

CAUSES OF MATHEMATICS PHOBIA AMONG SENIOR SCHOOL STUDENTS: EMPIRICAL EVIDENCE FROM NIGERIA

Omoniyi Mathew Olaniyan
Medinat Folorunso Salman
University of Ilorin

Abstract

Empirical evidence has it that math-phobia is a contributing factor to students' poor performance in mathematics. This study examined math-phobia existence among senior school students in Nigeria and its causes from teachers' and students' perspectives. Two hundred and thirty-eight students and twenty-five teachers were the study respondents. The study revealed that math-phobia exists among students, which is characterized by feverish feelings in math class, difficulty in understanding math problem among others. Highlighted causes include poor student-teacher relationship, non-conducive environment for math class among others. Concerted efforts should be made by all stakeholders in solving the problem to improve students' mathematics achievement in Nigeria.

Keywords: Causes, Mathematics, Math-phobia, Students, Nigeria

Introduction

Mathematics is a core subject in Nigerian secondary schools. The study of the subject was established in schools in order to produce competent persons who are skillful in applying mathematical knowledge in solving everyday life problem. Mathematics is also relevant to decision making process. The Nigerian national policy document on education (Federal Republic of Nigeria, 2013) shows that improvements in the teaching and learning of Science, Technology and Mathematics (STM) is necessary in order to create the basis for technologically sound workforce in line with the nation's developmental needs (Onwuachu & Nwakonobi 2009).

Fajemidagba, Salman & Ayinla (2012), have described Mathematics as a core science subject and tool for the development of any science-based discipline. These include; technology, astronomy, graphics, industry and analytical reasoning in daily living. Ayinla (2011), also posited that mathematics is the pillar of all knowledge, showing its relevance to all disciplines. Onwuachu & Nwakonobi (2009) noted that mathematics is the foundation on which the whole essence of living revolves and the platform for scientific and technological innovation. Mathematics is viewed as a valuable tool for academic enhancement and career choice of individual regardless of gender and age (Ebeh, 2000).

Mathematics is an important subject with broad applicability to everyday life, yet mathematics is often considered as a difficult subject in schools (Pradeep, 2012). However, the student's interest and weakness in mathematics learning could affect the efforts of various sectors in achieving the Millennium Development Goals (MDGs) of making Nigeria a fully developed nation by 2020. Mathematics phobia is regarded as mathematics weakness in students. It deals with the psychological dimension of learning. It is important for educators to identify this factor in enhancing mathematics interest of students.

The term phobia originated from the word 'Phobus' with its root in Greek, meaning fear, terror or panic, but a phobia is more than this, since all persons experience fear of terror occasionally. Phobia is the fear or anxiety disorder, which causes avoidance and panic. Fear is a common type of anxiety disorder, intense fear that is characterized by fear of a particular situation or object (Khalid, 2001). Tillfors, (2003) viewed Phobia as learned emotional responses. The defining feature of phobia is that it causes frequent, severe and intense anxiety. The author further defined phobia as an irrational, intense, persistent fear and anxiety of certain situations, objects or places (Tillfors, 2003). Phobia is of different types. Common types include Anthrophobia (fear of people), Ergophobia (fear of work), Hydrophobia (fear of water), Decidophobia (fear of making decisions) (Winerman, 2007), and for this study Mathematics phobia (fear of math).

Trujillo & Hadfield, (1999) defined mathematics phobia as the level of discomfort that occurs among students in response to situations involving mathematical tasks, which is seen as a threat to their self-ability. Math-phobia has been described to involve cognitive and affective domains of learning. Harper & Daane, 1998; Hembree, 1990; Sloan, (2002) described the construct as related to personality characteristics, negative attitudes toward mathematics, mathematics avoidance, poor mathematics background, poor teaching behaviour, achievement levels, lack of confidence and negative experiences in school.

