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LEARNERS' TEST ANXIETY, TEST WISENESS AND MATHEMATICS ACHIEVEMENT IN SECONDARY SCHOOLS IN JOS NORTH LOCAL GOVERNMENT AREA, PLATEAU STATE

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Abstract

The study examined the relationship between learners' test anxiety, testwiseness and achievement in mathematics. It was prompted by the need to investigate if testwiseness can reduce students' test anxiety which may adversely affect their performance in mathematics. A correlation design was adopted for the study. Three research questions and three hypotheses were formulated to guide the study. The population for the study was made up of all the7551 SS2 students in all the 107 Senior Secondary Schools in Jos North Local Government Area, Plateau State. A total of 475 SS2 students selected from 11 schools sampled out of 107 made up the sample for the study. Proportional stratified sampling technique using a sampling fraction of 1/10 was employed in sampling two public schools out of 21 and 9 private out of 86, all SS2 students in the sampled schools were involved in the study. Data were collected using documents (records of students' mathematics achievement scores) and test anxiety/ testwiseness questionnaire. The content validity of the questionnaire was judged to be adequate by two Measurement Experts. The Cronbach-alpha internal consistency reliability coefficients of the test anxiety and testwiseness sub-scales of the questionnaire were 0.80 and 0.81 respectively while the construct validities of the test anxiety and testwiseness sub-scales of the questionnaire using correlation method were 0.81 and 0.87 respectively. Pearson correlation coefficients were used to answer the research questions and test the hypotheses. The findings show a low, negative but significant correlation

between test anxiety and mathematics achievement. Again a low, positive but significant correlation was found between testwiseness and mathematics achievement while a low, negative and significant correlation was found to exist between test anxiety and testwiseness. Based on the findings, it was concluded that reducing students test anxiety level can be achieved by raising their testwiseness status which might in turn raise their achievement in mathematics. It was therefore recommended that students need to be trained in test-taking skills which will help bring down their test anxiety to some extent.

Key words: Test anxiety, Test wiseness, Mathematics Achievement.

Introduction

The learning environment does not only have physical and social components, it also has psychological aspects. If the Psychology of the learner is affected, learning might also be affected. When for example a learner is not motivated or is distracted, confused, uninterested or very anxious, learning might be affected. At the end of a period of teaching, it is usually required that teachers administer tests to ascertain students' level of mastery of learning objectives in order to make other decisions about them. When such decisions are high stake, many students experience high level of anxiety which makes them feel insecure during the testing period as a result of which their performance in the test may be affected negatively. For a core subject like mathematics which is taught at the basic and senior secondary school levels in Nigeria, a pass in the subject is necessary for admission into tertiary institutions for many courses especially in the science and social sciences. The utility of mathematics in everyday life, commerce and industry, technology and other areas of human endeavour makes the subject compulsory at the primary and the secondary school levels. Given such importance attached to mathematics, many students dread the subject and suffer high level of anxiety when writing mathematics tests. Some Scholars have suggested that students who possess testwiseness (any skill that allows a testee to choose the correct answer on an item without knowing the correct answer) may utilize them at such times to enhance their performance in the test(Harris & Coy, 2003; Abdelwahab, 2007). Common observation in Nigeria is that students perform poorly in mathematics. In looking for ways to improve students' performance in mathematics in secondary schools, there is need therefore to look for solution to the problem of the learner's test anxiety. Harris and Coy (2003) had suggested that improving students' test-taking skills will help reduce their test anxiety. For this to be true, the variables must be related in one way or the other. Abdelwahab (2007) as well as Jacob (as cited in Testwiseness, n.d) also posit that test anxiety correlates highly with testwiseness, but Millman in the same text found no relationship between the two variables. Given these different opinions expressed by scholars. it is necessary to carry out an empirical study to verify these claims. This study therefore investigated how students' test anxiety is related to their testwiseness and achievement in

mathematics in the study area. For a better understanding of issues raised in the study, brief explanations of concepts of test anxiety and testwiseness are here presented.

