ACADEMIC ANXIETY, CLASSROOM ENVIRONMENT AND SECONDARY SCHOOL STUDENTS' MATHEMATICS ACHIEVEMENT IN IBADAN NORTH LOCAL GOVERNMENT AREA, OYO STATE

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Abstract
The study investigated influence of academic anxiety and classroom environment on senior secondary school students' Mathematics achievement in Ibadan North Local Government Area, Oyo State. The Descriptive survey research design was adopted for the study. The simple random sampling technique was used to select 200 male and female senior secondary school II (SSS 2) students in Ibadan North Local Government Area, Oyo State. Academic anxiety and classroom environment scale (á=.89) and Mathematics Achievement Test (MAT) (KR_{20}= .93) were used to collect data. Inferential statistics of Multiple regression and independent t-test were used for data analyses. The results revealed: a significant joint influence of academic anxiety and classroom environment on student's Mathematics achievement (R^2=.360, $F_{(2,197)}$ =3.701, p<.05); a significant relative influence of academic anxiety (â=.081, t=.187, p<.05) and classroom environment (â=-.079, t=-.025, p<.05) on student's Mathematics achievement; and a significant gender difference in academic anxiety (males (35.65), females (36.19); t=.873, p<.05). It is recommended that school counselling psychologists should endeavour to reduce academic anxiety among both male and female students through organising psychotherapeutic programmes, among others.

Keywords: Academic anxiety, Classroom environment, Mathematics achievement, Senior secondary school students

Introduction

The low achievement in Mathematics is observed to have become a recurring phenomenon in many Nigerian secondary schools. This alarming occurrence has been a source of concern for so many years, especially among critical stakeholders in education. Low academic performance in Mathematics is an anomaly because Mathematics is so crucial a subject that students learn other subjects from logical reasoning, mental discipline and rigor developed from Mathematics. Low

academic achievement in Mathematics would mean that students may fail to understand the content of even, other subjects. This implies that students' low academic achievement in Mathematics connotes poor academic performance in other school subjects, including lack of cognitive skills like, abstraction, thinking, problem solving, decision making and creativity. Hence, low academic achievement in Mathematics would spell doom for other school subjects if remediation is not made. What is more, a subject like Mathematics in Nigerian school is a compulsory subject for all students. If a candidate does not pass Mathematics at the least credit level, they will not gain admission into any tertiary institution in Nigeria. A grade less than credit in Mathematics more often than not means that the other subjects' grades amount to nothing, even if the candidate passes other subjects with very high grades. This is another reason low academic achievement in Mathematics has far-reaching consequences. The wastage of resources from parents, teachers, government and other stakeholders that will be recorded when students perform poorly in school subjects particularly Mathematics is quite disheartening.

On the part of the student, a low academic achievement in Mathematics may result in issues like feelings of inadequacy, low academic self-concept, social withdrawal, isolation, truancy, self-hate, mood disorder, school drop-out, lack of school/academic engagement and poor career aspiration. When some students develop and sustain negative feelings about themselves as a result of their performance, their vision may reduce, and they tend to become less futuristic. The cumulative effect of low academic achievement may linger for a long time, possibly causing present and future behaviour to be maladaptive. Again, the problem of low social perception may adversely affect social competence and emotional regulation.

The reason for this low achievement in Mathematics could be due to personal factors like procrastination, poor study habits, peer influence, achievement motivation, achievement emotion, self-perception, and anxiety level. Low academic achievement in Mathematics can also be due to social factors like social status, parental socio-economic factors, school climate, and classroom environment factors. Academic anxiety and classroom environment in this are investigated regarding their influence on academic achievement in Mathematics, owing to the fact that empirical researches on these variables are very few.

