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Factors Influencing Effective Learning of Mathematics at Senior Secondary Schools within Gombe Metropolis, Gombe State Nigeria

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Abstract
The study investigated the factors that influencing effective learning of mathematics at senior secondary school in Gombe metropolis of Gombe state-Nigeria. Survey research design was adopted. One hundred and twenty (120) students of SSII were purposively sampled from four senior secondary schools out of twenty six senior secondary schools in Gombe Metropolis. In each of the sampled school, thirty (30) students comprising of fifteen (15) males and fifteen (15) females were involved and all the teachers teaching Mathematics were used as samples for the study. The three hypotheses formulated in the study were tested using t-test and chi-square at 0.05% level of significant. The results revealed that lack of qualified teachers and gender will not have significant effect on students learning of Mathematics. The study recommended that only professionally qualified Mathematics teachers should be allowed to teach mathematics, Mathematics teachers should be devoted to their duties by covering the content of Mathematics in each class. The size of classes in secondary schools is to be reduced to manageable number (30-40) students per class and finally Government should make available and affordable Mathematics textbooks to students by subsidizing the cost of the books.
Keywords: Senior Secondary School, Qualified teacher and Instructional materials.

Introduction

One does not need to tell any individual or the society about the importance of Mathematics. Obodo (2001) asserted that the importance of mathematics education in Nigerians educational system and the nation's technological development has been recognized. This is why mathematics was considered as one of the most important subject in Nigerian schools. According to Odumosu et al (2001) Mathematics has been regarded as the bedrock of science and technology. Altbach (2002) in Fasasi, K.M (2009) supported this fact when he noted that the progress of science could be determined by the extent to which mathematics has entered into its methods and contents. Adeyegba (2005) in Odumosu et al (2012) observed that there is hardly any area of science that does not make use of mathematical concepts to explain its own concepts, theories or models. In a similar view, Mathematics is regarded as the major tool available for formulating theories in the Science, Engineering, and Economics as well as in other fields (Abiodun, 2007). Uhumuaubi and Umoru (2005) in Useni, P.F (2012), revealed that Mathematics has always been regarded as the language of science. Mathematics without any doubt remains the most serviceable science subject to all discipline and field of human work and study Sam (2006) in Odili (2006). Ukeje (1997) described the importance and the attention given to Mathematics as stemming from the fact that without Mathematics, there is no science, without science, there is no modern technology, and without modern technology, there is no modern society. Ale (1989) in Simeon & Francis (2012) Opined that mathematics is the queen of science and technology and also a tool for scientific and technological development. Ojerinde (1999) defined mathematics as "the communication system of those concepts of shape, size, quantity and order used to describe diverse phenomena". Obodo (1999) has a similar view. According to him it is a language of size, order and symbol: just like English. Related to Obodo view is that offered by Madu and Hogan (2010) that Mathematics is made up of a set of concepts, facts, principles, and operations that are fundamental to the existence of every individual. Nelist and Nchel (1986) in Stephen, T.K (2009) saw Mathematics as a set of precise and logical language, which not only lead to interesting activities in their own right but can also be applied to everyday life and is used as description or models in science and other areas. Others like Osen (1974) and Ale (1981) in Stephen, T.K (2009) described mathematics as the mother or queen of all sciences and that diverse phenomenon in physical, biological and economic situations can be communicated through the concept of shape, quantity, size and order. To Marut (1999) it is" the mother and language of all science". More complete but related to Marut's definition is that offered by Aminu (1985) that" is not only the language of science" it is the essential nutrient for thought, logic, reasoning and therefore progress, while Olosunde and Olaleye (2010) say that is the fundamental science that is necessary for understanding of most fields. According to Ajayi (2011) Mathematics is the queen of all sciences and servant to all discipline. The summary of the matter is that of

Abubakar (1980) Mathematics is the foundation of all science and also very embodiment of precision and brevity.

