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STUDENTS' PERCEPTION ON THE CAUSAL FACTORS OF MATHEMATICS ANXIETY AMONG SENIOR SECONDARY SCHOOLS STUDENTS IN LAGOS STATE

(Persepsi Pelajar Terhadap Faktor Punca Kebimbangan Matematik dalam Kalangan Pelajar Sekolah Menengah Atas di Negeri Lagos, Nigeria)

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Abstrak

This study examined students' perception on the causes and effects of mathematics anxiety among Senior Secondary Schools in Alimosho Local Government Area, Lagos State, Nigeria. The two instruments used for data collection were math anxiety scale adopted from Mutodi and Ngirande (2014) and researcher designed questionnaire titled causes and effects of math anxiety. The two instrument has reliability values of 0.78 and 0.76 respectively. Three hundred and twenty (320) students who were identified to have math anxiety using math anxiety scale were involved in the study. Data collected were analysed using frequency count, Simple percentage, Means and Binomial Test. The study revealed that Mathematics anxiety has significant negative effect on students' performance in Mathematics. Also, the level of involvement of parents, teachers and peers towards students learning of Mathematics has significant relationship with mathematics anxiety among students. It was recommended that school management should ensure that students' Mathematics anxiety is reduced by sensitizing Mathematics teachers not to be intimidating students with cane and other threats, encouraging teachers and others to help students solve mathematics problems. Also School management should ensure that adequate facilities are provided for the teaching and learning of mathematics.

Keywords: Anxiety, Math Anxiety, poor preparation, poor performance, Anxiousness

Abstract

Kajian ini mengkaji persepsi pelajar terhadap punca dan kesan kebimbangan Matematik dalam kalangan pelajar Sekolah Menengah Atas di kawasan Kerajaan Tempatan Alimosho, Negeri Lagos, Nigeria. Dua instrumen yang digunakan untuk pengumpulan data ialah Skala Kebimbangan Matematik yang diadaptasi daripada Mutodi dan Ngirande (2014) dan borang soal selidik yang direkabentuk oleh penyelidik bertajuk Punca dan Kesan Kebimbangan Matematik. Kedua-dua instrumen tersebut mempunyai nilai kebolehpercayaan masing-masing 0.78 dan 0.76. Tiga ratus dua puluh (320) pelajar yang terlibat di dalam kajian ini telah dikenalpasti mempunyai kebimbangan Matematik dengan menggunakan skala kebimbangan Matematik. Data yang dikumpul dianalisis menggunakan kiraan

kekerapan, peratusan mudah, purata dan Ujian Binomial. Kajian itu mendedahkan bahawa kebimbangan Matematik mempunyai kesan negatif yang signifikan terhadap prestasi pelajar dalam subjek Matematik. Selain itu, tahap penglibatan ibu bapa, guru dan rakan sebaya terhadap pembelajaran Matematik juga mempunyai hubungan yang signifikan dengan kebimbangan Matematik dalam kalangan pelajar. Adalah disyorkan bahawa pengurusan sekolah harus memastikan kebimbangan Matematik pelajar dikurangkan dengan memastikan guru pengajar Matematik tidak menakutkan pelajar dengan rotan dan ugutan lain, menggalakkan guru dan pihak terlibat untuk membantu pelajar menyelesaikan permasalahan Matematik. Pengurusan sekolah juga perlulah memastikan kemudahan yang mencukupi dibekalkan untuk tujuan pengajaran dan pembelajaran Matematik.
Kata kunci: *kebimbangan; kebimbangan matematik; lemah persediaan; lemah prestasi; kerisauan*