Mathematics is important to everyday life; it is described as the queen and servant of sciences. A basic level of mathematics has long been recognized as an essential requirement for everyday life and for most occupations (Confederation of British Industry CBI, 2006). Awofala (2000), observed that most of the secondary school students often display negative attitude towards Mathematics. Ahiakwo in Ojimba, (2013) had earlier found that mathematics performance of students at various levels to have declined over the years with that of Nigerian students quite remarkable. Ojimba, (2013) reported that Chief examiners reports of results of public examinations in Nigeria had shown markedly a decline in the percentage of passes in mathematics. Chinn (2009) in his own study observed that despite the importance of mathematics to mankind and the effort of the Government to improve its teaching and learning, the mathematics achievement of students is unacceptably low.

Efforts have been made at investigating trends of students' achievement in Mathematics as well as factors responsible for the level of such achievement. Some of the reasons attributed to the observed poor achievement in Mathematics include; shortage of qualified Mathematics teachers (Ohuche, 1989), poor facilities, equipment and instructional materials for effective teaching (Akpan, 1987 and Odogwu, 1994), use of traditional chalk and talk methods (Oshibodu, 1988, Edwards & Knight, 1994), large pupils to teacher ratio (Alele-Williams, 1988) and mathematics phobia/fear (Georgewill, 1990), limited background preparation in Mathematics, lack of Mathematics teaching equipment and materials, phobia, low level of interest and inadequate government policy (Abimbade, 1995), lack of problem solving abilities (Abimbade, 1997), self-concept and achievement motivation (Akinsola, 1994). Also, access to conveniences and instructional facilities significantly affecting student's achievement in Mathematics have been observed (Jaiyeoba & Atanda 2011). However, as far as the researcher is aware, there are yet to be studies in Nigeria on the causes of math-phobia as a factor for students' performance in mathematics.

Specifically the study sought to:

- i. identify mathematics phobia existence among senior school students
- ii. find out the perception of teachers and students on the causes of mathematics phobia

Methodology

This study is a descriptive research of the survey type. Information were obtained from respondents using a designed proforma for mathematics teacher complemented with structured questionnaire for students. The student's questionnaire was a researcher's adapted questionnaire from the Fennema-Sherman Mathematics Attitudes Scale (FSMAS), which was translated by Zakaria and Nordin (2008). Data collected was analyzed using Statistical Package for the Social Sciences (SPSS) (Ver. 20; SPSS Inc., Chicago, IL). Mean, frequency, charts were used for analyses.

Results and Discussion

The study revealed that mathematics phobia is present among senior school students. Furthermore, in the selected schools for the study, the mathematics teachers were able to identify mathematics phobia as a problem to mathematics learning in their schools. They were also able to provide list of math-phobic students in their class. From table 1, the study shows that the expression of mathematics phobia by students is characterized by feverish feelings in math class, difficulty in understanding math problem, failure to ask or answer/contribute in math class, truancy in math class, student's refusal to do their math assignment and students showing no interest in math class. Some of these findings were in agreement with Smith (1997) and Wilson (2012) who had earlier found out that mathematics phobia among students is characterised in a number of ways ranging from uneasiness

when asked to perform mathematical task, to avoidance, feeling of physical illness, and panic in math class.

Table 1: Expression of Mathematics phobia

S/N	Expression of mathematics phobia	Number of Respondents
1	Feverish feelings in math class	3
2	Difficulty in understanding math problem	4
3	Students do not concentrate in math class	2
4	Students showing no interest in math class	3
5	Students' failure to ask or answer/contribute in math class	4
6	Truancy in math class	5
7	Students mood switch when asked to perform mathematical task	2
8	Students who were not showing concern for math classes	2
9	Students refusal to do their math assignment	3

Source: Survey 2014

The study further revealed in table 2 that mathematics phobia among students is caused by poor student-teacher relationship, non-conducive environment for math class, insufficient preparation on the part of the teachers before going to class, limited time for math class on time-table, the way the subject is painted by people around, teachers' methods of teaching the subject, students nonchalant attitude to the subject, most mathematics teachers are not math-specialist, inadequate instructional materials, poor math background of students, perceived believe/orientation about the subject being difficult, hatred for calculation related subject, perceived nature of math being abstract and inadequate math textbooks for students. These findings corroborated other studies such as Uusimaki & Nason, (2004) and Hasbee, Sam, Nur, & Tan, (2009), they identified inappropriate teaching practices/methods and the teacher's attitude as a major factor causing mathematics phobia (Vinson, 2001). As observed by Wilson, (2012) many students have limited mathematics understandings at lower level.

