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Mathemaphobia and Teaching Learning Materials as Correlates of Pupils Achievement in Mathematics

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Abstract
The importance of mathematics to the effective daily living and contributions to the scientific and technological advancement of the society cannot be over-emphasized. As important as this subject is, there seems to be a lot variable that promote or inhibit the pupils' performance in it as various level of Nigerian educational system. The study investigated mathemaphobia and teaching-learning materials as correlates of pupils' achievement in mathematics. Correlation design was adopted in the study. A sample size of 1,080 students and 48 mathematics teachers were randomly selected for the study. Three instruments (Students Mathemaphobia Questionnaires (SMQ), Teaching-learning Materials Inventory (TMI) and Mathematics Achievement Test) were used for data collection. SMQ was adapted from Sokun (1998) and was revalidated by the researcher while SMQ and TMI were constructed and validated by the researcher. The results of the finding showed a linear relationship between the predictors and the criterion; the combination of predictor variables and students achievement in basic mathematics yielded a multiple correlation of 0.574 with students' achievement in basic mathematics. The multiple correlation of 0.574 indicates that there is moderate relationship between the predictors and the students' achievement in basic mathematics; it implied that the obtained regression equation resulting from the set of the four (4) predictor variables allow reliable prediction of students' achievement in Mathematics. The four predictor variables accounted for 30.7% of the observed variance in the students' achievement in basic mathematics; only mathemaphobia contributed significantly to the prediction model while the remaining predictors' contributions were not significant. The study recommends adequate provisions of teaching materials to various basic schools on Oyo state among others.
Keywords: mathemaphobia, teaching-learning materials, mathematics

1. Introduction

Mathematics which evolved from counting, calculating, measurement and systematic study of shapes and motion of physical objects is referred to as the queen of science, language of nature and a fundamental pillar of civilization both in practical and in aesthetic sense. On a basic level, one needs to be able to count, multiply, subtract and divide to cope with daily life activities such as counting, managing money, driving, cooking, selling, buying, all these involve mathematics unintentionally. Mathematics pervades literally every field of human endeavour and plays a fundamental role in economic development of a country. Tiemo cited in Oyegoke (2014) emphasized that mathematics is needed by individual in the society for the execution of their day to day activities and helps people to think and act logically, analytically and critically. Adegbiyi (2007) stressed that all students are made to study mathematics at both primary and secondary levels of education, whether they have aptitude for it or not due the recognition given to its importance throughout the world. Mathematics is an essential tool in many fields. That is why the Federal Government of Nigeria took a bold step to encourage the teaching of mathematics in schools with the establishment of National Mathematics Centre by a decree No 40 of National Policy on Education, 1981. The decree empowers the centre to encourage and support activities leading to the improvement of the teaching of mathematical sciences at all levels of the educational system and also to implement national set goals in the development of mathematical science throughout the federation. The centre since its inception has introduced a lot of programmes and activities to upgrade the teaching and learning of mathematics in schools and in tertiary institutions of learning. The construct of 'mathemaphobia' and its attendant effect on students' mathematics achievement has received considerable attention among researchers and mathematics educators in recent years. Mathemaphobia otherwise known as mathematics anxiety is generally viewed as feelings of fear, avoidance and dread when dealing with any situation relating to mathematics. Mathematics anxiety has been defined as a feeling of tension and anxiety that appears when someone is engaged in the manipulation of figures to solve mathematical problems in both academic and daily-life situations; It is a repetitive process that is based on information gathered by individuals from their surroundings, this information is accumulated and becomes the personal experience of individuals, which finally informs their beliefs toward mathematics (Aremu 2009; Puteh, 2002). Various researches have been carried out on the relationship between mathemaphobia and achievement of students in mathematics. Sherman and Wither (2003), conducted a five-year study on students from the age of 6 to the age of 10 which revealed that the level of mathematics anxiety in students is strongly related to student achievement. This is supported by findings from the studies conducted by Khatoon and Mahmood (2010); Satake and Amato (1995) and Yuksel-Sahin (2008). In

addition, the study of Elenchothy (2007) showed that students with high mathematics anxiety will realize low achievement in mathematics. In a nutshell, mathematics anxiety is inversely related to student achievement. Teaching learning materials have been defined by various Educationalists. Some of the Terminologies used for teaching and learning materials are teaching aids learning and instructional materials, audio and visual materials, media of instruction, truly are devices through which teaching and learning are done in school. They constitute an integral part of teaching and learning process with the intent and purpose of making learning more real, meaningful lively and sustainable. Although learning can occur as a result of newly acquired skills, knowledge, perception, facts, principles and new information at hand but it can further be reinforced with teaching aids of different varieties because they stimulate, motivate as well as arouse learner's attention. Teaching aids could perform most of the information imparting functions of the average teacher.This paper focused on the predicting students' performance in mathematics through mathemaphobia and teaching-learning resources.