How tensed students are about the academic activities and the structure of their classroom in terms of facilities and comfort may have great impact on learning effectiveness and attainment. Achievement which describes the outcome of students and how well they have benefitted from

instruction signals a very crucial stand for evaluation and judgment. Mathematics achievement deals with the performance of a student's test given to them by their teacher or any standardized test administered by examining bodies. Low Standard teaching methods by the teachers can lead to poor results, and also students who have Mathematics anxiety tends to perform poorly in the subject. The teaching of Mathematics encourages learners to improve their idea and mental ability (Halai, 2010). One significant way of monitoring the quality and standards of the teaching and learning of Mathematics in schools is by assessing the students' learning outcome via a good quality test. Tests and other evaluation instruments are used during the instructional process to guide, direct, and monitor students' learning progress towards attaining the course objectives (Kahan, 2008). This monitoring of learning achievements in Mathematics involves the methods of testing, measurement, assessment and evaluation, thus it is observed that students' achievement in Mathematics may be low especially in public examinations. Right from time, Mathematics is the bedrock of science and technology, but some students develop anxiety in Mathematics and this might lead to student's poor performance. There are some reasons why some students fail or become afraid of Mathematics; it can be either teacher's attitude to the subject, class environment, interest, of issues surrounding achievement motivation and emotion, which may determine each student's achievement.

Anxiety which is a complex mental wellness factor can be into two classifications: state, an emotional condition that is temporary and initiated by a particular experience, trait, a stable aspect of one's personality and situation-specific (Tohill & Holyoak, 2000). Academic anxiety can therefore, be a situation-specific form of distress related to educational environment, from assembly ground, to hall, to the classroom, to the laboratory, and even to the library. Academic pressure encompasses not only test anxiety but also anxiety about certain education subjects in general. It can also be the feeling of nervousness, fear, worry over academic activities or test. Academic anxiety is the showing of fear of academic tasks, examination or assignment. Students can feel anxiety related to every academic work as a student's academic performance suffers; the anxiety level related to specific academic tasks increases. A little dosage of anxiety is good for motivation and goal achievement, but when anxiety becomes pathological and disrupts daily living and academic life of students, then there is need for urgent attention.

It can also be biochemical processes in the body and the brain that increase students' attention level when they occur. The changes happen in response to a stressful academic situation,

such as tedious or difficult school assignments, presenting a project in class or taking a test. When the anxiety becomes too much, the body recoils as if threatened, which is a normal fight-or-flight-or-freeze reaction. Thus, a moderate level of anxiety motivates students to study for examination and strife for better Mathematics achievement. On the other hand, a high level of anxiety hampers the concentration power and affected memory's power. A high level of anxiety has become the main obstacle to the academic achievement of students. Academic anxiety is a major factor which impedes the learning process in the predominant teenage years of the learner, and it is characterised by inferiority complex about their capabilities and competencies (Sharma, 2017). It may tend towards unhealthy competition with classmates, deterioration of educational tasks, inability to study, worry about the future, lack of concentration, low intellective assessment, undesirable physiological reactions, such as increase of heart rate, cold fingers, drop in blood pressure and poor academic performance (Sharma, 2017).

It has been argued that anxiety response to Mathematics is a significant concern in terms of the perception that high anxiety will relate to avoidance of Mathematics tasks (Anderson, 2007). Mathematic anxiety is lack of ability for an intelligent person to cope with quantification, confronted with a mathematics problem. Academic anxiety is not a bad thing in fact, a little dose of anxiety is needed for motivation, but it can affect the students' academic achievement when it is severe. A majority of students would lack the enthusiasm and motivation to study for examinations or any educational activities. Most secondary students experience academic anxiety in some vital subjects like Mathematics because they feel that Mathematics is too complex or difficult to understand. Academic stress becomes a problem when it affects students' academic achievement. If not treated, it will make the student have fear or hate the subject, thereby causing the students to perform poorly on the subject. Therefore, academic anxiety is one factor that affects a student's Mathematics achievement, for if negative emotions sets in for a subject, there will low drive to attain good academic outcome for that subject.