Further research reported that mathematics phobia develops in a child at the elementary school level (Jackson & Leffingwell, 1999). This findings were in line with the outcome this study that mathematics phobia is as a result of poor mathematics background.

Table 2: Identified causes of mathematics phobia from the teachers' view

S/N	Identified causes of mathematics phobia	Number of Respondents
1	Poor students-teacher relationship	4
2	Non-conducive environment for math class	4
3	Insufficient preparation on the part of the teachers before going to class	3
4	Limited time for math class on time table	3
5	The way the subject is painted by people around	5
6	Teachers' methods of teaching the subject	7
7	Students nonchalant attitude to the subject	3
8	Wide mathematic syllabus	2
9	Most mathematics teachers are not math-Specialist	5
10	Inadequate instructional materials	5
11	Poor math background of students	3
12	Perceived believe/orientation about the subject being difficult	5
13	Hatred for calculation related subject	2
14	Perceived nature of math being abstract	4
15	Inadequate math textbooks for students	7

Source: Survey 2014

Table 3 shows the causes of mathematics phobia from the student's perspective. Even though, some of the mentioned causes by students coincided with the highlighted causes by teachers, other factors such as math have numerous formulae, difficulty in solving math-problem privately, students forgetting the required steps in solving mathematics problem, teacher's inability to solve math problem in class, and believe system that math is difficult were the highlighted causes of mathematics phobia.

Table 3: Identified causes of mathematics phobia from the students' view

S/N	Identified causes of mathematics phobia	Number of Respondents
1	Math has numerous formulae	70
2	Difficulty in solving math problem privately	62
3	Often forget the required steps in solving math problem	59
4	Teacher's inability to solve math-problem in class	57
5	Believe math is a difficult subject	40

Table 4 revealed the suggested solutions to mathematics phobia by respondents. These includes stimulating students interest in math, students re-orientation about math, constant retraining of math teachers, extension of allocated time to math on the time table, provision of instructional facilities, adapting suitable teaching methodology for math-teaching, societal recognition for teaching profession and so on.

Table 4: Suggested Solutions to mathematics phobia by respondents

S/N	Suggested Solutions	Number of Respondents
1	Students' interest in math should be stimulated by concerned stakeholders	4
2	Re-orientation of students about the subject	7
3	Math counseling for students	4
4	Societal recognition for teaching profession	2
5	Provision of instructional materials	4
6	Parents should assist in following up their children on math	4
7	Teacher's preparation before going to class	2
8	Government should have deliberate policies to improve math	2
9	Only qualified teachers should take the subject	3
10	Assignment should always be given and marked by teachers	2
11	Conducive environment should be provided for math class	2
12	Teachers should be encouraged to be friendly while taking the subject	2
14	Constant re-training for math teachers	3
15	Provision of math-textbooks by Governments to schools	2
16	Extension of time allocated to math class on the timetable	2
17	Teachers should adapt best suitable methodology in teaching the subject	2

Source: Survey 2014

Discussion

This study revealed that mathematics phobia exists among senior school students in the study area. This was attributed to various causes and by implication is also a contributing factor to students' poor mathematics achievement. Consequently, math-phobia existence among school students is a threat to national technological advancement.

It is recommended among others that: Teachers should understand individuality of learners based on their math-phobic status and devised appropriate strategies such as biblio-therapy (guided learning), group studying as appropriate to help mathematics learners. Students' re-orientation on mathematics is recommended through organized math-counselling for students. Concerned

stakeholders should implement policies at secondary school level to extend time of math class on time-table as well as conducive environment for the teaching of mathematics. Constant re-training of math-teachers by concerned stakeholders is necessary to help improve math-teaching and learning using the appropriate methodology. School management should be mandated to employ only teachers that are mathematics specialist to teach the subject.

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