In spite all these importance accorded Mathematics in the society, there is a lot of public complaints on the performance of students at the secondary school level in mathematics, this performance in mathematics Attah (2009) attests to the disheartening Mathematics results in public examination. This is further buttressed by the reports of the Chief Examiners to the senior WAEC results. In addition the performance of the students at the senior WAEC results, from 2002 to 2006 is depicted by the table below.

Table 1; Distribution of students' performance in Mathematics between 2002 and 2006 at the May/ June WAEC Examinations

Year	Total No. Registered	% pass with credit and above	% with pass and below
2002	1,078,901	34.50	65.50
2003	939,506	36.91	63.09
2004	844,525	34.52	65.42
2005	943,371	35.55	64.45
2006	1,045,406	39.92	60.08

Adopted from WAEC Annual Reports in Journal Voice of Teachers 1 (2), 74, and ABACUS 37 (1) 30-37.

From the table above, it can be seen clearly that the performance of students in mathematics in Nigeria has not been good.

The Federal Government of Nigeria effort has taken some positive steps towards improving the performance of mathematics by making it a compulsory subject for primary, junior and senior secondary schools. Admission requirement to most courses in institutions of higher learning in Nigeria required at least a credit pass in Mathematics (JAMB, 2008) in Madu, (2012).A research on the factors that affects the performance of the students in mathematics is therefore, very necessary.

Purpose of the study

The purpose of this study is to investigate the factors influencing effective learning of mathematics at senior secondary school in Gombe Metropolis of Gombe state and also to discuss the possible ways to improve the condition.

Research questions

In order to obtain the factors influencing effective learning of mathematics at senior secondary schools within Gombe metropolis. The study seeks answers to the following questions:-

1-Do the senior secondary schools within Gombe metropolis of Gombe State have qualified and experience mathematics teachers?

2-Do teachers usually exhaust their syllabus before examination?

3-Do the methods of teaching teachers used affects student learning mathematics?

4-Are the class sizes okay for the teachers to meet the needs of each student?

5-Are the students exposed to text books in mathematics?

Research Hypothesis

1-Lack of qualified mathematics teachers will not have significant effect on student learning mathematics.

2-There is no significant difference between the learning mathematics of Boys and Girls in senior secondary schools within Gombe metropolis of Gombe state.

3-Learning mathematics in boarding secondary schools will not be significantly different in mathematics achievement test from their counter part in day Secondary schools.

Significance of the study

The study will provide parents and guardian information on how they can assists their children in the provision of mathematics test and other basic learning materials for their learning of mathematics. Results indicate that parents' education and encouragement are strongly related to improved students achievement (Wang, Wildman & Calhoun, 1996) in Madu, 2012.

Methodology

The study adopted a descriptive survey design. The population of the study was the entire S.S 11 students in all senior secondary schools in Gombe metropolis of Gombe state, the researcher used random sampling and selected four (4) senior secondary schools out of the twenty six (26) Senior Secondary schools in Gombe metropolis, two of these schools are boarding schools while the remaining two are day secondary schools. These schools have a population of two thousand eight hundreds and ten (2810) students and staff strength of eighty four (84). Thirty (30) Students were purposively sampled from each of the four secondary schools.

Table 3.01: Shows the number of the SSII Students from the Sampled School.

S/No	Schools	Number of Boys	Number of Girls	Total number Students.
1	GGSS Doma	15	15	30
2	GSSS Gombe	15	15	30
3	GDSS Pantami	15	15	30
4	GDSS Gandu	15	15	30
	Total	60	60	120

From the table 3.1 the total number of students used for the study was one hundred and twenty (120).

Table3: General information about the Sampled Schools.

SCHOOLS	NO OF TEACHERS	TEACHERS QUALIFICATION
GGSS Doma	4	N.C.E Geo, N.C.E Biology, Bsc physics, Bsc/ED Mathematics.
GSSS Gombe	3	Dip statistics, B A English, N.C.E. Mathematics.
GDSS Pantami	1	Bsc/ED Mathematics.
GDSS GANDU	2	Bsc Economics. Bsc Mathematics.