1.0 INTRODUCTION

Anxiety as a global construct has been given various definition by different scholars. According to Paul and Nolting (2009), anxiety can be referred to as a painful, distress of mind concerning imminent or envisaging problems. An anxious person usually feels helpless, blocked and unable to find a solution to his problem. Anxiousness is associated with frequent invasive thoughts or concerns. Some physical symptoms associated with anxiety include; dizziness, a rapid heartbeat sweating and trembling. An anxious person usually feels a missing link that makes him unfit or not capable to carry out a particular task. Hence, anxiety is an emotional situation, a feeling of distress, having doubt or having fear on achieving success on a set goal or a particular task. It is capable of making someone loose tract or interest pursuing a goal to a successful end. Mathematics anxiety is a phenomenon that has affected and still affecting students' attitude and academic performance in mathematics, at all levels of education especially at the basic and post basic level of education. Researchers such as (Aremu, 2009 & Kumari, 2015) opined that Mathematics anxiety has a direct link to students' attitude and academic performance in Mathematics

Mathematics anxiety, on the other hand, can been described as a feeling of phobia that disrupt one from proficiently tackling mathematical problems. Students' attitude towards Mathematics has effects on their handling of mathematics problems. Students' positive attitude to Mathematics can lead to positive interest in the subject and consequently positive achievement in it. On the other hand, students' negative attitude in Mathematics may result to math phobia and consequently poor academic performance in the subject. (Maloney & Beilock, (2012) and Kumari (2015).

Aremu (2009) described Mathematics anxiety as a mental, physical and emotional construct that has to do with solving mathematical problems and obstacles resulting from past experiences as related to problem solving in Mathematics. He opined that negative feelings and experiences will have negative effect on a student's ability and readiness to learn mathematics in future as they have experienced disappointment in their mathematics abilities. Olaniyan and Salman (2015) regarded Mathematics anxiety as mathematics weakness in an individual that has to do with psychological dimension of learning. Anxiety is capable of making one to lose interest in a subject and can make one lose confidence in one's ability to perform a specific task. It is a real situation that occurs among many students where they lost confidence in their ability to succeed in an activity or a task prior to the commencement of the activity or task.

Kumari (2015) described Math anxiety as "a feeling of helplessness or frustration about one's ability to do Math and a negative reaction to Mathematics learning". Mathematics anxiety can be considered as a reason of multiple consequences

which show fear of mathematics like; feeling discomfort while doing mathematics, skipping mathematics classes until the problem of attendance comes, feelings of sickness, dizziness, or fright, failure to perform on a test and feeling incompetent to handle mathematics problems (Khatoon & Mahmood (2010) & Yang, (2014).Many who experiences mathematics anxiety may not be able to explain the exact time when this negative feelings started spring up in them, it usually begins with avoidance of mathematics lessons, activities or even mathematics teachers.

Puteh (2002) argued that if a student perceived Mathematics as a difficult subject in his/her formative years, there is likelihood for mathematics anxiety to be activated. It is likely that such student will try to dodge any situation that involves mathematics and continue to doubt his/her ability to learn or do well in Mathematics. Aremu (2009) and Ashcraft & Rudig (2012), concluded that students suffering from Mathematics anxiety usually preoccupied themselves with other activities to avoid having contact with their mathematics teachers. They are also afraid to talk, ask questions or answer questions in mathematics class. Hence, it can be described as a feeling of nervousness, tension or fear that arises from manipulation of number and the solving of mathematical problems.

Mathematics anxiety like test anxiety can be viewed in two dimensions: cognitive and affective. The cognitive dimension, has to do with fears of one's performance and the penalties of failure, while the affective dimension has to do with emotionality such as nervousness, tension, restlessness of mind in testing situations and respective emotional reactions. Studies on Mathematics anxiety have not been conclusive on the extent to which Mathematics anxiety can lead to mathematical difficulties and the extent to which mathematical difficulties and resulting experiences of failure can trigger mathematics anxiety. However, evidences abound on how mathematics anxiety inhibits the performance of Mathematical tasks, especially those that require working reminiscence. Whether a person likes or fears mathematics is usually evident in one's willingness to take courses in mathematics beyond the school age where mathematics is made compulsory. Consequently, mathematics anxiety determined how well and how far an individual can engage in mathematical task. (Núñez-Peña & Suárez-Pellicioni 2014 and Geist (2015). The theory below explains the process or formation of mathematics anxiety in the learners.

