



Test Anxiety and Negative Self-Concept as predictors of Senior Secondary School Students' Learned Helplessness in Mathematics in Makurdi Metropolis, Benue State

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Abstract

The issue of poor academic achievement in mathematics has become a long-standing concern among researchers. This trend of low academic achievement in mathematics is worrisome because it can lead to learning helplessness. In view of this, the study investigated Test Anxiety and Negative Self-Concept as predictors of Senior Secondary School Students' Learned Helplessness in Mathematics in Makurdi Metropolis, Benue State. A correlational survey design was used, with 256 SSII students participating. Data was collected using the Mathematics Learned Helplessness Scale, Students' Test Anxiety Scale, and Students' Negative Self-Concept Questionnaire. Results showed that the predictive power of test anxiety and negative self-concept on students' learned helplessness in mathematics were statistically significant. Based on the findings, students should deviate from too much emphasis on grade, fear of failure, and negative perceptions of mathematics that may lead to test anxiety and negative self-concept.

Keywords: Academic Achievement; Learned Helplessness; Test Anxiety; Negative Self-Concept.

Introduction

The issue of poor academic achievement in mathematics among senior secondary school students is a long-standing concern among researchers. According to literature, students' achievement in mathematics, both at internal and external examinations, has continued to deteriorate year after year (Galadima & Okogbemon, 2012; Iji, Emiakwu & Utubaku, 2015; Amadi, Adedapo & Sunday, 2021). Andor (2021) highlighted a statistic of the West African Examinations Council's (WAEC) SSCE result from 2015 to 2020, in which the average number of candidates who enrolled for the examinations and scored below credit pass in mathematics was 65.82% in 2015, 61.32% in 2016, 40.78% in 2017, 50.02% in 2018, 35.38% in 2019, and 34.76% in 2020. This demonstrates an unsatisfactory and inconsistent state of academic achievement in mathematics. Again, this pattern of poor academic achievement in mathematics appears to be causing students learning mathematics to feel helpless before to, during, and even after mathematics tests (Peixoto, Sanches, Mata, & Monteiro, 2017). Students' worry about recording poor achievement and a lack of improvement from previous attempts has rendered many of them helpless in learning mathematics.

Learned helplessness is an evolving concept in education literature. Psychologists Steven Maier and Martin Seligman made the initial observations and research on this phenomenon in the late 1960s. According to Maier and Seligman (2016), learned helplessness is an intuitive concept that comprises the conviction that one's efforts are ineffective and that nothing one does will matter. Yunusa (2020) defines it as the act of an individual or organism quitting up or ceasing to try a task that they are unable to complete even after multiple efforts. Learned helplessness in mathematics can therefore be seen as a situation where students give up or stop solving mathematics tasks as a result of repeated failure. After experiencing repeated failures, the student comes to believe that failure in mathematics is inevitable, no matter how hard they work on the task.

Learned helplessness in mathematics poses a threat to mathematics education, especially at the secondary school tier of education. Maier and Seligman (2016) claim that certain students act in a way during mathematics classes that suggests they don't think they have any control over how much they learn. Because of their reserved enthusiasm for mathematics, these students frequently complain that mathematics



tasks are too difficult or impossible to complete, even before attempting to solve them. In Makurdi Metropolis, the researcher observed that Students in Makurdi Metropolis often find mathematics tasks difficult or impossible, leading to absenteeism from classes. This prevents them from participating in class activities and struggle to achieve high grades in mathematics.

As a result, there is an increasing recognition of the dangers posed by learned helplessness in mathematics. This has sparked research on possible factors that are responsible for this degrading phenomenon. Gurefe and Bakalum (2018) identified mathematical anxiety as a factor related to learned helplessness. According to Amadi, Agi, and Nwoke (2020), anxiety, self-efficacy, and locus factors are responsible for learning helplessness in mathematics. While anxiety and self-efficacy may appear to be responsible for learned helplessness in mathematics, some students may perceive mathematics as inherently difficult or abstract, which can create a mental barrier to learning and lead to the belief that success is unattainable. Again, when students' place emphasis on grades rather than understanding concepts, they may become more focused on avoiding failure than learning, which can contribute to their helplessness. Going by these assertions, it is imperative to investigate test anxiety and negative self-concept as predictors of students' learned helplessness in mathematics.

