

Causes and Solutions of Mathematics Phobia Among Secondary School Students

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Abstract

The study investigated the causes and solutions to mathematics phobia among secondary school students. The study was carried in Owerri North local Government of Imo State. The descriptive survey research design was adopted in carrying out the study. A sample of 110 mathematics teacher was selected for the study through random sampling technique. A researcher made 4-points likert type of questionnaire titled "Causes and Solutions of Mathematics Phobia(CSMP)" was used for data collection, it had reliability coefficient of 0.81 determined using the crounbach's alpha formula. The generated data was analyzed using mean and standard deviation to answer research questions while the hypothesis was analyzed using chi-square(χ^2) and tested at 0.05 level of significance. The result of the study revealed among other factors, teachers method of teaching, teacher-students relationship, use of abusive words on students as causes of mathematics phobia among students. Based on the result it was recommended that, mathematics teachers should be retrained periodically in order to have ideas of innovative approaches of teaching mathematics to avoid phobia.

Keywords: causes, solutions, mathematics phobia, innovative approaches.

Introduction

Mathematics is a subject that determines individuals' functionality in any given society. Mathematics can be defined as the science of numbers and space and the language of science and technology. It is an essential requirement in every field of intellectual endeavor and human development to cope with the challenges of life. It can also be seen as the queen and servant of the school subjects since it cuts across the school curriculum (Martins, 2013). Fajemidagba, Salman and Ayinla (2012) see mathematics as a core subject and tool for the development of any science-based discipline which includes; technology, astronomy, graphics, industry and analytical reasoning in daily living. According to Onwuachu and Nwakonobi (2009) in Olaniyan and Salman (2015) mathematics is the foundation on which the whole essence of living revolves and the platform for scientific and technological innovations. Mathematics is much more than a collection of definitions, theories and proofs. It is a richly woven fabric of connections that involves visualizing, imagining, manipulating, analyzing, abstracting an associating ideas (Gbolagade, Waheed & Sangoniya: 2013).

Mathematics encourages the habit of self-reliance and assists learners to think and solve their problems themselves (Adedayo; 1997). The relevance of mathematics cuts across all works of life and cannot be overemphasized. The technological, scientific and economic breakthrough of any nation depends on their level of mathematics education. Mathematics helps a man to give exact interpretation to his ideas and conclusions. It is the numerical and calculation part of man's life and knowledge. It plays a predominant role in our everyday life and it has become an indispensable factor for the progress of our present day world (Roochi, n.d). Makarfi (2001) noted that mathematics has played an important role in the development of society from the pre-historic era to the present and its role is more significant than ever before and still be more significant in the future.

The great recognition given to mathematics as a result of its contribution to the development of the society is expected to translate to a satisfactory students' performance in the subject but, the reverse is the case in Nigerian Society. Elekwa (2010) remarked that students exhibit non-chalant attitude towards mathematics, even when they know that they need it to forge ahead in their studies and in life. Such students who have already conditioned their minds that mathematics is a difficult subject are usually not serious in the learning of mathematics and therefore perform poorly in mathematics tests and examinations (Ihendinihu; 2013).

Tshabalala and Ncube (2013) in Sa'ad, Adamu and Sadiq (2014) pointed that shortage of well trained teachers, inadequate of teaching facilities, lack of funds to purchase necessary equipment, poor quality of textbooks, large classes, poorly motivated teachers, lack of laboratories and libraries, poorly coordinated supervisory activities, interference of the school system by the civil services, incessant transfer of teachers and principals, automatic promotion of pupils, the negative role of public examinations on the teaching-learning process and inequality in education opportunities all hamper the smooth acquisition of mathematics knowledge. Also one of the greatest causes of poor performance in mathematics among secondary schools students in mathematics is phobia.

Okigbo (2010) citing Aprebo indicated that phobia is an academic sickness whose virus has not yet

been fully diagnosed for an effective treatment in the class and the symptoms of this phobia are usually expressed on the faces of mathematics students in their classes. Sloan (2002) observed the construct as related to personality characteristics, negative attitudes towards mathematics, mathematics avoidance, poor mathematics background, poor teaching behaviour, achievement levels, lack of confidence and negative experiences in school. Olaniyan et al (2015) pointed out that mathematics phobia is regarded as mathematics weakness in students that deals with psychological dimension of learning. Tillfors (2003) defined phobia as learned emotional responses and it causes frequent severe and intense anxiety. Mathematics Phobia can be defined as a feeling of anxiety that hinders one from efficiently tackling mathematical problems. Many students have negative attitude towards mathematics which influences their approach to solving mathematics problems which may result to phobia and subsequent poor performance in the subject area. Tobias and Weissbrod (1980) indicated that mathematics phobia is the panic, helplessness, paralysis, and mental disorganization that arise among some people when they are required to solve a mathematical problem. Gier and Bisanz (1995) see the construct as feeling of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations. Prolonged feeling of mathematics phobia impacts negatively on the interest of students in the subject.