2.0 MATHEMATICS ANXIETY THEORY

Mathematics anxiety theory popularly known as cycle of mathematics avoidance model was developed by Pries and Biggs (2001). The model has four phases and the first phase lead to the second phase, while the second leads to the third phase and the third phase leads to the final phase which is phase four. The first phase has to do with a person's negative experience with mathematics, this phase is capable of making an individual to avoid math situations which is the second stage. Mathematics avoidance leads to poor mathematics preparation which is the third phase. The last stage which is the poor performance in mathematics arises as a result of the poor preparation; some people have several repetitions of this cycle as such, they became anxious and convinced that they cannot do mathematics Ashcraft, Hopko (2007).

Students, who performed poorly in tests or examinations are usually confused, are unable to focus on the task at hand especially if the student has a multiple repeat of failure experience. Mathematics anxiety slow down student's eagerness to learn, reduces self-efficacy and interest in learning mathematics. Therefore, mathematics lessons need to be presented in an interesting manner to the students using different instructional materials that will make it to be less abstract in order to avoid student having negative mathematics experience.

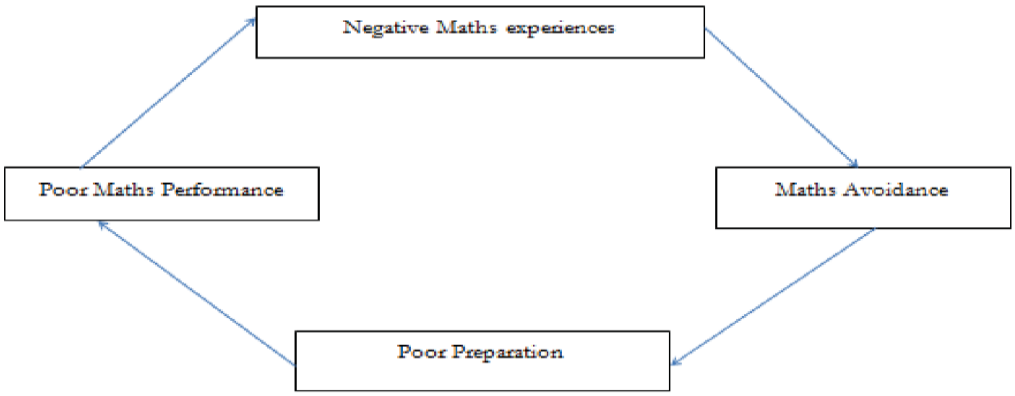

Figure 1: Cycle of Mathematics Avoidance Model

Source: Pries and Biggs' (2001).

Different scholars have attributed different reasons as the causes of Mathematics anxiety and the causes identified are related to the prevailing situation or circumstances. Haralson, (2002) and Finlayson (2014), identified teacher behavior with students and teaching techniques used by teacher in mathematics classroom as the factors which causes Mathematics anxiety while, Peker (2009) identified feeling of helplessness, insecurity and inferiority as the causes of mathematics avoidance and anxiety. Other factors identified by Aremu (2009); Jain &Dowson (2009); Geist (2010); Gbolagade, Waheed & Sangoniyi, (2013) and Kumari (2015) include; unsuitable test-taking strategies, inadequate test preparation, psychological pressures, abstract nature of content, teacher's negative attitudes and traditional pedagogy. Mathematics as a subject is at the core of all science and technological endeavours. The knowledge of Mathematics is required by many professionals to effectively perform in their different professions. For instance, the tailors, the carpenters/ furniture makers, the brick layers, the engineers, the pilot and many more, all need the application of mathematics knowledge to function successfully in their different area.