1.1 Statement of the problem

Different researches have looked into various issues that affect academic performance of students in relation with mathematics as a subject. Issues related to factors such as students' characteristics, teachers' characteristics, teaching and learning environmental factors, home background, gender issues, parental variables and others. However, there seems to be shortage of literature on the study that focussed on the prediction of students' achievement in mathematics through mathemaphobia and teaching –learning materials. Infact, there is no known study that used teaching-learning materials to predicts students' performance in mathematics. Hence, this work examines the extent to which mathemaphobia and teaching-learning resources predict students' achievements in Mathematics.

1.2 Research Questions

1. What type of relationship exists among the predictor variables (mathemaphobia teaching-learning materials availability, teaching-learning materials adequacy and teaching-learning materials utilization) and the criterion?
2. Does the obtained regression equation resulting from the set of the four (4) predictor variables (mathemaphobia, teaching-learning materials availability, teaching-learning materials adequacy and teaching-learning materials utilization) allow a reliable prediction of students' achievement in Mathematics?
3. Which of the four (4) predictor variables (mathemaphobia, teaching-learning materials availability, teaching-learning materials adequacy and teaching-learning materials utilization) are most influential in predicting students' achievement in Mathematics?
4. Are there any predictor variables that do not contribute significantly to the prediction model?

1.3 Significance of the study

The study was carried out to examine the extent to which four variable (mathemaphobia and teaching learning materials in terms of availability, adequacy and utilization) contribute to students' achievement in mathematics. The composite and relative contributions of each of the variables were also examined. Hence the findings of the study will be useful to governments, teachers, parents and students and this will have a great impact in the field of general and special education.

2. Methodology

The study adopted a correlation design. This is because the independent variables to be investigated had already occurred and cannot be further subjected to manipulation. A sample size of 1,080 students and 48 mathematics teachers were randomly selected for the study. Three instruments were used for data collection. They were Students Mathemaphobia Questionnaires (SMQ), Teaching-learning Materials Inventory (TMI) and Mathematics Achievement Test. SMQ was adapted from Sokun (1998) and was revalidated by the researcher while SMQ and TMI were constructed and validated by the researcher. The content validity of the SMQ was established through the input of some experts in the field of psychology while its construct validity and reliability was established with Cronbach Alpha method and its reliability coefficient was found to be 0.84. The reliability coefficients of sub-sections of the TMI were found to be 0.87, 0.94 and 0.85 respectively. The difficulty level of each items in MAT were between 0.40 and 0.60 and discrimination power 0.3 and above while its internal consistency was established through Kuder-Richardson 20 (KR-20) and it was found to be 0.82. Data collected were analyzed with multiple regression. The predictors variables (X) are Mathemaphobia, Teaching-Learning Materials Availability, Teaching-Learning Materials Adequacy and Teaching-Learning Materials Utilization while the criterion Variable(Y) is Pupils' Achievement in Mathematics

3. Results and Discussion

3.1 What are the profiles of the respondents?

Age Distribution: Table 1 showed that the respondents' ages spanned from 10 years to 18 years. The predominant age group is 13-15years (57.7%), followed by age group 10–12 years while the smaller number of respondents falls between 16 years and 18 years.

Gender Distribution: From Table 2, it can be seen that 50.6% of sampled students are female while the remaining 49.3% are male. Table 3 indicated that majority 70.8% of the sampled mathematics teachers are male while the remaining 29.2% are female.

Qualification Distribution: It is indicated in table 4 that highest percentage (56.2%) of the sampled school administrators are first degree holders, 37.5% are masters' holders while 6.2% are PhD holders.

3.2 Research Question 1: What type of relationship exists between the predictors (mathemaphobia, teaching-learning materials availability, teaching-learning materials adequacy and teaching learning materials utilization and the criterion (students' achievement in mathematics)?

Table 5 showed the relationship among the predictor variables and the criterion variable. From the analysis, it can be seen that the mathemaphobia has the highest correlation coefficient with the criterion variable while utilization of teaching learning materials has the lowest correlation coefficient with the criterion variable. Also, the relationship among the Predictors and the criterion variable is generally low. Mathemaphobia ($r(1080) = 0.342$, $p > 0.05$), teaching-learning materials availability ($r(1080) = 0.247$, $p > 0.05$), teaching-learning materials adequacy ($r(1080) = 0.241$, $p > 0.05$) and teaching learning materials utilization ($r(1080) = 0.164$, $p > 0.05$) have a positive but low correlation with the students achievement in Mathematics.

3.3 Research Question 2: Does the obtain regression equation resulting from the set four (4) predictor variables allow reliable prediction of students' achievement in mathematics?

