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ASSESSMENT OF THE CAUSES OF MATHEMATICS PHOBIA AMONG SECONDARY STUDENTS IN RIVERS STATE

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Abstract

The study focused on Assessment of the causes of mathematics phobia among secondary school students in Ogba/Egbema/Ndoni local Government Area of Rivers State. The descriptive survey research design was adopted in carrying out the study. A sample of 100 senior secondary school students was selected for the study through simple random sampling technique. The instrument of the study wasa twenty (20) item structured questionnaire of 4-points likert type titled "Mathematics Phobia Questionnaire (MPQ)"The reliability coefficient of (MPQ) was determined using the Cronbach's Alpha formula which yielded 0.88. The generated data was analyzed using mean, standard deviation and t-test. The result of the study revealed that; teachers' method of teaching, teachers' qualification, teachers' experience and non-usage of instructional materials are major 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.

KEY WORDS: Assessment, Causes, Mathematics and Phobia.

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. 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. It can also be seen as the queen and servant of the school subjects since it cuts across the entire school curriculum (Martins, 2013). 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 associating ideas (Gbolagade, Waheed & Sangoniyi 2013). Mathematics is an essential discipline in today's world. It is a powerful tool for understanding the world around us and our perspective of the important issues facing us as individuals, families, businesses, and nations. Mathematics surrounds us; we see and use mathathematical skills and capabilities every day–from balancing our checkbooks to advertising agencies to doctors; from retailers to builders, lawyers and accountants. Everyone needs some level of specific mathematics knowledge. Most professions use mathathematics to perform their jobs better and to get ahead in the world.

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 the Nigerian Society. Elekwa (2010) remarked that students exhibit non-chalant attitudes 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). Mathematics has evolved over many centuries to help solve problems. Mathematics teaches us to think logically; to identify and state the problems clearly; to plan how to solve the problems; and then to apply the appropriate methods to evaluate and solve the problems.

Tshabalala and Ncube (2013) in Sa'ad, Adamu and Sadiq (2014) pointed out that shortage of well trained teachers, inadequacy 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, 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. 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. Hence this study is carried out to access the fundamental causes of Mathematics phobia among secondary school students in Rivers State.

Statement of the Problem

It is particularly disappointing to find that mathematics has remained one of the least successful subjects in Nigerian schools despite its importance, and also despite the time it receives in an average school system. Many students have the obnoxious notion that mathematics learning is an unattainable task. Not many school children have interest in the subject even right from the primary school level. A great majority of students believe that mathematics competence is reserved for a selected few. Unfortunately, many adults also share this same feeling. It is common to have Nigerian adults declare their lack of competence in mathematics publicly without any feeling of shame whatsoever.

Considering the relevance attached to 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 assess the causes of mathematics phobia among secondary school students in Rivers State.

Purpose of the Study

The major purpose of this study was to assess the causes of mathematics phobia among secondary school students River State. More specifically the study was designed to achieve the following objectives;

1. To determine whether Teachers' exposition/experience influences mathematics phobia.
2. To determine whether Teachers' qualification influences mathematics phobia.
3. To determine whether Teachers' non-use of Instructional Materials influences mathematics phobia.
4. To determine whether teachers' Methodologies influences mathematics phobia.

Research Questions

The following research questions guided the study.

1. To what extent does teacher's exposition/experience influence mathematics phobia among secondary school students?

2. To what extent does teacher's qualification influence mathematics phobia among secondary school students?
3. To what extent does teachers use of instructional materials influence mathematics phobia among secondary school students?
4. To what extent does teachers' methodology influence mathematics phobia among secondary school students?

Hypothesis

The following hypotheses were formulated for the study.

Ho1: There is no significant difference in the experience/expositions of mathematics teachers' on secondary schools Mathematics phobia.

Ho2: There is no significant difference in mathematics teachers' qualification on secondary schools Mathematics phobia.

Ho3: There is no significant difference on the use of instructional materials on the secondary schools Mathematics phobia.

Ho4: There is no significant difference on teachers' methodologies on the secondary schools mathematics phobia.

Methodology

The study adopted a descriptive survey design.

The population of the study consists of the five hundred and seven (507) senior secondary schools students (S.S.2) in the 19 senior secondary schools in Ogba/Egbema/Ndoni Local Government Area of Rivers State during the 2017/2018 academic year. A sample of one-hundred (100) students in five secondary schools was drawn for the study through simple random sampling technique.