Therefore, for any nation to measure up with the technological advancement in the world today, there is need for adequate mathematical knowledge and skills among youth because Mathematics is one of the major key knowledge required for technological development. This explains why Mathematics is made compulsory in the nations primary and secondary education and why a credit in mathematics is required for admission into tertiary institutions in Nigeria today. Moreover, the key to success in any mathematics test or examination depends on how well a Mathematics anxiety problem is treated and managed (Aremu, 2009). Therefore, it is detrimental to neglect the adverse effect of math anxiety which is capable of increasing academic failure in Mathematics according to (Ahmed, Minnaert, Kuyper and Van Der Werf, (2012). Hence, this work is on students' perception on the causes and effects of math anxiety among senior secondary schools (SSS) students in Lagos State, Nigeria.

3.0 OBJECTIVES OF THE STUDY

This study was set out to:

a) Examine students' perception on the causes of math anxiety among SSS students in Lagos State
b) Examine students' perception on the effects of math anxiety among SSS in Lagos State.
c) Determine the level of involvement of teachers, parents and peers towards the problem which has led to this research.

4.0 RESEARCH QUESTIONS

The following research questions guided the study

a) What is the perception of students on the causes of math anxiety among SSS students in Lagos State, Nigeria?
b) What are the effects of math anxiety among SSS students in Lagos State, Nigeria?
c) How do parents, teachers and peers contribute to math anxiety among students?

5.0 METHODOLOGY

The study adopted Descriptive survey research design. Descriptive survey research design was employed because it is effective in gathering information involving the current situation of a phenomena and to describe "what exists" with respect to variables or conditions in the research. The study population comprises of the public senior secondary school II (SSS I1) students in Alimosho Local Government Area, of Lagos state totaling Fifteen thousand seven hundred and eighty-three (15,783) SSS students. The sample of this study consist of five hundred (500) students of both sexes drawn from ten (10) selected schools using simple random sampling technique to avoid a bias selection and Fifty (50) students were randomly selected from each of the 10 selected schools for the purpose of this research.

The data for the study was collected using mathematics anxiety scales to establish the anxiety level of the students and the other instrument; causes of anxiety scales was employed to determine reasons for mathematics anxiety. The Mathematics anxiety scale was adopted from Mutodi and Ngirande (2014) and the reliability value was 0.78. The instrument used for data collection on causes of math anxiety was a researchers-designed questionnaire. The instrument was a 4 Point Likert scale with the format; Strongly Agreed (SA), Agreed (A), Disagree (D) and Strongly Disagree (SD). The instrument was pilot tested using 30 students from a secondary school in Yaba local government area of Lagos State, Nigeria and a Cronbach alpha value of 0.76 was obtained.

5.1 Procedure for data collection

The questionnaire was administered based on a face to face contact. The two instruments (questionnaire) was distributed among senior secondary school students in the science, commercial and arts classes respectively and the students were asked to express their opinion carefully with the assistance of the school mathematics teachers. The first instrument math anxiety scale was administered to ascertain the anxiety level of the students. However, only students with high mathematics anxiety level (above 50%) were finally considered as the sample for the study. In other words, Out of 500 students initially selected only 320 who scored 50% above on math anxiety were considered as having math anxiety. Hence, their responses on the causes of math anxiety were considered as data for this study. Data collected were analyzed using frequency counts, Simple percentage, means, standard deviation and Binomial Test. To calculate the Binomial Test, the responses were dichotomized into agree and not agree. That is, strongly agree and agree are categorized as agree while strongly disagree and disagree are categorized as disagree. This allows for the binomial distribution in the non-parametric form to be considered suitable for the analysis. The p-values were used to establish whether the responses of the participants were related.

6.0 RESULTS

6.1 Research Question 1: What is the perception of students on the causes of mathematics anxiety among SSS students in Lagos State?