The ANOVA table 6 showed a linear relationship between the predictors and the criterion and it is significant. Also from table 6, the combination of predictor variables and students' achievement in basic mathematics yielded a multiple correlation of 0.574 with students' achievement in basic mathematics. The multiple correlation of 0.574 indicated that there is moderate relationship between the predictors and the students' achievement in basic mathematics. The analysis showed that 30.7 % of the variance observed in students' achievement in mathematics is accounted for by the four predictor variables and it is statistically significant. Tables 6 and 7 showed that the prediction model obtained from the set of four predictor variables is reliable in predicting students' achievement in mathematics. $F(9,1057) = 57.81$, $p<0.05$

3.4 Research Question 3: Which of the four (4) predictor variables are the most influential in predicting students' achievement in mathematics?

Table 8 indicated estimate of contributions of predictor variables to the criterion variable. It is showed that "mathemaphobia" $\beta = 0.084$, $t(1067) = 3.36$, $p < 0.05$ contributed significantly to the prediction model. The studies of Sherman and Wither (2003), Khatoon and Mahmood (2010); Satake and Amato (1995) and Yuksel-Sahin (2008) corroborated this finding. They discovered in their studies that mathematics anxiety (mathemaphobia) is strongly related to students achievement in mathematics.

3.5 Research Question 4: Are there any predictor variables that do not contribute significantly to the prediction model?

Table 8 showed that teaching-learning materials availability, teaching-learning materials adequacy and teaching-learning materials utilization do not contribute significantly to the prediction model. Hence, they do not contribute significantly to the prediction of students' achievement in mathematics.

3.6 Summary of the Findings

The findings of the study showed that

(i) The ANOVA table results showed that there is linear relationship between the predictors and the criterion.

(ii) The combination of predictor variables and students achievement in basic mathematics yielded a multiple correlation of 0.574 with students' achievement in basic mathematics. The multiple correlation of 0.574 indicates that there is moderate relationship between the predictors and the students' achievement in basic mathematics.

(iii) The obtained regression equation resulting from the set of the four (4) predictor variables allow reliable prediction of students' achievement in Mathematics.

(iv) The four predictor variables accounted for 30.7% of the observed variance in the students' achievement in basic mathematics.

(v) Although four predictor variables contribute to the prediction model of students' achievements in mathematics. Only one (mathemaphobia) out of the four predictor variables contribute significantly in predicting students' academic achievement in basic mathematics. While the remaining three predictor variables do not contribute significantly to the prediction model

4.1 Educational Implications

The findings of this study have a lot of meaningful implications for all stakeholders in education (students, teachers, parents and the school administrators). This study revealed that all the variables under study accounted for 30.7% of the observed variance in students' achievement in basic mathematics. Educational resources (teaching-learning materials) in terms of availability, adequacy and utilization are parts of these variables. Based on this, government through the ministry of education should not shark in their responsibility to provide resources needed/required both in quality and quantity to education sector in order to enhance the academic performance of students in basic mathematics. Also, adequate school guidance and counsellors should be provided to all basic schools to help students alleviate their phobia for mathematics with the aim of improving their academic performance in basic mathematics.

Based on this study, students should realize that the ability to improve on their academic performance in basic mathematics inherent largely within them. As a result, they should alleviate their anxiety for mathematics and improve on the self-efficacy as all these variables can make them to be better students of mathematics.

It is revealed from the mathemaphobia contributed significantly to the prediction model of achievement in basic mathematics. Since all professional teachers irrespective of their subject specialization were exposed to educational psychology courses in the course of training. The knowledge acquired in this training should not lie dormant, this knowledge should be applied by mathematics teachers in order to alleviate the phobia of their students and to help students improve on their self efficacy in mathematics. In other word, mathematics teachers should serve as school counsellors where counsellors are not available. However, they should refer students to guidance counsellor where necessary.

4.2 Recommendation

On the basis of the findings of this study, the following recommendations are made:

1. Students should be helped to alleviate their phobia for mathematics
2. Government should provide resources needed/required both in quality and quantity to schools.
3. Adequate school guidance and counsellors should also be provided to all basic schools.
4. Mathematics teachers should apply their knowledge of educational psychology in alleviating the students' phobia for mathematics and improving their students' self efficacy in mathematics.
5. Mathematics teachers should refer students with phobia to a professional guidance counsellor where necessary.

REFERENCES

Adegbuyi (2011). Construction of mathematics attitude Sclae using Factor Analysis. A project submitted to International Centre for Educational Evaluation, University of Ibadan.

Ale S.O (2003). Global view of Mathematics Improvement. National Mathematical Centre Abuja.

