Test Anxiety as Correlate of Chemistry Achievement among Secondary School Students in Imo State

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Abstract

This paper investigated test anxiety as correlate of secondary school students' achievement in chemistry in Imo State. Three research questions and three hypotheses guided the study. The study adopted a correlational survey design. The population of 16,302 comprised all senior secondary school class two Chemistry students in 295 public secondary schools in the six education zones in Imo State. Eight hundred and seventy-five (875) formed the sample size which were selected using multi-stage sampling procedure. The instrument used for data collection is Sokan Test Anxiety Scale (STAS). The Cronbach reliability coefficient for STAS is 0.78. To collect data for the research, the researcher first visited the schools and discussed with the principals to get permission to carry out the research. The instrument was administered on the students by the researcher with the help of five research assistants to facilitate easy administration of the instruments. The cumulative average scores of the student in their first, second and third terms were used as their academic achievement scores. The data collected from respondents were analysed using Pearson product moment correction coefficient and regression analysis via SPSS version 20. The results revealed that test anxiety related negatively and to students' chemistry achievement, although, the relationship was weak. This indicates that other factors are contributing more to students' achievement in chemistry other than their test anxiety. It was recommended among others that teachers should work on their students to do away with every form of anxiety during examinations.

Keywords: Chemistry, Achievement, Test Anxiety, Students, Anxiety

Introduction

Chemistry is a branch of science that finds applications at home and industry. According to Akpan (2016), chemistry is the study of matter and the changes that matter undergoes. It is a branch of science which deals with the study of the nature, composition and properties of matter and the changes matter will undergo under different conditions. Chemistry is an experimental science whose study involves exploration of relationship between theory and

experiment (Otor, 2013). The study of chemistry as a subject at the secondary school level helps students in developing basic science skills, knowledge and attitude-based competences required for problem solving in their environment. Therefore, a poor foundation in chemistry at the secondary school level may jeopardize future achievement in the subject. One of the major variables that measure an individual's success or failure in chemistry is academic achievement. Academic achievement is often cognitive based and measured by examination or continuous assessment.

The factors that affect academic achievement in chemistry have been identified by scholars. According to Usman and Memeh (2012), the factors that negatively affect chemistry achievement include students' background, their self-efficacy, lack of interest and negative attitude towards chemistry. Teacher related factors like poor teacher preparation, inadequate teacher qualification, inadequate instructional materials and adoption of poor teaching methods also play a role. In Nigeria, efforts are being made by researchers, government and non-governmental organizations to improve cognitive outcomes among chemistry students. Some of these efforts includes organization of conferences, seminars and workshops for both students and teachers, organization of quizzes for students as a motivational approach to learning, equipping the laboratory with modern laboratory equipment's and facilities among others.

As available evidence indicates, achievement in chemistry at the secondary school level remains low and unimpressive (Sarason, 2014). Factors that influence students' chemistry achievement at the senior secondary school are multivariate. The factors that have been identified to be responsible for low achievement in chemistry include; teachers' qualification, quality of instruction and attitude, social psychological factors and social environmental factors (Udoh, 2008). Among the factors affecting student's achievement in general, less attention has been paid to student's test anxiety (Busari, 2010). That is the factor under focus in this study

because much attention has already been paid on ameliorating the effects of such factors related to teaching method, materials, environmental and other teacher-related factors yet students' achievement in chemistry has remained low. The present research is poised to divert attention to a social psychology based factor as test anxiety and see how it relate to students achievements in chemistry.

Test anxiety is an important variable often related to academic achievement (Spielberger & Vagg, 2015) Anxiety is an unpleasant emotion experienced as dread, scare, alarm, fright, trepidation, horror or panic (Nadeem, Maqbool & Zaidi, 2012). Test anxiety implies the debilitating experiences of anxiety as described by Lewis, during the preparation for a test or during the test itself. Minimal amount of anxiety can mobilize human beings to respond rapidly and efficiently, but excessive amount of anxiety may foster poor response and sometimes inhibit response. Test anxiety makes it hard for students to concentrate on test and perform adequately. In chemistry, students are tested for both knowledge levels, skill acquisitions and attitudes. Test anxiety can adversely affect a chemistry student carrying out practical exercises, his or her attitudes specific to the materials, his or her peer groups and even the ability to record observations promptly and correctly. Hence, this study is suspecting that test anxiety may be a contributing factor to poor achievement in chemistry. Most studies done in Nigeria in this area concentrated on the relationship existing between self-efficacy and one or two variables (Adeyemo & Torubeli, 2008; Onyeizugbo, 2010). Such variables include self-concept, peer influence, attribution and so on. They failed to show the contribution of test anxiety. Most times the fear or anxiety of male and female students during examination or test differs. The present researcher is also suspecting that test anxiety may be gender sensitive in affecting academic achievements generally and in chemistry in particular. This is because social behaviours of male and female students may affect their test anxiety differently.