Lack of academic engagement can tense a student up in the school. A student that does not do homework, study and prepare for examination may be very afraid of test/examination situation. Fear of public speaking, answering questions in the classroom, asking questions/seeking clarification and even personal teacher consultation may result in nervousness, palpitations and uneasiness in a student. When there is any academic activity, such students will usually draw back feeling like

escaping the academic environment, and this may result in low academic achievement for all school subjects including Mathematics. Academic anxiety negatively affects Mathematics performance (Halai, 2010; Oludipe, 2012).

Another factor that can affect a student's Mathematics achievement can be the classroom environment. A classroom is a positive place where students can come to work toward specific goals set before them. A classroom needs to be positive, organised, welcoming, fascinating, and supportive of students' learning. Teachers and students spend many hours together within the classroom walls, thus a classroom climate needs to be learning inspired and motivating. Apart from being a place for learning and teaching, classrooms are also arenas for the rich array of social relations, bringing about school connectedness. Thus, they are also placing of high subjective importance saturated by intense emotional experiences, which may direct relations, affect learning and classroom routines, and influence the personal growth of everyone.

The classroom environment involves the physical layout, the arrangement of desks and working space, the attractiveness and appeal of bulletin boards, the storage of materials and supplies, and the environmental features, including the temperature, lighting, aesthetics, and noise level. The classroom environment can have a positive and negative effect on student's achievement depending on the kind of work and fun space it depicts for students. The classroom environment deals with the students cognitive and behavioural outcome around their environment, including self-discovery, social motivation, learning style and attitudes. Creating a quiet, conducive environment supposed to be a top priority for any critical stakeholder interested in learning effectiveness and good academic outcome. A classroom should be comfortable enough for students combining factors like climate, temperature, lighting, and noise control (Murugan & Rajoo, 2013). The classroom environment is expected to provide students with practical instruction and promotes a smooth teaching process.

The physical aspects can be class size, the arrangement of tables and chairs, textbook, ventilation. In contrast, the social element can be the teacher role and attitude towards teaching, teacher qualification, and student participation in the class. A well-arranged classroom helps students engage in the lesson and have an interactive course with the teacher. When a classroom is overcrowded, it will be difficult for the teacher to control students' chances of listening to the class. Every classroom plays different personality types of learners who come into the school differently, prepared with uniquely set characteristics that determine their aspirations within the same classroom

environment. The classroom environment is, therefore, a common playground hosting all these personalities at the same time. The problem of organizing these into a reasonable, identifiable and functional whole falls on the teacher, who is the second living component in the classroom environment and a chief facilitator of learning.

The physical environment plays a vital room where the teacher and the learners are the main elements. A well-managed and vibrant classroom environment has a positive effect on the academic achievement of students (Kausar, Kiyani & Suleman, 2017). An effective, well-managed, vibrant and favourable classroom environment should be ensued for effective instructional process (Kausar, et al., 2017). An unfavourable classroom environment can discourage students from learning optimally, and this adversely affects their academic engagement and performance. The space where teaching and learning mostly and traditionally take place is the physical classroom, thus the environment must be positively and favourable perceived to support learning by students.

Some schools in Nigeria, especially government schools observably lack the necessary internal facilities for a classroom such as ramshackle tables and chairs, overcrowded classrooms, poor ventilation, noisy environment (school close to market places, railway station, bus station, high ways), and poor chalk/whiteboard. will lead to low academic achievement. A classroom with a favourable environment will make a positive sign on secondary students' Mathematics achievement. The overcrowded or noisy classroom environment can discourage learners, and they will become uninterested in the class affecting their interest and achievement in the subject. Poor teaching of the Mathematics subject and inefficient use of materials or aids in the classroom can lead to academic anxiety, affecting students' Mathematics achievement (Donnelly, 2009). It is expected that a conductive Mathematics classroom environment with a tone and climate that signals inspiration and support for students' learning uniqueness and peculiarities would promote a smooth teaching-learning process, and positively foster Mathematics achievement.