Test anxiety is tied to the dread of not performing well. Test anxiety arises when a person feels nervous or uneasy before, or after an exam (Mohamadiah, Alishahib, & Soleimanic, 2014). According to Doherty and Wenderoth (2017), test anxiety is a psychological disorder that causes significant distress and anxiety in those who are taking tests. In this study, students who experience significant agitation and distress under testing settings are said to be suffering from test anxiety. There is a wide range in test anxiety symptoms. Test anxiety symptoms might manifest as behavioural, emotional, cognitive, or physical (Kendra, 2021). Some of these symptoms include sweating, shaking, rapid heartbeat, avoidance behavior, negative self-talk, memory lapses, anger, and low self-esteem, among others.

Test anxiety may lead students to perceive mathematics tests as threatening situations. Such students may possibly perform poorly in the subject. Empirical literature also abounds in this regard (Reyes & Castillo, 2015; Sung, Chao, & Tseng, 2016; Balogun, Balogun, & Onyencho, 2017). In a meta-analysis, Von

der Embse, Jester, Roy, and Post (2018) showed that test anxiety was significantly and negatively correlated with a wide variety of educational performance outcomes, including standardized tests, university admission examinations, and grade point average. This demonstrates that test anxiety negatively impacts academic outcomes, but its relationship with learned helplessness in mathematics is not well understood, highlighting the need for further investigation.

Another factor that may determine students' learned helplessness in mathematics that this study is concerned with is negative self-concept. Self-concept is defined as a structured, consistent set of views and beliefs about oneself (Mandigo, 2021). Therefore, negative self-concept refers to a person's entire perception and judgment of oneself in a negative way. Individuals have a mistaken or unpleasant impression of themselves. According to Oberle (2018), having a negative self-concept can lead to feelings of inadequacy, self-doubt, and challenges in relationships and reaching personal fulfillment. Students with negative self-concept are more likely to engage in self-critical thinking, exaggerating perceived defects while ignoring positive accomplishments, causing low motivation, concentration difficulties, and lack of confidence in academics.

Drawing from the foregoing, negative self-concept may negatively impact the academic outcomes of students. Empirical literature revealed that self-concept influences academic outcomes when it is positive (Susperreguy, Davis-Kean, Duckworth & Chen, 2018; Hansen & Henderson, 2019) and impedes students' learning when negative or low (Hansen & Henderson, 2019; Möller, Zitzmann, Helm, Machts & Wolff, 2020). Concerning the relationship between self-concept and learned helplessness, a study in Jordan by Almasri (2019) revealed no statistically significant differences in students' deficit due to negative self-concept. A similar study in Korea by Cho (2020) found that learned helplessness had a negative association with educational expectations and academic self-concept. Empirical evidence on the predictive power of test anxiety and negative self-concept on students' learned helplessness in mathematics is grossly lacking. The few studies found in this area were done outside of Nigeria and did not focus on students with learned helplessness in mathematics. As a result, more research is needed, particularly to determine the predictive power of test anxiety and negative self-concept on students' learned helplessness in mathematics. This underscores the need for the present study.



Research Questions

The following research questions guided the study

1. What is the predictive power of test anxiety on students' learned helplessness in mathematics in Makurdi Metropolis?
2. What is the predictive power of negative self-concept on students' learned helplessness in mathematics in Makurdi Metropolis?

Hypotheses

H₀₁: The predictive power of test anxiety on students' learned helplessness in mathematics in Makurdi Metropolis is not statistically significant.

H₀₂: The predictive power of negative self-concept on students' learned helplessness in mathematics in Makurdi Metropolis is not statistically significant.

Materials and Methods

The study adopted a correlational survey design. Ezeh (2015) described correlational survey design as a systematic study in which the researcher aims to determine the relationship between variables. The design was deemed appropriate for the current study because the researcher wanted to know the size of the relationship between test anxiety, negative self-concept, and students' learned helplessness in mathematics.

Participants

8670 SSII students from Makurdi Metropolis' 62 public secondary schools made up the study's population. For this investigation, ten public secondary schools in Makurdi Metropolis were chosen at random using a simple random sampling technique. Prior to data collection, a pilot study was carried out to identify SSII students with learned helplessness in mathematics in the sampled schools using the Mathematics Learned Helplessness Scale (MLHS). A student who scored above average on the MLHS was considered to be suffering from learned helplessness in mathematics, and vice versa. This is because all 20 items of MLHS are positively skewed towards learned helplessness in mathematics and are modeled on a 4-point rating scale (Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1). Hence, a score of 40 on the MLHS represents the average. 256 students who had been identified as having learned helplessness in

mathematics were then chosen as the study's sample using the convenient sampling technique.