Anxiety is a basic human emotion which is psychological in nature. It is a condition in which people feel uneasy, apprehensive or fearful about events they cannot predict or control or events they perceive to be threatening to their self-esteem (Harris & Coy 2003; Ahmad, 2004). Although moderate level of anxiety is necessary in avoiding dangerous situations, enabling people prepare for upcoming events and staying focused on a given task, high levels of anxiety produce negative results.

In a learning environment, testing is one of the things that make students to be anxious. If a student who is to take an important test experiences high level of anxiety, it is referred to as test anxiety. There are various factors that can cause test anxiety. It could arise due to the fact that he/she cannot predict the test questions, or is not sure of making good grade in the test. The fear of consequences of failure in the test such as parental disappointment, peer group rejection and mockery may cause the testee to experience test anxiety. Other causes of test anxiety can be previous bad experience of the testee in a similar test, as well as lack of adequate preparation for the test. The emphasis laid on testing by the society also helps to create anxiety for testees. Testing situations therefore put much stress on students. Cherry (2015) explained that the stressful situations cause the body to release adrenaline in preparation to deal with what is about to happen, either to stay and deal with the stress or escape the situation entirely. Some students may even drop out of school in order to avoid the source of fear. Negative consequences of test anxiety include psychological distress and insecurity (Harris & Coy, 2003). Test anxiety is also said to affect academic performance negatively (Abdelwahab, 2007; Cherry, 2013; Harris & Coy, 2003). However, Birjandi and Alemi (2010) found no significant relationship between test anxiety and engineering students performance in general English.

Test anxiety, is made up of three components: cognitive, affective and behavioural. Students who experience test anxiety from the cognitive perspective are said to worry a lot, lack self-confidence, doubt their academic ability and competence and overemphasise the negative consequence of failure in an examination. From the affective perspective, test anxiety causes students to experience increased heartbeat, nausea, dry mouth, frequent urination, cold hands and increased perspiration. Their inability to control their emotions then makes it difficult for them to concentrate. Behaviourally, test anxiety causes students to procrastinate and have ineffective study habits and test-taking skills as they experience difficulty in interpreting and organizing information into patterns of meaning (Harris & Coy, 2003). Test anxiety also causes "blanking out" of answers to a test even though the testee had studied hard (Cherry, 2015). In helping test anxious students, Harris and Coy recommend among other things that students be taught

test-taking skills(testwiseness).

What testwise students do is that they look out for mistakes in test construction, make guesses based on teacher tendencies and search for any unintentional clues that can be found in a test (The University of Kansas, n.d). A testwise testee is expected to obtain higher scores on a test (aptitude, achievement or teacher-made) than an equally competent one who lacks the skill. It is believed that a testwise testee could do well on a test even though his/her level of preparation is not adequate (Testwiseness,n.d; Abdewahab, 2007). This suggests that testwiseness correlates positively with achievement. This view is supported by Mustapha (2013) who found testwiseness to correlate positively with achievement in mathematics. Testwiseness status of students can be changed through specific test experience and training to know what to do before, during and after a test/examination (Woodley as cited in Testwiseness, n.d; Ugodulunwa, 2008).

In the taxonomy of testwiseness, two divisions exist: the principles of testwiseness which are independent of the test constructor or test purpose and the ones that contain elements that and dependent on the test constructor or test purpose. The first division has four subdivisions: time use, error avoidance, guessing and deductive reasoning strategies. For reasoning strategy to be effectively used, at least a partial knowledge of subject matter is needed (Testwiseness, n.d). In the second, the testee benefits from the knowledge of test maker's idiosyncrasies or past testing experience on a test with similar purpose. The strategies that belong to this division are intent consideration and cue-using strategies. According to the University of Kansas (n.d) such clues include; predictable answer options, inconsistent wording of the stem and options, use of options that are easily ruled out, use of "odd man out", use of elimination of answer options obviously unrelated to the stem and so on. Multiple choice questions are said to be the most susceptible to the use of cue to guess correct answers and the fewer the options, the easier the elimination process. But can the use of these strategies during testing help reduce students' test anxiety in order to enhance their achievement in mathematics?