Gender (sex) difference could exist in academic anxiety in senior secondary school. The anxiety levels of male and female students may differ. Inherently, male and female students are biologically different and this may also translate to mental and emotional difference. Some authors have submitted that females are more anxious than males when it comes to a Mathematics-related subject than other subjects (Abiam & Odok, 2006; Habibollah, Abdullahi, Arizan, Sharir & Kurma, 2009). While some other researchers opine that males are more anxious about science subjects (Abubakar, 2010; Epstein, 1998; Hedges & Newell, 1990). The conflicting findings in literature

regarding academic anxiety and sex differences leaves an interesting question to empirically examine if there is a difference in academic anxiety levels for both boys and girls.

The nature of a subject like mathematics may bring about anxiety in students. The subject requires so much effort from students, it is perceived to be difficult. Parents and teachers may demand more level of preparations from student and this may mount pressure on them. So, the nature of the subject may induce fear, pressure, stress and anxiety among both male and female students in senior secondary schools.

By and large, the observed cases of failure or low achievement in Mathematics is a big problem in education. Academic anxiety and classroom environment could influence a student's academic achievement in Mathematics. The constant cases of failure or low achievement in Mathematics is a big problem in education. Several studies had tried to addresses some factors that could influence Mathematics achievement. Academic anxiety and classroom environment could influence a student's academic achievement in Mathematics. This study therefore investigated whether academic anxiety, as well as classroom environment could influence Mathematics achievement of students in Ibadan North Local Government Area, Ibadan, Oyo State.

Hypotheses

H0 1: There will be no significant joint influence of academic anxiety and classroom environment on senior secondary school students' Mathematics achievement.

H0 2: There will be no significant relative influence of academic anxiety and classroom environment on senior secondary students' Mathematics achievement.

H0 3: There will be no significant difference between males and females' academic anxiety in senior secondary schools.

Methodology

The descriptive survey research design was employed to carry out this study. The research is non-experimental, and therefore, variables were not manipulated. The population of the study comprised of 4,946 male and female senior secondary school II (SSS 2) students in the 42 public secondary schools in Ibadan North Local Government Area, Oyo State (Oyo State Ministry of Education and Technology, 2019). 200 male and female senior secondary school II (SSS 2) students from 5 schools were selected as sample for the study using the simple random sampling technique. First, 5 senior secondary schools were randomly selected from the 42 public senior secondary schools in

Ibadan North Local Government Area, Oyo State. Then, 40 male and female senior secondary school II (SSS 2) students were selected using simple random sampling technique. Thus, 200 students participated in the study. The instrument used for data collection was researcher-designed questionnaire, with 4-point response format. The questionnaire consists of 4 sections which are A, B, C, and D. Section A was the Demographic Data, section B was Academic Anxiety, Section C, which is the classroom environment, and section D was the self-constructed Mathematics Achievement Test. Sections B and C consists of 11, and 12 items with response format of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). Mathematics Achievement Test: This test was self-developed by the researcher to assess the level of acquisition of Mathematics topics of the students. It covered SS2 first term topics. It consisted of 30-item multiple-choice questions with four options A-D. The test items were scored manually. Each correct answer attracted one mark while a wrong answer was scored zero. The level of achievement of a student is taken to be the student's total test score. A Pilot study was carried out to determine the instrument's reliability coefficients and was statistically analysed for the purpose of reliability coefficients. The Cronbach Alpha was used for the questionnaire(á=.89), while the reliability coefficient of ($KR_{20=}$ 0.93) was obtained for the Mathematics Achievement Test. This reliability coefficient was considered reliable for the internal consistency of the instruments since it is within the recommended value. The collected data were sorted, collated and inputted for analyses with the aid of the Statistical Packages for the Social Sciences version 23, using the Multiple regression and t-test analyses at 0.05 level of significance.

Results

H0 1: There will be no joint influence of academic anxiety and classroom environment on senior secondary school students' Mathematics achievement.