Aremu, C.A., (2003). Conquering Math Anxiety. 2nd Edn.,Brooks/Cole-Thomson Learning, Pacific Grove, ISBN-10: 0534386342, pp: 193.

Aremu, C.A., (2009). Conquering Math Anxiety. 3rd Edn.,Cengage Learning, Belmont, ISBN- 10: 0495829404, pp: 215.

Elenchothy, D.,(2007). Kebimbangan matematik danhubungannya dengan pencapaian pelajar tingkatan empat di daerah Klang. M.Sc Thesis, UniversitiPutra Malaysia.

Khatoon, T. and S. Mahmood, (2010). Mathematics anxiety among secondary school students in India and its relationship to achievement in mathematics. Eur. J. Soc. Sci., 16: 75-86.

Odedele, A. R.(2000). Test anxiety and self-efficacy as correlates of academic performance among secondary school students. *Education and Information Studies Abstracts,* University of Ibadan, Vol. 1, Pp 95.

Ojetola D.A (2003). Distribution and Utilization of Education Resources: A case study of Surulere Local Education Authority, Lagos State. A project submitted to the Departmant of Educational Administration, University of Lagos.

Oyegoke D.A. (2014). Educational Resources and mathematics related psychological variables as predictors of students' academic Achievements in Mathematics. A project submitted to International Centre for Educational Evaluation, University of Ibadan.

Puteh, M., (2002). Qualitative research approach towards factors associated with mathematics anxiety. Proceeding of the 3rd International Mathematics Education and Society Conference, (MESC' 02),

Centre of Research in Learning Mathematics, Copenhagen, pp: 1-5.
Saseun A. (2005). Survey of Education Resources: A case study of Amuwo-Idofin Local Education Authority, Lagos State. A project submitted to the Departmant of Educational Administration, University of Lagos.
Satake, E. and P.P. Amato, (1995). Mathematics anxiety and achievement among Japanese elementary school students. Educ. Psychol. Measure., 55: 1000-1007. Tobias, S., 1995. Overcoming Math Anxiety. 1st Edn., W.W. Norton, ISBN-10: 0393313077, New York, pp: 260.
Yuksel-Sahin, F. (2008). Mathematics anxiety among 4th and 5th Grade Turkish Elementary School Students. Int. Elect. J. Math. Educ., 3: 179-192.

Table 1: Distribution of Respondents (Students) by age

Age	Frequency	Percent	Valid Percent	Cumulative Percent
10-12	406	37.7	37.7	37.7
13-15	623	57.7	57.7	95.4
16-18	51	4.6	4.6	100.0
Total	1080	100.0	100.0	

Table 2 Distribution of Respondents (students) by Gender

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	532	49.3	49.3	49.3
Female	547	50.7	50.7	100.0
Total	1080	100.0	100.0	

Table 3 Distribution of Respondents (Mathematics Teachers) by Gender

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	34	70.8	70.8	70.8
Female	18	29.2	29.2	100.0
Total	48	100.0	100.0	

Table 4: Highest Qualification of the Sample Mathematics Teachers

Qualifications	Frequency	Percent	Valid Percent	Cumulative Percent
NCE	4	8.3	8.3	8.3
First Degree	31	64.6	64.6	72.9
Masters	12	25.0	25.0	97.9
PhD	1	2.1	2.1	100.0
Total	48	100.0	100.0	

Table 5: Correlation Matrix of the Criterion and the Predictors Variables

	Mathematics Achievements	Mathemaohobia	Availability of Teaching Learning Materials	Adequacy of Teaching-Learning Materials	Utilization of Teaching-Learning Materials
Mathematics Achievements	1				
Mathemaohobia	.342	1			
Availability of Teaching Learning Materials	.247	.248	1		
Adequacy of Teaching-Learning Materials	.241	.235*	.191	1	
Utilization of Teaching-Learning Materials	.164	.210	.046	.108	1
Mean	11.29	12.69	50.80	41.60	12.43
SD	4.11	3.73	7.88	6.88	.93

Note: * Correlations are significant, p< 0.05

Table 6 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.574[a]	.330	.307	8.836

Table 7 Summary of Analysis of Variance of the Variables

Model	Sum of Squares	Df	Mean Square	F	Sig	Sig.
Regression	5534.434	9	614.937	57.811	000[a]	
Residual	11242.899	1057	10.637			
Total	16777.333	1066				

Table 8 Estimate of Contributions of Predictor Variables to the Criterion Variable

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant	2.361	1.572		1.502	.133
Mathemaphobia	.040	.012	.084	3.362	.001
Teaching-Learning Materials Availability	-.017	.025	-.022	-.685	.493
Teaching-Learning Materials Adequacy	-.008	.022	-.011	-.352	.725
Teaching-Learning Materials Utilization	-.005	.012	-.010	-.412	.681