Research Questions

The following research questions were formulated to guide the study:

1. To what extent is there a relationship between students' test anxiety and their achievement in mathematics?
2. To what extent is there a relationship between students' testwiseness and their achievement in mathematics?
3. What is the relationship between test anxiety and testwiseness?

Hypotheses

1. There is no significant relationship between test anxiety and students' achievement in mathematics.
2. There is no significant relationship between testwiseness and students' achievement in mathematics.
3. There is no significant relationship between test anxiety and testwiseness.

Method

The study utilized correlation research design since it is aimed at determining relationship between variables through the use of correlation coefficients. Here data are collected from the same sample on two or more variables and correlation coefficients computed (Awotunde & Ugodulunwa, 2004). The population of the study was made up of all the 7551 SS2 students in all the 107 Secondary Schools in Jos North Local Government Area of Plateau State. The Sample for the study was made up of 475 students from 11 Secondary Schools selected through proportional stratified sampling technique using sampling fraction of 1/10. Two schools were selected from a total of 21 public schools and nine schools from 86 private schools giving 11 schools in all. All the SS2 students in each sampled school were involved in the study. Two instruments were used for data collection: document (School records of students' scores in mathematics in the previous term), 4-point test anxiety/ testwiseness questionnaire. The test anxiety/testwiseness questionnaire was made up of Section A- which elicits name of school and students identification number and Section B- which contains 15 items on test anxiety and 15 on testwiseness. The students were required to rate themselves on a 4-point scale of "strongly agreed". "agreed", "disagreed" and "strongly disagreed" against each item, having weights of 4,3,2 and 1 respectively. The test anxiety/ testwiseness questionnaire which was designed by the researchers was subjected to the judgement of two test and measurement experts in the University of Jos who judged the content validity to be adequate. The internal consistency reliability coefficients of the two sub-scales of the questionnaire using Cronbach-alpha method gave 0.80 for test anxiety and 0.81 for testwiseness respectively. The construct validity of the instrument using correlation method with already existing measures gave coefficients of 0.81 for the test anxiety and 0.87 for the testwiseness sub-scales.

The researchers sought permission from the authorities of the selected schools to carry out the survey. Names of SS2 students were collected and identification numbers assigned to them. Dates for mathematics examinations were noted for each school. On the examination date, the instruments were administered about 30 minutes to the examinations in each school. Students were requested to indicate their identification numbers on their mathematics answer scripts and on the questionnaire. Later, the researchers visited the schools to collect scores of the individual students in the mathematics examinations. The scores on the test anxiety and testwiseness sub-scales were correlated with students' mathematics scores respectively following Pearson Product-moment correlation method.

Results

The results are presented using summary tables after the analyses.

Table 1: Summary of Pearson Product-Moment correlation Between Test Anxiety Scores and Mathematics Achievement Scores

Variable	Test Anxiety Score	Mathematics Score
Test Anxiety Score		
Pearson Correlation	1	-0.370
Significant (2-tailed)		000
N	475	475
Mathematics Score		
Pearson Correlation	-0.370	1
Significant (2-tailed)	000	
N	475	475

Correlation is significant $p<0.05$

Table 1 showed a negative, low correlation (-0.370) between test anxiety and achievement in mathematics. However, the correlation is significant, so the null hypothesis is rejected. A weak, negative but significant relationship therefore exists between test anxiety and mathematics achievement.