R	0.190[a]
R Square	0.360
Adjusted R	0.026
Std Error of Estimate	4.870

Table 1 Summary of multiple regression analysis of academic anxiety and classroom environment in student's Mathematics achievement of senior secondary school.

The model sum of	Square	df	Mean Square	F	Sig	Remarks
Regression	46.096	2	87.79	3.701	0.026[b]	significant
Residual	4226.499	197	23.72			
Total	**4272.595**	**199**				

Source: Fieldwork 2022

a. Dependent Variable: M.A.T.
b. Predictors: (Constant), academic anxiety, classroom environment

Table 1 shows the regression correlation (R) between academic anxiety and classroom environment on student's Mathematics achievement test (M.A.T.). The results show that the regression correlation (R) is .190[a], R square equals 0.360 and Adjusted R square equals .026. It implies that the combined variables (independent variables) contributed 36% to the student's Mathematics achievement variation. Further verifications using analysis of variance (ANOVA) produced $F_{(2,197)} = 3.701$, p-value= 0.026. since $p<.05$, this implies we reject the null hypothesis and concluded that the linear relationship between the combined variables on Mathematics achievement is significant. It means there is a significant composite influence of academic anxiety and classroom environment on senior secondary school students' Mathematics achievement.

$H_0$2: There will be no significant relative influence of academic anxiety and classroom environment on senior secondary students' Mathematics achievement.

Table 2: Dependent Variable: MAT

Coefficients					
Unstandardised Coefficients		**Standardised Coefficients**			
Model	**B**	**Std Error**	**Beta**	**T**	**Sig**
(Constants)	4.654	4.123		2.940	.004
Anxiety	.211	.079	.081	-.187	.008
classroom	-.029	.081	.079	-.025	.031

Source: Field work 2021

Table 2 presents the coefficients indicating the relative influence between each predictor on students' Mathematics achievement. The independent variables (academic anxiety and classroom environment) showed negative coefficients, it means as the both of the independent variables increases, the mean rate of Mathematics achievement decreases, therefore the independent variables showed a high influence on student's Mathematics achievement. The table above shows the results of the independent variables as indicated in standardized(â), academic anxiety contributed more with â=.081, t=.187, p-value = .008, p<0.05 while classroom environment contributed lesser to student's Mathematics achievement with â= -.079, t= -.025, p value= .03. Since the p values are less than .05, we reject the null hypothesis and conclude that academic anxiety and classroom environment significantly influence senior secondary school students' Mathematics achievement.

$H_0$3: There will be no significant gender difference in academic anxiety of senior secondary school students

Table 3: Independent t-test of academic anxiety of males and females senior secondary school students

Gender	N	Mean	Std. Dev	Std Mean Er	df	T	sig
female	110	36.19	4.92	.52	198	.873	.044
anxiety male	90	35.65	3.89	.37			

Source: Fieldwork 2022

Table 3 shows the mean rate of academic anxiety in males and females. It showed that males have the least mean of 35.65 with a standard deviation of 3.92; females have a high mean of 36.19 with a standard deviation of 4.92, which signifies that females are more academically anxious than males in. Since p<.05, the null hypothesis is rejected and it is concluded that there is a significant difference between academic anxiety of male and female senior secondary school students.

Discussion of Findings

Results for the study on the composite influence of academic anxiety and classroom environment on Mathematics achievement showed a significant composite influence of academic anxiety and classroom environment on Mathematics with p<.05. Hence it is concluded that academic anxiety and classroom environment have a significant combined influence on student's Mathematics achievement. This study's finding unveiled that the variation of academic anxiety and classroom environment on students' Mathematics achievement were 36%. It means that the combined variables

of academic anxiety and classroom environment have contribution on students' academic achievement in Mathematics, with other extraneous variables not considered in this study. This finding supports previous a study carried out in which anxiety and classroom size positively influence Mathematics performance across the study area (Figueroa, Lim & Lee, 2016). However, a finding of a study which confirmed that learning environment does not affect Mathematics performance when combined jointly with anxiety but it can be found on students' interest (Adesegun, Adekunle & Emmanuel, 2017), is in contrast with the finding of the present study.