Statement of the Problem

Considering the relevance attached the study of mathematics with respect to its contributions in scientific, technological and economic development of a nation, poor achievement in the subject due to persistent phobia will pose danger in the developmental stride of the nation. Therefore, this study was carried out to answer the question: what are the causes of and solutions to mathematics phobia among secondary school students?

Purpose of the Study

The main purpose of this study was to determine the causes and solutions of mathematics phobia among secondary school students. Specifically, it will determine.

1. Teachers' perceived factors causing mathematics phobia among secondary school students.
2. Teachers' perceived solutions to mathematics phobia among secondary school students.

Research Questions

The following research questions guided the study.

1. What are teachers' perceived factors causing mathematics phobia among secondary school students.
2. What are teachers' perceived solutions to mathematics phobia among secondary school students.

Hypotheses

The following hypothesis was formulated for the study.

Ho1: There is no significant relationship between teachers' perceived factors causing mathematics phobia and secondary school students' achievement.

Methodology

The population of the study consists of all the five hundred and eighty (580) teachers in the fifteen (15) Government own secondary schools in Owerri North Local Government Area of Imo State. A sample of hundred and ten (110) mathematics teachers was drawn for the study through simple random sampling technique. This consists of seventy (70) females and forty (40) male mathematics teachers.

The descriptive survey research design was adopted in determining the causes and solutions of mathematics phobia among secondary school students in Owerri North Local Government. The instrument for data collection was researchers made 15-item likert 4-point type of questionnaire titled "Causes and Solutions of Mathematics Phobia (CSMP)" which was made up of two parts. Part A dealt with respondents demographic variables while part B dealt with items relevant to the objective of the study.

The face and content validity of the questionnaire were determined by a measurement and evaluation expert, a psychologist and a mathematics educationist. Their inputs guided the restructuring of the instrument. To determine the reliability of the instrument, it was pilot tested with twenty 20 teachers outside the study sample and their responses were analyzed using Cronbach's alpha formula which gave a reliability coefficient (r) of 0.83 which was acceptable for the study.

The instrument was administered on face to face bases by the researcher through the head teachers of the schools selected for the study. The respondents were briefed on the objectives of the study and were assured that any information given will be confidentially used for the study. They were then allowed to read through the instruction and fill out the questionnaires as directed. The instrument was collected on the spot after completion and all the copies of the questionnaire given out were retrieved.

The data generated were collected and tabulated. The research questions were answered using mean and

standard deviation while the hypothesis was analyzed using chi-square (χ^2) statistical tool tested at 0.05 level of significance. In answering the research questions, any item with response mean within 2.50 and above was accepted while any below 2.50 was rejected.

Results

Research Question One: What are teachers' perceived factors causing mathematics phobia among secondary school students.

Table 1: Teachers responses on causes of mathematics phobia among students

S/N	Factors causing mathematics phobia	Mean (\bar{x})	SD	Remark
1	Teachers' method of teaching causes phobia among students.	3.10	0.65	Accept
2	Students' inability to solve mathematical problems results to phobia.	2.93	0.67	Accept
3.	Poor teacher-student relationships causes phobia among students.	2.86	0.70	Accept
4	Too many take home assignment causes phobia among students.	2.72	0.83	Accept
5	Teachers' inability to break down concept into simple and understandable units results to phobia.	2.90	0.71	Accept
6	Non application of instructional materials while teaching causes phobia.	3.21	6.63	Accept
7	Teachers' use of abusive words on students causes phobia.	3.00	0.68	Accept
8	Non conducive learning environment causes phobia among students.	2.74	0.81	Accept
9	Students career choice lead to phobia.	3.00	0.67	Accept
10	Students' inadequate background in calculations causes phobia.	2.84	0.74	Accept
11	Students' poor mathematics background causes phobia.	2.80	0.71	Accept
12	Students' negative attitude towards mathematics leads to phobia.	3.03	0.66	Accept
13	Abstract nature of mathematics leads to phobia.	3.00	0.65	Accept
14	Long procedures of solving mathematical problems leads to phobia.	2.68	0.80	Accept
15	Lack of reading materials in mathematics causes phobia.	2.63	0.80	Accept
Grand Mean = 2.90				

Table 1 shows that items 1-15 were all accepted as causes of mathematics phobia among students because they had response mean greater than the instrument scale mean of 2.50. Also the grand mean of 2.90 is higher than the scale mean which implies high perception of those items as causes of mathematics phobia among teachers.