Table 2: Summary of Pearson Correlation Between Testwiseness Scores and Mathematics Achievement Scores

Variable	Testwiseness Scores	Mathematics Scores
Testwiseness Scores		
Pearson Correlation	1	0.113
Significant (2-tailed)		0.014
N	475	475
Mathematics Score		
Pearson Correlation	0.113	1
Significant (2-tailed)	0.014	
N	475	475

Correlation is significant $p<0.05$

Table 2 showed a very low, positive but significant correlation between testwiseness and maths achievement. The null hypothesis stated was rejected. This means a positive, significant but weak relationship exists between testwiseness and achievement in mathematics.

Table 3: Summary of Pearson Product-Moment Correlation between Mathematics Test Anxiety and Testwiseness

Variable	Test Anxiety	Testwiseness
Test Anxiety Score		
Pearson Correlation	1	-0.138
Significant (2-tailed)		0.003
N	475	475
Testwiseness score		
Pearson Correlation	-0.138	1
Significant (2-tailed)	0.003	
N	475	475

Correlation is Significant $p<0.05$

Table 3 showed a very low, negative but significant correlation between test anxiety and testwiseness. The result shows there is a negative, significant but weak relationship between test anxiety and testwiseness. The null hypothesis stated was also rejected.

Discussion

The findings of the study showed that a negative, weak, but significant relationship existed between test anxiety and achievement in mathematics which means that achievement in mathematics increases as test anxiety decreases. This confirmed the positions of Abdelwahab (2007), Harris and Coy (2003) and Cherry (2015) that test anxiety affects academic achievement negatively. This is expected since according to Cherry (2015) test anxious testees can suffer blanking out of answers even after studying adequately for a test. This implies that efforts made towards reducing students' test anxiety will likely lead to improvement in their achievement in mathematics since the two are related significantly. However, the degree of the relationship shows that test anxiety may not be the only contributor to students' low achievement in mathematics that should be addressed. A good knowledge of subject matter is required as well as other factors.

The findings also showed that a very weak positive, but significant relationship exists between testwiseness and achievement in mathematics. The finding is in conformity with that of Mustapha (2013) and Abdelwahab (2007) who posit that positive correlation exists between testwiseness and students' mathematics and academic achievements respectively. The reason for the significant relationship is not far-fetched as testwise students can use their skills to earn high scores even in the face of ill-preparation for examinations. However, the positive relationship is very weak. This might suggest that some of the strategies like cues strategy may not be readily used in mathematics as stems most times do not easily give away answers as it can do in some other subjects. A good knowledge of subject matter or at least partial knowledge is also needed in order to

employ reasoning strategy in guessing correct answers (Testwiseness. n.d).

A very weak, negative but significant relationship existed between test anxiety and testwiseness in the study, thus confirming the position of Jacob (as cited in Testwiseness, n.d) and Abdelwahab (2007) but the Correlation is not as strong as Jacob expressed. This implies however, that the position of Harris and Coy (2015) that training of students in test-taking skills will reduce test anxiety is a possibility since the two variables are significantly related, however, other strategies like good teaching and learning of subject curriculum, adequate preparation for examinations/tests and other strategies that will boost the testees' confidence in themselves are needed in addition to test taking skills.

Conclusion

From the findings of the study, it can be seen that a significant relationship existed between test anxiety and mathematics achievement which means that the students' performance in mathematics can be affected by their test anxiety. Again, testwiseness contributed a bit to students' achievement in mathematics going by the very weak but significant relationship existing between them. Also, given that the relationship between testwiseness and test anxiety is significant, the two variables can affect each other to some extent. Going by the significance of the relationships, it was concluded that raising the testwiseness status of the students might contribute towards reducing their test anxiety level which in turn might contribute towards raising the students' achievement in mathematics.

Recommendations

- It was recommended that in addition to other strategies adopted for raising students' achievement in mathematics, students' testwiseness status equally needs to be raised to help reduce their test anxiety to some extent.
- It was also recommended that mathematics teachers should work hard towards teaching and examining the subject in such a way that achieving highly in the examinations does not make the students very anxious.

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