Table **1:** students' perception of the causes of math anxiety

S/N	Views	SA	A	D	SD	Mean	BT (P-Values)	Decision
1.	My Mathematics teacher comes to the classroom with cane.	82	96	73	69	2.59	.050	Agreed
2.	My friends complain about Math being too difficult.	125	100	41	54	2.92	.000	Agreed
3	Some Mathematics topics are very boring to study.	131	91	55	43	2.93	.000	Agreed
4.	There is no enough time to solve mathematics questions.	98	101	70	51	2.76	.000	Agreed
5.	We are just too many in the class that I find it difficult to concentrate.	94	89	55	82	2.69	.012	Agreed
6.	I don't get help when I couldn't solve my Mathematics homework.	91	95	71	63	2.68	.004	Agreed
7.	My teacher reacts badly when I make mistakes while solving Mathematics problems.	111	90	67	52	2.75	.000	Agreed

Criterion: mean$\geq\geq$2.5

As can be observed from Table 1, the mean response of the respondent on all the seven items identified on the causes of mathematics anxiety among senior secondary school students was greater than the acceptance criterion (mean$\geq\geq$2.5). Also, the mean response of respondents from 2 to 7, $p<.05$ indicated that the entire factor listed are contributing factors to Mathematics Anxiety. This implies that mathematics teacher attitude, peer influence, large population in the class, nature of the course, lack of help to solve difficult assignment are all contributing factors to math anxiety among students.

6.2 Research Question Two: What are the effects of mathematics anxiety among SSS students in Lagos State?

Table **2:** Perception of students on the effects of mathematics anxiety

S/N	Views	SA	A	D	SD	Mean	BT (p-values)	Decision
1.	I feel tensed whenever I have to solve mathematics questions on the board with my friends watching.	106	112	73	29	3.0239	.000	Agreed
2.	I am afraid of my mathematics teacher	99	110	41	70	2.6184	.002	Agreed
3.	Plenty of mathematics homework gives me discomfort.	153	97	31	39	2.7600	.000	Agreed
4.	I get afraid when my mathematics teacher tells me how difficult it is to study mathematics	98	97	70	55	2.5726	.003	Agreed
5.	Some mathematics topics are just too difficult to understand.	94	89	55	82	2.5463	.012	Agreed

6.	Some mathematics topics are too long to solve.	91	103	67	59	2.5835	.000	Agreed
7.	Cramming mathematics formulas is a problem for me.	98	98	71	53	2.5645	.000	Agreed
8	Application of too many mathematics formulas is a problem for me.	142	107	25	46	2.9078	.000	Agreed

Criterion: mean$\geq\geq$2.5

Table 2 revealed the mean response of respondents' opinion on *the effects of mathematics anxiety among senior secondary school students. It can be observed that* the mean response of the respondent on all the 8 items was higher than the acceptance criterion (Criterion: mean$\geq\geq$2.5). p<.05 in items 1 to 7, suggested that Mathematics anxiety has significant effects on Students learning of Mathematics. Hence, math anxiety makes students to view mathematics as untouchable and difficult.

6.3 Research Question Three: How do parents, teachers and peers contribute to mathematics anxiety among students?

Table 3: Parents, teachers and peers' involvement in the problem that has led to this research

S/N	Views	SA	A	D	SD	Mean	BT (P-Values)	Decision
1	My parents are not available to help me with my mathematics homework.	98	98	71	53	2.6281	.000	Agreed
2	My parents do not like mathematics so I see nothing good in it.	112	78	71	59	2.6156	.001	Agreed
3	My parents have no problem with me failing mathematics.	87	97	71	65	2.7531	.009	Agreed
4	My parents react badly when I make mistakes while solving mathematics problems.	98	79	65	78	2.6875	.006	Agreed
5	My parents are not available to help me with my mathematics homework.	98	98	71	53	2.7313	.000	Agreed
6	My parents say mathematics is a very difficult subject.	86	45	87	102	1.6 750	.064	Disagreed
7	I don't have enough books to study mathematics.	91	103	67	59	2.6531	.000	Agreed
8	My parents react badly when I make mistakes while solving mathematics problems.	98	79	65	78	2.7563	.004	Agreed
9	My parents force me to study mathematics every day at home	100	81	67	76	2.7531	.022	Agreed

10	My friends do not like math	102	83	90	45	2.7406	.003	Agreed
11	I do not like answering question in class because I hate been mocked by my classmate	100	91	81	46	2.8406	.001	Agreed
12	My math teacher is always interested in the final answer	90	106	74	50	2.6728	.000	Agreed
13	My math teacher is too strict. I do not like attending his class	98	98	71	53	2.7281	.003	Agreed