Consequently the researcher believes that such in-depth may reveal hitherto uncharted course in understanding academic achievements among chemistry students.

Statement of the Problem

The study of Chemistry as a subject at the secondary school level helps students in developing basic science skills, knowledge and competence required for problem solving in their environment. It is observed that secondary school students in Nigeria perform very poorly in Chemistry yearly. The dismal achievement of students in Chemistry over the years is a cause of serious concern. WAEC Chief Examiner's Report (2012-2017) showed consistent poor academic achievement of students in Chemistry over a period of six years. Efforts have been made by educational researchers to improve students' academic achievement especially in chemistry but adequate attention has not been paid to an affective component of learners such as test anxiety. The problem of this study, therefore, is the perennial poor academic achievement of secondary school students in chemistry despite robust efforts of teachers and researchers for an improvement. This could be due to the fact that the impact of an affective component of learners such as test anxiety on their academic achievement in the subject have not been examined. Therefore, this study on test anxiety as correlate of chemistry achievement among secondary school students in Imo State is considered imperative. The findings of this study will be of immense benefits to secondary school Chemistry students, Chemistry teachers, parents, administrators, government and future researchers. However, only senior secondary class II students in public secondary schools were involved in the study. Respondent variable is delimited to gender.

Research Questions

The following research questions guided the study:

1. To what extent does test anxiety of secondary school students relate with their chemistry achievement scores?
2. What is the relationship between test anxiety of secondary school male students and their chemistry achievement scores?
3. What is the relationship between test anxiety secondary school female students and their chemistry achievement scores?

Research Hypotheses

1. Test anxiety scores of secondary school students do not significantly correlate their chemistry achievement scores in Imo state.
2. Test anxiety scores of secondary school male students do not significantly predict their chemistry achievement scores in Imo state.
3. Test anxiety scores of secondary school female students do not significantly predict their chemistry achievement scores in Imo state.

Method

The study adopted a correlational survey design. The population of this study comprised all 16,302 senior secondary class two (SS2) Chemistry students in 295 public secondary schools in all the six education zones in Imo State. The sample size for this study is 875. The sample was drawn from the population of 16,302 SS2 Chemistry students in the selected schools in the education zones. The researcher adopted a multi-stage sampling to draw the education zones and the schools that were used for this study. The Sokan Test Anxiety Scale (STAS) was adapted to measure the test anxiety level of the students. This was done in terms of language modification. The STAS is a 25-item instrument measuring test anxiety expressed with statements concerned with ones feelings toward test of examination. A high index of score suggests anxiety disorder while a low index suggests the reverse. The Cronbach reliability

coefficient for STAS yielded 0.78. To collect data for the research, the researcher first visited the schools and discussed with the principals to get permission to carry out the research. The instrument was administered on the students by the researcher with the help of five research assistants to facilitate easy administration of the instruments. The cumulative average scores of the student in their first, second and third terms were used as their academic achievement scores. The data collected from respondents were statistically analysed using mean, standard deviation, and Pearson product moment correction coefficient and regression analysis were used in determining the significant relationship between the variables with the aid of SPSS version 20.

Results

Research Question 1.

To what extent does test anxiety of secondary school students relate with their chemistry achievement scores?

Table 1: Relationship Value for Test Anxiety and Chemistry Achievement

Variables	N	R	R^2	(%) Contribution
Test Anxiety	869	.034	.0012	0.12
Chemistry Achievement	869			

Table 1 shows that academic test anxiety had positive linear relationships with chemistry achievement given by R = .034. From the analysis, test anxiety contributed just 0.12% of variance in chemistry achievement (R^2 = .0012). The implication of this is that the more anxious the students are about chemistry test, the less they achieve poorly.

Research Question 2

What is the relationship between test anxiety of secondary school male students and their chemistry achievement scores?

Table 2: Relationship Value for Test Anxiety and Chemistry Achievement of Male Students

Variables	N	R	R^2	(%) Contribution
Test Anxiety	418	.024	.000057	0.0057
Chemistry Achievement	418			

Table 2 shows that academic test anxiety had positive linear relationships with male students' chemistry achievement given by R = .024. From the analysis, test anxiety contributed just 0.06% of variance in their chemistry achievement (R^2 = .000057). The implication of this is that the more anxious the male students are about chemistry test, the less they achieve poorly.

Research Question 3

What is the relationship between test anxiety secondary school female students and their chemistry achievement scores?

Table 3: Relationship Value for Test Anxiety and Chemistry Achievement of Female Students

Variables	N	R	R^2	(%) Contribution
Test Anxiety	451	.051	.0026	0.26
Chemistry Achievement	451			

Table 3 shows that academic test anxiety had positive linear relationships with female students' chemistry achievement given by R = .051. From the analysis, test anxiety contributed just 0.26% of variance in their chemistry achievement (R^2 = .0026). The implication of this is that the more anxious the female students are about chemistry test, the less they achieve poorly.