The instrument for data collection was structured in the researchers' questionnaire titled "Mathematics Phobia Questionnaire (MPQ)" which was made up of 20-item likert design type measurement on 4-point rating scale.

The instrument was validated by experts in measurement and evaluation and mathematics educators of the Rivers State University and University of Port Harcourt. The reliability of the instrument was established using Crounbach's alpha formular which gave a reliability coefficient(r) of 0.88. The instrument was administered by the researcher on face to face bases with assistance of the head teachers of the schools selected for the study. The respondents were briefed on the objectives of the study. 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 score and standard deviation while the hypothesis was analyzed using t-test 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:

To what extent does teacher's exposition/experience influence mathematics phobia among secondary students?

Table 1: Mean response of secondary school pupils

SN	Concerns	**Senior Secondary School Boys**			**Senior Secondary School Girls**		
		Mean(x)	SD	Decision	Mean(X)	SD	Decision
1	Mathematics Teachers are unable to breakdown math's concepts into simple units	3.61	0.79	Agree	3.62	0.89	Agree
2	Mathematics Teachers are hostile to the students	3.60	0.77	Agree	3.60	0.77	Agree
3	Mathematics Teachers apply corporal punishment on their students	3.62	0.80	Agree	3.60	0.77	Agree
4	Mathematics teachers start lessons with questions	3.61	0.79	Agree	3.60	0.77	Agree
5	Solving math's problem on the board without illustration or explanations	3.60	0.77	Agree	3.60	0.77	Agree
	TOTAL	18.04	3.92		18.03	3.90	
	AVERAGE	3.608	0.78		3.606	0.78	

From the data presented in table 1 above, it clearly reveals that senior secondary students' consent to the 5-items outlined on the table as measures in which mathematics teacher's experience/exposure induces phobia in secondary school students in Rivers State. From the table 1 above, the mean responses ranges from 3.60 – 3.62. The male and female secondary students had the same mean score on items 2, 4, and 5 which revealed that mathematics teachers are hostile to their students, starts mathematics lessons with questions and directly go ahead to solve mathematics problems on the board without illustration or explanations.

Research Question 2:

To what extent does teacher's qualification influence mathematics phobia among secondary school students?

Table 2: Mean response of senior secondary school pupils

SN	Concerns	Senior Secondary School Boys			Senior Secondary School Girls		
		Mean(x)	SD	Decision	Mean(X)	SD	Decision
1	Most mathematics Teachers are not trained mathematics educators.	3.54	0.72	Agree	3.56	0.74	Agree
2	Lack of qualified mathematics Teachers in our secondary schools	3.56	0.74	Agree	3.54	0.72	Agree
3	The use of Primary teachers to teach post-primary mathematics	3.55	0.73	Agree	3.55	0.74	Agree
4	Adoption of graduates from other fields to teach mathematics.	3.56	0.74	Agree	3.56	0.74	Agree
5	Most Qualified Mathematics teachers are occupied hence has little or no time for secondary school students.	3.54	0.72	Agree	3.55	0.73	Agree
	TOTAL	17.75	3.65		17.76	3.66	
	AVERAGE	3.55	0.73		3.55	0.73	

From the table 2 above, the senior secondary students' all agreed that all the 5-items outlined contribute to phobia in mathematics among secondary school students in Rivers state. The mean score ranges from 3.54 - 3.56. And the average mean score for both respondents are the same. The male and female secondary students respectively accept that qualifications of mathematics teachers are a factor that induces phobia in learning of mathematics in our schools in Rivers State.

Research Question Three:

To what extent does teachers use of instructional materials influence mathematics phobia among secondary school students?

Table 3: Mean response of secondary school pupils

SN	Concerns	**Senior Secondary School Boys**			**Senior Secondary School Girls**		
		Mean(x)	SD	Decision	Mean(X)	SD	Decision
1	Most mathematics Teachers do not use instructional materials to teach.	3.59	0.76	Agree	3.58	0.75	Agree
2	Lack of equipped mathematics laboratory in our secondary schools	3.60	0.77	Agree	3.60	0.77	Agree
3	The use of instructional material to teach is seen as inconvenience.	3.60	0.77	Agree	3.60	0.77	Agree
4	Lack funds to provide teaching aids.	3.58	0.75	Agree	3.59	0.76	Agree
5	Lack of modern Mathematics text-books and reading materials,	3.61	0.79	Agree	3.60	0.77	Agree
	TOTAL	17.99	3.86		17.98	3.84	
	AVERAGE	3.598	0.77		3.596	0.77	

From the table 3 data above, it shows that the five items outlined was agreed upon by senior secondary schools students as the ways in which instructional materials contribute to mathematics phobia among secondary students in Rivers State. Looking at the table 3 above, the mean scores range from 3.58 - 3.60. And the male secondary school students mean responses on items 2 and 3 are the same with that of the female secondary school students.