The results of the second hypothesis reveal there is significant relative influence of academic anxiety and classroom environment on student's Mathematics achievement. Also, the coefficients indicated the relationship between each of the factors on student's Mathematics achievement reveals that $p<.05$ for academic anxiety and $p< .05$ for classroom environment. The summary of the results, concluded that academic anxiety and classroom has a significant relative influence on student's Mathematics achievement. Further, it is revealed that academic anxiety has a greater influence on academic achievement in Mathematics than learning environment. The probable reason for this finding could be that students mental health component is directly linked to their academic self-concept, school engagement and achievement in subjects. When students are nervous, fearful of academic activities, and avoid test, examinations, asking questions, consulting teachers, participating in school events, their level of achievement in school subjects will be low. The feelings, emotions, sense of like and dislike, disposition, and general sense of self would affect schooling and performance a great deal. Academic anxiety is a personal factor to students, compared to learning environment which is outside of students' control. Mental health is great part of the overall wellness, and thus any problem with mental health will affect any behaviour of humans, including adolescents in school, who are still forming their identity and developing in all aspects of life.

This finding corroborates that of an earlier study which confirmed that classroom environment and academic anxiety individually is a significant predictor of students' academic achievement in Mathematics (Dami, James & Gogwim, 2019). This finding supports the findings of a study which confirmed that there is a significant negative coefficient between test anxiety and academic achievement in school subject (Oluoch, Aloka & Odongo, 2018).

The results of hypothesis three showed a significant difference between males and females' academic anxiety. It showed a significant difference in mean academic anxiety of males and females

and that females are more anxious than males in Mathematics. The probable reasons for this finding may be that 1: girls tend to be more sensitive to stressful and threatening situations, which may become overwhelming with time and tense them up, 2: more girls may report that they are anxious than boys because boys are constantly reminded to man-up their challenges, making the level of academic anxiety to be higher in female senior secondary school students than their male counterparts, 3: boys participate more in physical activities like sports and games thereby releasing stress and anxiety and triggering more happy hormones than girls who live more sedentary lifestyles. In like manner, senior secondary school students, males and females alike, are developing adolescents who are growing biologically, cognitively, emotionally and socially. However, girls may react differently to pubertal changes than boys. Girls become nervous with menarche-the onset of menstruation and monthly cycles may make girls generally anxious than boys. Again, in a typical African society, parental upbringing and rearing practice are stricter on girls than boys, and this may contribute to the development and sustenance of academic anxiety in girls.

This study's findings agree with the results showing that females are more anxious than males when it comes to a Mathematics-related subject than other subjects (Abiam & Odok, 2006; Habibollah, et al., 2009). However, the finding contrasts with the results that concluded that males are more anxious about science subjects (Abubakar, 2010; Epstein, 1998; Hedges & Newell, 1990).

Conclusion

The findings revealed that the combined academic anxiety and classroom environment had a significant composite influence on academic achievement in Mathematics. Also, academic anxiety and classroom environment had a relatively significant influence on Mathematics achievement, with academic anxiety showing higher influence on academic achievement in Mathematics than classroom environment. Also, it is concluded in this study that female students are more academically anxious than their male counterparts.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. School counselling psychologists should endeavour to reduce academic anxiety especially among female students through organising psychotherapeutic programmes through health

talks, symposiums and lectures. These intervention programmes will manage anxiety level, foster mindfulness, optimism and positive behaviours.

2. The government should improve school plants and facilities including classroom settings to foster good classroom climate that supports active and lifelong learning in public secondary schools.
3. Public secondary school administrators should encourage student-teacher interpersonal relationships as this will communicate love, warmth and acceptance resulting in reduction of academic anxiety and enhanced school connectedness.
4. As a matter of urgency, the government should make sure that the number of students per class does not exceed thirty as this would create a good learning environment devoid of distractions and overcrowding.

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