanding of the prediction of achievement in computer studies by test anxiety be conducted.

Purpose of the Study

The purpose of the study was to investigate test anxiety as a predictor of secondary school students' achievement in computer studies. Specifically, the study determined the:

1. Extent to which test anxiety predicts secondary school students' achievement in computer studies.
2. Contributions of the dimensions of test anxiety (worry, emotionality, interference and lack of confidence) in the prediction of secondary school students' achievement in computer studies.

Research Questions

The following research questions guided the study:

1. To what extent does test anxiety predict secondary school students' academic achievement scores in computer studies?
2. What are the contributions of the dimensions of test anxiety (worry, emotionality, interference and lack of confidence) in the prediction of secondary school students' achievement scores in computer studies?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. Test anxiety does not significantly predict secondary school students' academic achievement scores in computer studies.
2. The contributions of the dimensions of test anxiety (worry, emotionality, interference and lack of confidence) do not significantly predict secondary school students' achievement scores in computer studies.

Method

The design adopted for the study is correlation design. The study was carried out in Delta North Senatorial district of Delta State. The population of the study is 11,789 senior secondary school year two (SS2) computer studies students in Delta North Senatorial District. The sample size for the study is 600 SS2 computer studies students. The sample for the study was drawn using multi-stage procedure. The step in each of the stages is as follow: First random sampling was used to select five local government areas out of the four local government areas in Delta North Senatorial District. Secondly, random sampling was used to select five public secondary schools each from each of the local government areas giving a total of 20 schools. In each 20 secondary schools drawn for the study, 20 secondary school computer students were selected at random for the study yielding a total of 600 students.

The instrument for data collection was Test Anxiety Questionnaire (TAQ) adapted from Frances, Diana, Tobias, Sonja and William (2015). It was made up of 20 items designed to generate information on the thoughts and feelings students generally experienced in test and examination situations. TAQ has four domains focusing on worry, emotionality, interference and lack of confidence. The scale worry examines disruptive concerns about individual performance and the consequences of failure; emotionality deals on emotional and physical tension; interference will elicit information on distraction from the task by irrelevant thoughts; and lack of confidence measures low confidence to master academic challenges. TAQ has a four-point scale namely: never (1), almost never (2), almost always (3) and always (4). The major change in the TAI was that the numerical values of the scale were named as never, sometimes, always and almost always. Also, the incomplete statements in the instrument were restructured to convey a better meaning of what was being said. Computer studies teachers Diary is an inventory book to which the computer studies teachers in each school records their students' academic achievement in computer studies each term. Achievement scores for two most recent terms in computer studies were obtained from the teachers' diary in each school.

The instrument was validated by three experts from Nnamdi Azikiwe University, Awka. The reliability of

the instrument was established using Cronbach's Alpha. The instruments were administered to 40 computer studies students in two schools not involved in the study. The scores generated were collated and computed using Cronbach's Alpha to determine the reliability coefficient. The coefficient of internal consistency obtained for TAQ was 0.78. The instrument was administered with the aid of five research assistants. The research assistants were briefed on the purpose of the study and how to administer the instruments. Each research assistant with the assistance of the researcher covered all the selected schools in one local government area. They obtained the permission of the required authority and with the assistance of computer studies teachers in each school obtain the students' achievement scores in computer studies. Each students' serial number in the diary were written on the copy of the instrument that were given to the student. The instruments were collected the same day they were administered while checking to ensure that they are completely filled. The research assistants provided every guidance to the students need in the course of filling the instruments. Every instrument was scored and the scores collated and sent to the researcher along with the instruments for further analysis.

Data obtained for the study was analyzed using simple linear and multiple regressions. The Pearson correlation coefficients was used to answer the research questions while regressions was used to test the hypotheses. The interpretation of the correlation coefficient was according Nworgu (2015) who provided a three-way guide for interpreting correlation coefficient values when a large number of pairs of scores have been correlated. They are as follows: $r = \pm.30$ *and below*, low relationship; $r = \pm.30$ *to below* ± 0.80, moderate relationship and $r = \mp.80$ and above, high relationship. The null hypotheses was tested at 0.05 alpha level. The decision rule was to reject the null hypothesis whenever Pvalue is less than 0.05 or equal to 0.05 ($P \leq 0.05$), not reject null hypothesis whenever Pvalue is greater than 0.05 ($P > 0.05$).