Instrumentation

This study used three instruments for data collection: The Mathematics Learned Helplessness Scale (MLHS), the Students' Test Anxiety Scale (STAS), and the Students' Negative Self-Concept Questionnaire (SNSQ). The MLHS was adapted from Quinless and Nelson's (1988) Learned Helplessness Scale (LHS). In adapting the LHS, all the items on the LHS were modified to reflect learned helplessness in mathematics. Items 2, 3, 6, 12, 14, 16, and 19 on the LHS were modified to be positively skewed towards learned helplessness. In addition, items 5 and 10 were replaced because item 5 was a repetition of item 2, and item 10 was inappropriate with respect to learned helplessness. The MLHS had two sections, consisting of A and B. Section A contained information on the demographics of the students' gender, school name, and' register number. Section B has 20 items modeled on a four-point Likert-type scale with response options of "Strongly Agree" (SA), "Agree" (A), "Disagree" (D), and "Strongly Disagree" (SD) with numerical values or points of 4, 3, 2, and 1, respectively.

The researcher developed the STAS, which consists of 20 items with response options labelled "Highly Applicable" (HA), "Applicable" (A), "Less Applicable" (LA), and "Not Applicable" (NA), with numerical values or points of 4, 3, 2, and 1, respectively. The researcher also developed the SNSQ, which consists of 20 items with response options labelled "Strongly Agree" (SA), "Agree" (A), "Disagree" (D), and "Strongly Disagree" (SD) with numerical values or points of 4, 3, 2, and 1, respectively. Three experts, one from each of the specialties of measurement and evaluation, mathematics, and psychology, were given the instruments to evaluate in order to ascertain the face validity of the instruments. They were asked to verify that the items were appropriate, that the language was clear, that the items were well structured, and they offered suggestions for making the instruments better. In Gboko, Benue State, the instruments were trial-tested on a comparable sample in order to ascertain the instruments' reliability and coefficient of internal consistency. For MLHS, STAS, and SNSQ, respectively, Cronbach alpha reliability values of 0.82, 0.79, and 0.77 were found.

Data Analysis

Version 23 of the Statistical Package for Social Science (SPSS) was employed in the analysis. On the



data, a linear regression analysis was carried out. Research questions were addressed using correlation coefficients (R) from regression analysis, and hypotheses were tested at the 0.05 level of significance using analysis of variance (ANOVA) from regression.

The correlation coefficients were assessed using the guidelines provided by Nwana (1979). Coefficients that ranges from 0.00-0.20 would be regarded as very low, 0.20-0.40 low, 0.40-0.60 medium, 0.60-0.80 high and 0.80-1.00 very high.

Results

This section presents the result of the data collected and analysed in line with the specific purposes of the study.

Table 1: Linear regression analysis of the predictive power of test anxiety on students’ learned helplessness in mathematics

Model	N	R	R ²	Adjusted R ²
1	256	0.71	0.50	0.50

Note: N=Number of Respondents, R=Correlation coefficient, R²=Coefficient of determination

Table 1 reveals that the correlation coefficient (R) between test anxiety and students’ learned helplessness in mathematics is 0.71. This shows that there is a high and positive relationship between test anxiety and students’ learned helplessness in mathematics. Furthermore, the coefficient of

determination for the correlation coefficient of 0.71 was 0.50. The coefficient of determination shows that 50% of the variation in students’ learned helplessness in mathematics is attributed to test anxiety. This implies that 50% of the variation can be attributed to other variables other than test anxiety.

Table 2: ANOVA of the predictive power of test anxiety on students’ learned helplessness in mathematics

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3815.608	1	3815.608	255.543	0.00
Residual	3792.576	254	14.931		
Total	7608.184	255			

$\alpha = 0.05$, Df= Degree of freedom

Table 2 reveals that the F-ratio was 255.54, with an exact probability value of 0.00. This probability value of 0.00 was compared to the level of significance established at 0.05 for testing the hypothesis, and it was determined to be significant because 0.00 is less than 0.05. The null hypothesis one was therefore rejected.