Research Question Four:

To what extent does teachers' methodology influence mathematics phobia among secondary school students?

Table 4: Mean response of secondary school pupils

SN	Concerns	Senior Secondary School Boys			Senior Secondary School Girls		
		Mean(x)	SD	Decision	Mean(X)	SD	Decision
1	Use of long procedures and methods to solve problems.	3.60	0.77	Agree	3.58	0.75	Agree
2	The use of many terms and complex terminologies during classes	3.58	0.75	Agree	3.60	0.77	Agree
3	No good teacher-student relation	3.59	0.76	Agree	3.59	0.76	Agree
4	Absence of demonstration and interactive teaching methods.	3.59	0.76	Agree	3.59	0.76	Agree
5	No improved teaching styles and lack of motivation or incentives to teachers/ students	3.61	0.79	Agree	3.60	0.77	Agree
	TOTAL	17.98	3.84		17.96	3.81	
	AVERAGE	3.596	0.77		3.592	0.76	

Table 4 above shows that senior secondary school student's consented to the five outlined items as measures in which teachers' methodology of teaching influences phobia in mathematics among secondary school students in Rivers State. The mean score ranges from 3.58 – 3.61, while the average scores for both respondents was 3.596 and 3.592 respectively. It is interesting to note that item 4 on table 4 above was the item that has the mean score of 3.59 from both respondents. That item stressed that Mathematics teachers do not use teaching aids to interact freely in class with their students while item 5 on tables 4 above highlights the need to enforce modern teaching styles; motivate and provide incentives to enhance the teaching and learning of mathematics in our secondary schools in Rivers State. Infect, item 5 on table 4 above got the highest mean response from the mean rating of the boys' secondary school.

Hypothesis

HO1: There is no significant difference in the experience/expositions of mathematics teachers' on secondary schools Mathematics phobia.

This hypothesis was tested using the t-test and the result was presented in table 5-below:

Table 5: t-test Analysis for Mathematics teachers' experience.

Respondents	Mean	SD	Numbers	DF	Standard error	t(cal)	t-crit
Senior secondary school Boys	3.608	0.784	70	68	0.23	0.009	1.96
Senior secondary school Girls	3.606	0.780	130				

p > -0.05

From table 5, it was revealed that the calculated t-value of 0.009 is less than the t-critical value of 1.96 with 68 as the degree of freedom and alpha level of 0.05. Therefore, the null hypothesis is retained at p> -0.05. Hence, there is no significant difference between the experience/expositions of mathematics teachers' in both the male and female secondary schools in Rivers state.

Ho2: There is no significant difference in mathematics teachers' qualification on secondary schools Mathematics phobia.

The table below illustrates how the hypothesis was tested using the t-test.

Table 6: t-test Analysis for Mathematics teachers' qualification.

Respondents	Mean	SD	Numbers	DF	Standard error	t(cal)	t-crit
Senior secondary school Boys	3.550	0.731	70	68	0.20	0.015	1.96
Senior secondary school Girls	3.553	0.732	130				

p > -0.05

From table 6, it was revealed that the calculated t-value of 0.015 is less than the t-critical value of 1.96 with 68 as the degree of freedom and alpha level of 0.05. Therefore, the null hypothesis is retained at p> -0.05.Hence, there is no significant difference between the mean responses of male and female secondary school students with respect to mathematics teachers' qualification in secondary schools in Rivers State.

Ho3: There is no significant difference in the use of instructional materials on the secondary schools Mathematics phobia.

The table below illustrates how the hypothesis was tested using the t-test.

Table 7: t-test Analysis for teachers' use of instructional materials.

Respondents	Mean	SD	Numbers	DF	Standard error	t(cal)	t-crit
Senior secondary school Boys	3.598	0.772	70	68	0.22	0.014	1.96
Senior secondary schools Girls	3.596	0.769	130				

p > -0.05

From table 7, it was revealed that the calculated t-value of 0.014 is less than the t-critical value of 1.96 with 68 at the degree of freedom and alpha level of 0.05. Therefore, the null hypothesis is retained at p> -0.05.Hence, there is no significant difference in the use of instructional materials among the male and female secondary schools in Rivers State.