Results

Research Question 1: To what extent does test anxiety predict secondary school students' academic achievement scores in computer studies?

Table 1: Extent of Prediction of Students' Achievement in Computer Studies by Test Anxiety

Model	R	R^2	Adjusted R^2	Unstandardized coefficients (b)	Std. Error	Decision
Constant	.080[a]	.006	.005	81.473	14.773	Low positive relationship
Test Anxiety				-.136		
a. Predictors: (Constant), Test Anxiety						

Table 1 shows a low positive relationship (R = 0.080) exists between students' test anxiety and their achievement in computer studies. The R-Square value of 0.006 indicates that 0.6% of the variance in computer studies scores is predicted by test anxiety.

Research Question 2: What are the contributions of the dimensions of test anxiety (worry, emotionality, interference and lack of confidence) in the prediction of secondary school students' achievement scores in computer studies?

Table 2: Contributions of the Dimensions of Test Anxiety in the Prediction of Achievement Scores in Computer Studies

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	77.098	4.251		18.137	.000
	Worry	-.416	.195	-.088	-2.135	.033
	Emotionality	-.463	.193	-.098	-2.400	.017
	Interference	-.393	.183	-.089	-2.151	.032
	Lack of Confidence	.692	.186	.158	3.723	.000
a. Dependent Variable: Achievement						

Table 2 shows the standardized beta coefficient which indicates correlation between variables. The unstandardized beta coefficient which shows the prediction powers of each dimension of test anxiety which indicates their relative contribution to achievement in computer studies. The table shows that worry has a low negative relationship (R = -0.088) with students' their achievement in computer studies, emotionality has a low negative relationship (R = -0.098) with achievement in computer studies, interference has a low negative relationship (R = -0.089) with achievement in computer studies, while lack of confidence has a low positive

relationship (R = 0.158) with achievement in computer studies. Table 2 also reveals that worry decreases achievement in computer studies by -0.416 whenever a students' worry increase by one unit. With a unit increase, emotionality decreases achievement in computer studies by -0.463, interference by -0.393, while lack of confidence contributes 0.692 which increases achievement in computer studies whenever there is a unit increases in lack of confidence. The order of relative contribution to achievement in computer studies from the highest to lowest by each dimension of test anxiety is; lack of confidence (0.692), followed by emotionality (-0.463), worry (-0.416), and then interference (-0.393).

Hypothesis 1: Test anxiety is not a significant predictor of secondary school students' academic achievement scores in computer studies.

Table 3: ANOVA on Significance of Prediction of Achievement in Computer Studies by Students' Test Anxiety

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	847.238	1	847.238	3.882	.049[b]
	Residual	130504.656	598	218.235		
	Total	131351.893	599			
a. Dependent Variable: Achievement						
b. Predictors: (Constant), Test Anxiety						

Table 3 shows that test anxiety is a significant predictor of achievement scores in computer studies F (1, 598) = 3.882, P (0.049) < 0.05. The null hypothesis is rejected meaning that test anxiety is a significant predictor of secondary school students' achievement scores in computer studies.

Since test anxiety is a significant predictor of achievement scores in computer studies, the regression model (Y= a + bX) for the prediction of achievement score in computer studies as derived from Table 1, where constant = 81.473 and b value = -0.0136 is:

CSA = 81.473 -0.0136(TA)

Where, CSA = Computer Studies Achievement and TA = Test Anxiety

Hypothesis 2: The contribution of the dimensions of test anxiety (worry, emotionality, interference and lack of confidence) in the prediction of secondary school students' achievement scores in computer studies is not significant.

Table 4: ANOVA on Significance of Prediction of Achievement in Computer studies by the Individual Dimensions of Test Anxiety

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4675.374	4	1168.843	5.490	.000[b]
	Residual	126676.520	595	212.902		
	Total	131351.893	599			
a. Dependent Variable: Achievement						
b. Predictors: (Constant), Lack of Confidence, Emotionality, Interference, Worry						

Table 4 shows that all the individual dimension of test anxiety, jointly, predicted the students' achievement scores in computer studies significantly F (1, 595) = 5.490, P (0.000) < 0.05. Also, data contained in Table 2 shows the significance of the contributions of the individual dimensions to the prediction of achievement scores in computer studies.