Research Question Two: What are teachers' perceived solutions to mathematics phobia among secondary school students.

Table 2: Teachers perceived solutions to mathematics phobia among students.

S/N	Solutions to Mathematics phobia among students	Mean (\bar{x})	SD	Remark
1	Use of instructional materials in teaching mathematics	2.98	0.63	Accept
2	Use of students' centered/innovative teaching approach.	2.91	0.61	Accept
3.	Teaching mathematics in a conducive atmosphere.	2.72	0.69	Accept
4	Reduction in the number of assignment given at a time.	2.64	0.83	Accept
5	Developing a good teacher-student relation.	2.81	0.73	Accept
6	Motivating students to have positive attitude toward mathematics.	2.85	0.70	Accept
7	Breaking down topics into understandable small units.	2.75	0.83	Accept
8	Provision of reading materials for students.	2.61	0.85	Accept
9	Ensuring that only qualified teachers teach the subject.	2.84	0.76	Accept
10	Application of modern facilities such as ICTs in teaching mathematics.	2.80	0.71	Accept
11	Organizing seminars, and workshops to train teachers on current issues in the subject.	2.80	0.71	Accept
12	Teachers having good knowledge and presentation of the subject.	2.85	0.77	Accept
13	Encouraging those regarded as low achievers through attention.	2.62	0.87	Accept
14	Mathematics counselors guiding and advising students on the subject.	2.70	0.71	Accept
15	Making mathematics curriculum in such a way that students can cope with the content	2.83	0.74	Accept
Grand Mean = 2.79				

Table 2 shows that items 1-15 had response mean greater than the scale mean of 2.50; also, the grand mean of 2.79 is above the scale mean. Based on the result, they were all accepted as solutions to mathematics phobia.

Ho1: There is no significant relationship between teachers' perceived factors causing mathematics phobia and secondary school students' achievement in mathematics.

Table 3: Summary of chi-square (χ^2) analysis

Respondents	No of Rows	No of Colum	Df	X ² -cal	X ² -critical	Decision
110	15	4	42	201.121	58.124	Reject null

Table 3 shows that calculated chi-square (χ^2) value (201.121) is greater than the critical value (58.124) at 0.05 level of significance. Based on the result, the null hypothesis is rejected and the alternative accepted at 0.05 level of significance. This implies that, there is a significant relationship between teachers' perceived factors causing mathematics phobia and secondary school students' achievement in mathematics.

Discussion of Findings

The result of the study revealed that teachers were of positive perception of factors causing mathematics phobia among secondary school students. These includes, teaching methods, inability to solve mathematical problems, poor teacher-students relationship, giving too many assignments, non-application of potent instructional materials, use of abusive words, non conducive learning environment, poor mathematics background, students negative attitude towards mathematics, abstract nature of mathematics and lack of reading materials. Also, these factors were statistically significant in relationship with mathematics achievement of students. These results are in consonance with the findings of Olaniyan et al (2005) and Gbolagade et al (2013) which revealed factors responsible for mathematics phobia and showed statistical influence of the factors on students' mathematics achievement.

The study also revealed teachers perceived solutions to mathematics phobia among students. These includes among others, good teacher-student relationship, use of students-centered/innovative approach of teaching, counseling, positive attitude towards mathematics, improved mathematics curriculum, breaking down topics into units, application of ICTs in teaching mathematics etc. This result is in agreement with the findings of Olaniyan et al (2015) which indicated solutions to mathematics phobia among students.

Conclusion

The result of the study revealed causes and solutions to mathematics phobia among secondary school students as perceived by mathematics teachers.

Recommendation

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

1. Mathematics teachers should be re-trained periodically in order to have ideas of innovative approaches of teaching mathematics to avoid phobia among students.
2. There should be counseling units in secondary schools to re-direct students thinking about mathematics via letting them know the importance and usefulness of mathematics in their everyday to day activities.
3. Mathematics curriculum should not be overloaded at the secondary school level in other not to cause phobia among students.
4. There should be good teacher-student relationship to enable teachers to understand their students' problems.

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