Ho4: There is no significant difference in teachers' methodologies on the secondary schools mathematics phobia.

The table below illustrates how the hypothesis was tested using the t-test.

Table 8: t-test Analysis for Mathematics teachers' methods of teaching.

Respondents	Mean	SD	Numbers	DF	Standard error	t(cal)	t-crit
Senior secondary school Boys	3.596	0.768	70	68	0.22	0.02	1.96
Senior secondary schoolgirls	3.598	0.762	130				

p > -0.05

From table 8, it was revealed that the calculated t-value of 0.02 is less than the t-critical value of 1.96 with 68 as the degree of freedom and alpha level of 0.05. With an insignificant standard error of 0.22.Therefore, the null hypothesis was retained at p> -0.05. Hence, there is no significant difference between methodologies used in teaching mathematics in both male and female secondary schools in Rivers State.

Discussion of Findings

The discussion of the findings was presented to correspond with the research questions posed. The result of the investigation shows that there is no significant difference between causes of mathematics phobia among the male and female secondary school students in Rivers State. All the 5 items outlined under mathematics teacher's experience as one of major causes of phobia among secondary schools with the average mean of 3.608 and 3.606 respectively,

Also the hypothesis shows that that the calculated t-value of 0.009 is less than the t-critical value of 1.96, Therefore, the null hypothesis is retained at p> -0.05. These attributes of teacher's experience and exposure include among others; the inability of mathematics teachers to breakdown complex maths concepts into simpler units, teacher's hostile attitudes to students, administering corporal punishments and starting mathematics lessons with questions. This may be attributed to the fact that previous studies such as Hembree, (1990); Vinson, (2001); Bursal & Paznokas, (2006); Gresham, (2007) and Sloan, 2010) have shown that mathematics anxiety levels could be reduced among teachers with an emphasis on understanding mathematics through the use of manipulates, and classroom discussions. In particular, the use of manipulates not only reduces mathematics anxiety levels but also gives better understanding of the concepts, improves confidence levels of the learners, and produces positive attitudes toward mathematics (Sloan, 2010).

Secondly; there is no significant difference between the mean responses of male and female secondary school students with respect to mathematics teachers' qualification in secondary schools in Rivers state; specifically, the participants attributed the causes of mathematics anxiety to their teachers' actions, insensitive comments, mean behaviours, as well as their own lack of understanding of mathematics concepts. Teachers' actions, such as fast-paced instruction, lack of review on the past mathematics concepts etc., all stems from the qualification of mathematics teachers. In Harber-Peters, V.F.A (2001), Brady and Bowd's (2005), and Bornstein, D. (2011) study, inadequacy experienced through the teacher's qualification were reported by their findings. Perry (2004) found insensitive mathematics teachers as the cause of mathematics anxiety experienced among college students.

Thirdly; there is no significant difference in the use of instructional materials. The result tends to be in line with the work of Abimbable (2004), Eze (2005) which showed that students performance improved on using instructional materials to teach mathematics in schools. This agrees with earlier findings of (National Council of Teachers of Mathematics, 2014). However; Ale, S. O. and Adedula, L.O. (2010) support the fact that visual evidence not only stimulates interest but helps to build mathematical meaning and understanding.

Finally, there is no significant difference between methodologies used in teaching mathematics in both male and female secondary schools in Rivers State. 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 among others, good teacher-student relationship, use of students-cantered/innovative approach of teaching, counselling, 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. This finding is also consistent with other studies involving White and Black college students (Fuson, 2007; Merritt, 2011); and adult students from different ethnic groups that reported no differences in mathematics anxiety with respect to race and ethnicity but varies with teacher's methodology and approach.

Conclusion

The result of the study revealed causes of mathematics phobia among secondary school students as perceived by both the male and female senior secondary school students in Rivers State.

Recommendations

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 approach of teaching mathematics to avoid phobia among students.
2. There should be counselling units in secondary schools to re-direct students thinking about mathematics via letting them know the importance and usefulness of mathematics in their every day to day activity.
3. Mathematics curriculum should not be over loaded 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
5. Use of instructional materials in teaching mathematics should be encouraged
6. Motivating students to have positive attitude toward mathematics is a task that must be done.
7. Breaking down mathematics topics into understandable small units by the teachers is very necessary.
8. Ensuring that only qualified teachers teach the subject will go a long way to ameliorate phobia.
9. Organizing seminars and workshops to train teachers on current issues in the subject is where the Government needs to come in.
10. Application of modern facilities such as ICTs in teaching mathematics should be encouraged.

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