Table 2 shows that worry is a significant predictor of achievement scores in computer studies, t = -2.135, P (0.033) < 0.05, emotionality is a significant predictor of achievement scores in computer studies, t = -2.400, P (0.017) < 0.05, interference is a significant predictor of achievement scores in computer studies, t = -2.151, P (0.032) < 0.05, and lack of confidence is also a significant predictor of achievement scores in computer studies, t = 3.723, P (0.000) < 0.05. Thus, all the dimensions of test anxiety are significant contributors to the achievement of students in computer studies. Since the individual dimensions as well as their joint prediction of computer studies is significant, the regression model ($Y= a + bX_1 + cX_2 + dX_3 + eX_4$) for the prediction of achievement score in computer studies as can be derived from Table 2, where constant = 77.098 and b value = -0.416, c value = -0.463, d value = -0.393, e value = 0.692 is:

CSA = 77.098 – 0.416(WOY) – 0.463(EMY) – 0.393(INF) + 0.692(LOC)

Where, CSA = Computer studies Achievement and WOY= Worry, EMY = Emotionality, INF = Interference, LOC = Lack of Confidence.

Discussion

The findings of the study showed that test anxiety negatively predicted 0.6% academic achievement in computer studies, with all its dimensions significantly predicting academic achievement of computer studies students. The findings of the study can be attributed to the fact that test anxiety level of students reduces their enthusiasm for learning. If a student considers a test to be more frightening, the more would be the increase in anxiety level before the examinations or test. Students with test anxiety problems usually have inappropriate study styles and are short of test solving techniques. When the students do not also manage their time properly like completing their homework, class work, assignment and when they are not prepared for taking a test at an appropriate time, these leads to lack of self-confidence and anxiety. Some students are stressed by time limitation of a test, because they are not sure to complete the test within the time given. Thus, they begin to worry so much that the worry interferes with the little they know and they forget what they have studies. The resultant effect of this worry and interference is a negative impact on achievement.

In fact, students who struggle with test anxiety typically fall to a grade below their peers. In addition to academic impacts, text anxiety can affect a student's mental health, including lowered self-esteem, confidence, and motivation due to the negative emotionality they develop when test anxiety heightens. Students who suffer from test anxiety frequently experience distraction in examination and problems in preparing for examination. Several consequences of test anxiety include long period of the study as well as physical and psychological impairments. Students' perception about their knowledge and inability to enhance their learning has been included as the factors affecting student's achievement and their level of stress due to the high levels of test anxiety they may develop for a test they did not adequately prepare for.

The lack of confidence to pass a test, followed by emotionality and worry all culminate in cognitive interference, a phenomenon in which mental processing is made slower and less accurate by competing mental processes. Interference effects occur when two or more perceptual or cognitive processes are in conflict. Students' perception and cognition involve many different mental systems that parse and process information independently of one another. The outputs of these systems are communicated to working memory, where they are interpreted. When the outputs are congruent, the process of interpretation occurs quickly and performance is optimal. When outputs are incongruent, interference occurs and additional processing is needed to resolve the conflict. The additional time required to resolve such conflicts has a negative impact on academic achievement, explaining why test anxiety negatively affected academic achievement in computer studies.

The findings of the study are in line with the findings of Ogunmakin & Osakuade (2014) that computer knowledge and computer anxiety significantly combined to predict performance in computer based test. The findings of Chukwu (2014) that test anxiety negative affect students' achievement in line with the findings of the present study. The findings of the study support the findings of Olisaemeka and Solarin (2019) that a statistically significant negative relationship existed between test anxiety and academic performance. Again, Denwigwe and Jacks (2020) findings which revealed an inverse relationship (negative correlation) between the test anxiety of students and their performance in mathematics and a significant difference between the performance in mathematics of high-test anxiety students and low-test anxiety students support the findings of the present study. The findings of the study contradict the findings of Eman, Hind, Rufa, Nadiah and Brouj (2016) that a negative none statistically significant relationship between test anxiety scores and undergraduate nursing students Grade Point Average.

Conclusion

The study concluded that test anxiety is significant predictors of students' achievement in Computer studies. Again, the higher a students' test anxiety, the more likely, the students' achievement in computer science may reduce.

Recommendations

The following recommendations are made based on the findings of the study:

1. Secondary school teachers should ensure to cover the scheme of work at the appropriate time, to enable students study them in sequential order and in a way that will enable prepare for test. This should be done to reduce the study load that result in cognitive overload and test anxiety.
2. School counsellor should find effective strategies to manage students test anxiety especially during mid-term test and end of term assessments and examination.

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