The inference drawn is that the predictive power of test anxiety on students’ learned helplessness in mathematics in Makurdi Metropolis is statistically significant. This implies that test anxiety is a predictor of students’ learned helplessness in mathematics in Makurdi Metropolis.

Table 3: Linear regression analysis of the predictive power of negative self-concept on students’ learned helplessness in mathematics

Model	N	R	R ²	Adjusted R ²
1	256	0.68	0.46	0.46

Note: N=Number of Respondents, R=Correlation coefficient, R²=Coefficient of determination

Table 3 reveals that the correlation coefficient (R) between negative self-concept and students’ learned helplessness in mathematics is 0.68. This shows that there is a high and positive relationship between negative self-concept and students’ learned helplessness in mathematics. Furthermore, the coefficient of determination for the correlation

coefficient of 0.68 was 0.46. The coefficient of determination shows that 46% of the variation in students’ learned helplessness in mathematics is attributed to negative self-concept. This implies that 54% of the variation can be attributed to other variables other than negative self-concept.

Table 4: ANOVA of the predictive power of negative self-concept on students’ learned helplessness in mathematics

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3486.850	1	3486.850	214.896	0.00
Residual	4121.333	254	16.226		
Total	7608.184	255			

$\alpha = 0.05$, Df= Degree of freedom

Table 4 reveals that the F-ratio was 214.90, with an exact probability value of 0.00. This probability value of 0.00 was compared to the level of significance established at 0.05 for testing the hypothesis, and it was determined to be significant because 0.00 is less than 0.05. The null hypothesis two was therefore rejected. The inference drawn is that the predictive power of negative self-concept on students’ learned helplessness in mathematics in Makurdi Metropolis is statistically significant. This implies that negative self-concept is a predictor of students’ learned helplessness in mathematics in Makurdi Metropolis.

Discussion

The study reveals a high and positive correlation between test anxiety and students’ mathematical learned helplessness. This implies that an increase in test anxiety correlates with a higher percentage of students’ learned helplessness in mathematics. Further analysis revealed that the predictive power of test anxiety on mathematics learned helplessness is statistically significant, possibly due to students’ focus on grades and fear of failure. The finding of the study with respect to test anxiety is in line with previous findings. The findings are congruent with those of Raufelder, Regner, and Wood (2018), who discovered a positive relationship between test anxiety and learnt helplessness. Test anxiety has been found to correlate with mathematics performance. Reyes and Castillo (2015) revealed that test anxiety in mathematics affected students’ mathematics performance. In general, test anxiety was found to be substantially and adversely correlated with a variety of educational performance outcomes, such as grade point average, university entrance exams, and standardised tests (Von der Embse, Jester, Roy & Post, 2018). This shows that test anxiety is a predictor of educational outcomes and could be responsible for performance deficits such as the learned helplessness phenomenon, as revealed by the present study.

The study reveals a high and positive correlation between negative self-concept and students’ mathematical learned helplessness. This implies that an increase in negative self-concept correlates with a higher percentage of students’ learned helplessness in mathematics. Further analysis revealed that the predictive power of negative self-concept on mathematics learned helplessness is statistically significant, possibly due to students’ negative perception of mathematics as inherently difficult or abstract. The findings of the study about negative self-concept are consistent with earlier findings. The finding is consistent with that of Almasri (2019), who discovered no statistically significant differences in the learner deficit as a result of the negative self-concept variable. Furthermore, Cho (2020) found that learned helplessness correlated negatively with educational expectations and academic self-concept. This shows that negative concepts have a relationship with learned helplessness. The finding is also consistent with Hansen and Henderson (2019), who discovered that both high and low achievers are more likely to achieve higher academic achievement on average if they have a strong academic self-concept than comparably ability students with a low academic self-concept. By implication, a low academic self-concept is a threat to academic achievement, and students’ learned helplessness as revealed by the present study.

Conclusion

Drawing from the findings of the study, it was concluded that test anxiety and negative self-concept are all predictors of students’ learned helplessness in mathematics. Hence, students with mathematics phobia and negative perception of mathematics as a difficult subject could exhibit feeling of helplessness in the subject.



Recommendation

The study's findings led to the following recommendations:

1. Students should deviate from too much emphasis on grade, and fear of failure that may lead to test anxiety by approaching mathematics assessments with confidence.
2. Students should avoid negative perception of mathematics as a difficult subject among other things that may lead to negative self-concept by approaching mathematics lessons with confidence.

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