Research Hypotheses

H_{01}: Test anxiety scores of secondary school students do not significantly correlate their chemistry achievement scores in Imo state.

Table 4: Significant Correlation of Test Anxiety on Chemistry Achievement

Variables	N	R	T	Sig.	Remark
Test Anxiety	869	.034	.804	.422	Not Significant
Chemistry Achievement	869				

From the result of the regression analysis as shown in Table 4, the statement of hypothesis 1 is accepted; showing that test anxiety scores of secondary school students do not significantly correlate their chemistry achievement scores. This is because the p-value (Sig. = .422) is greater than the 0.05 level of significance.

H_{02}: Test anxiety scores of secondary school male students do not significantly correlate their chemistry achievement scores in Imo state.

Table 5: Significant Correlation of Test Anxiety on Male Students' Chemistry Achievement

Variables	N	R	T	Sig.	Remark
Test Anxiety	418	.024	.379	.705	Not Significant
Chemistry Achievement	418				

From the result of the regression analysis as shown in Table 5, the statement of null hypothesis 6 is accepted; showing that test anxiety scores of secondary school male students do not significantly correlate their chemistry achievement scores. This is because the p-value (Sig. = .705) is greater than the 0.05 level of significance.

H_{03}: Test anxiety scores of secondary school female students do not significantly correlate their chemistry achievement scores in Imo state.

Table 6: Significant Correlation of Test Anxiety on Female Students' Chemistry Achievement

Variables	N	R	t	Sig.	Remark
Test Anxiety	451	.051	.866	.387	Not Significant
Chemistry Achievement	451				

From the result of the regression analysis as shown in Table 6, the statement of null hypothesis 9 is accepted; showing that test anxiety scores of secondary school female students

do not significantly correlate their chemistry achievement scores. This is because the p-value (Sig. = .387) is greater than the 0.05 level of significance.

Discussion

The findings revealed a weak negative relationship between test anxiety scores of secondary school students and their chemistry achievement scores. This shows that an increase in test anxiety would lead to small decrease in students' chemistry achievement. From the result of the correlation analysis, there is no significant relationship between test anxiety scores of secondary school students and their chemistry achievement scores irrespective of gender. This is not surprising because anxiety is a highly unpleasant affective state similar to intense fear which can include feelings of threat, vague objectless fear, a state of uneasiness and tension, and a generalized feeling of apprehension. Individuals experiencing anxiety embody apprehension and avoidant behaviour that often interfere with performance in everyday life as well as in academic situations. Individuals that become highly anxious during tests typically perform more poorly on tests than low-test anxious persons, especially when tests are given under stressful evaluative conditions such as a post-secondary exam.

This result collaborated the result of Nadeem, M., Ali, A., Maqbool, S., & Zaidi, S.U. (2012) who carried out a study on the relationship between test anxiety and academic performance in secondary schools in Nyeri district, Kenya. The results showed that there was no significant relationship between test anxiety and academic performance. Their results indicated that there was a statistically significant difference between the levels of anxiety aroused by different subjects. They further found out that both boys and girls are equally affected by test anxiety. Onyeizugbo (2014) found out that, there was a correlation between anxiety levels and academic achievement, and that high anxiety levels had a negative impact on the quality of academic results recorded by students. The study also established that

students' encountered some high anxiety causing challenges which affect their ability to perform effectively, and girls were found to be more prone to high anxiety levels as compared to boys. The study recommended that, students should take responsibility to seek for anxiety management help from teacher counsellors, other teachers. Muola, J.M., Kithuka, M.R., Ndirangu, W.G., & Nassiuma, D.K. (2009) investigated the relationship between test anxiety and academic achievement. It was found that a significant negative relationship exists between test anxiety scores and students' achievement scores. Results showed that a cognitive factor (worry) contributes more in test anxiety than affective factors (emotional). Therefore, test anxiety is one of the factors responsible for students' low performance but it can be managed by appropriate training of students in dealing with the causative factors.

Conclusion

Based on the findings of the study, it was concluded that more than half of the students are anxious about chemistry achievement test. Secondary school students in the study area had an average achievement score in chemistry. The results of this study presented evidence of the existence of a relationship between test anxiety and chemistry achievement. It was found that test anxiety positively and insignificantly correlated chemistry achievement. Test anxiety however had weak correlation value meaning that to some extent test anxiety correlated chemistry achievement irrespective of gender. However, other factors are contributing more to students' achievement in chemistry other than their test anxiety.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. There should be continuous public enlightenment campaign on the importance of text anxiety. This enlightenment campaign should be carried out at the national, state and local government levels by the ministry of education.

2. Chemistry teachers should be sponsored on seminar and conferences associated with psychological constructs such as test anxiety by the government so as to encourage the students to maintain low level of anxiety.

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