Criterion: mean$\geq\geq$2.5

Table 3 showed the responses of the respondents on how peers, teachers and parents influences math anxiety among students. Out of 13 items identified on how parents, teachers and peers contribute to math anxiety among students, the mean of respondents' opinion on 12 items were greater than the required criterion for acceptance. Items 1, 2, 5 and 7 to 13 with p<.05 indicated that parents, teachers and peer contributed to students learning difficulties in Mathematics. However, items 3, 4 and 6 with p-values above 0.05 shows existence of insignificant difference between the participants that agree and those that disagree on some parental factors that can contribute to mathematics anxiety. Though, many parents fail to provide necessary support for their children to learn mathematics effectively but their utterances to the children are not detrimental to effective learning. Thus, parents' inability to provide necessary help and support for their children, teacher poor attitude and peers influence are all contributing factors to math anxiety among secondary students.

7.0 DISCUSSION OF FINDINGS

The findings of the study revealed the following factors as the causes of mathematics anxiety among students; teachers' bad attitude, not having enough time to solve mathematics questions, having too many students in a class, not getting help when solving Mathematics homework and the abstract nature of the mathematics as a course. This finding supports the work of Puteh (2002); Mohamed & Tarmizi (2010) and Escalera-Chávez *et al.,* (2016) who found that, if students perceived "mathematics as difficult" in their formative years there is likelihood for mathematics anxiety to be triggered. Also, the study support that of Kargar, Ahmad & Bayatc (2010) and Parvathamma & Sharanamma, (2010) who discovered a negative correlation between anxiety, attitude and self- confidence respectively.

The study also revealed that parents, teachers and peers' influences students' learning of Mathematics. Positive influence enhances learning while negative influence discourages learning and subsequently can trigger anxiety in the subject. This finding supports the work of Devine *et al*., (2012); Alkan, (2013) and Geist (2015) who found that parental education and teacher factor are still determinants of mathematics anxiety among students. The study also supports the findings of Taylor & Fraser (2013) who found that environmental factors influences math environment.

Finally, the study disclosed that mathematics anxiety is a deadly trap that is capable of destroying students interest and make learners to hate doing

mathematics. The finding corroborates that of (Ashcraft, Krause & Hopko, (2007) ; Akinsola, Tella, & Tella, (2007) ; Maloney, Beilock, (2012); Asikhia & Mohangi, (2015) and Olaniyan & Salman, (2015),Who in their respective studies affirmed that mathematics difficulties, if not attended to promptly, is capable of destroying learners' interest in mathematics and consequently lead to math anxiety.

8.0 CONCLUSION

From the study, it can be concluded that Mathematics anxiety causes students poor academic performance because anxiety makes them feel tensed whenever they are to solve mathematics questions; it makes them to be afraid of the mathematics teachers and causes feeling of discomfort with Mathematics homework. It is concluded that if mathematics anxiety is reduced, it will have significant positive influence on students' attitude and academic performance in Mathematics.

9.0 RECOMMENDATIONS

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

a) School management should ensure that, students' Mathematics anxiety is reduced in order to enhance the performance of students. This can be done by Mathematics teachers not intimidating students with cane and other threats, encouraging teachers and others to help students solve mathematics problems when they have difficulties in solving them, advice teachers not to rebuke students when they make mistakes in solving Mathematics problems.

b) The parents should improve the level of their involvement in encouraging students in learning Mathematics. This could be done by parents buying Mathematics textbooks, encouraging students to study with their peers, checking their Mathematics works and assisting them when they are doing their assignments.

c) School management should ensure that adequate facilities are provided for the teaching and learning of mathematics, such as good library, appropriate class size, and conducive school environment for learning. This will reduce Mathematics anxiety and encourage the students to learn the subject better. In other words, good learning environment and adequate use of required instructional materials are required for better understanding of Mathematics concept and better understanding of the concept is an antidote for math anxiety reduction.

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