From above table, the total number of teachers used for the study was ten (10).

Instrumentation

The instrument used for this study were Mathematics Achievement Test (MAT), Teachers Opinion Questionnaires (TOQ) base on 4-points likert types scale, thus: Strongly Agree (SA)…4, Agree (A)…3, Disagreed (D)…2, Strongly Disagree (SD)…1, and Students opinion questionnaires was based on YES, NO, or NEUTRAL responses.

Teachers Opinion Questionnaires (TOQ)

Ten items were constructed and validated. The instrument was trial tested on some teachers which were not part of this study. The data collected were computed using Cronbach alpha coefficient with reliability alpha level of 0.75.

Mathematics Achievement Test (MAT)

Mathematics Achievement test (MAT) consisted of a 30 items multiples choice questions with five options. The items were generated from SSI syllabus. The MAT was validated by experts in the Faculty of Education, University of Kashere, Gombe state. The experts after examining the instrument, made some corrections. These corrections were effected in the final draft of the instrument.

Procedure for data Collection

One hundred and twenty copies of questionnaire were distributed to the students. Out of it, one hundred and eight (108) copies were returned. Frequency and percentages was used while ten teachers opinion questionnaires were distributed to the teachers teaching Mathematics in the sampled schools and all the ten questionnaire were filled and returned. The mean of each of the item in the questionnaires were computed.

Analysis and Discussion

In the analysis using t-test/chi-square, when the calculated t-test/chi-square value is more than the t-test/chi-square value from the table then, the null hypothesis is rejected which shows that the variable under study is a factor affect the students performance in mathematics.

Table4: Responses of one hundred and eight (108) Students to Opinion Questionnaires.

S/N	QUESTION	RESPONSES	FREQUENCY	PERCENTAGE (%)
1	When any lesson is taught and is not understood, does your teacher repeat the lesson?	Yes No Neutral Total	20 80 8 108	18.5 74.1 7.4 100
2	Does your teacher give assignment at the end of your lesson?	Yes No Neutral Total	40 65 3 108	37.5 60.2 2.8 100
3	Do you have enough Mathematics textbooks in your school?	Yes No Neutral Total	11.5 85 8 100	13.9 78.7 7.4 100
4	Does your mathematics teacher use teaching aids when teaching?	Yes No Neutral Total	50 58 - 108	46.3 53.7 - 100
5	Does your parent encourage you to solve mathematics Assignment or Home work?	Yes No Neutral Total	8 100 - 108	7.4 92.6 - 100

From above table, this is a clear indication that mathematics teachers do not always give students Home work at the end of every lesson, the response to the question clearly shows that there are no enough textbooks for Mathematics lessons in the school under the study. This situation lead some students in borrowing and buying books while others that are not opportune to have money or place to borrow will be left without text books. This creates some negative feelings towards the study of mathematics, the response to the above question shows that most of the teachers under study do not use teaching aids during mathematics lesson in the selected schools. Hence this resulted in poor performance of students in the subject. It is a clear fact that parents does not encourage their children to do assignment or home work in mathematics when they were given from school.

Table5: Responses of ten (10) Teachers to Opinion Questionnaire on factors that affect their teaching.

S/N	Factors	RESPONSES Strongly Agreed **(4)**	 Agreed **(3)**	 Disagreed **(2)**	 Strongly Disagreed **(1)**	Mean	Decision
1	Instructional materials is very important in Mathematics lesson	4	4	2	-	3.2	Accept
2	In adequate number of qualified teachers	3	2	3	2	2.6	Accept
3	Lack of adequate textbooks	4	3	3	-	3.1	Accept
4	Lack of extra lesson before writing examination	-	2	5	3	1.9	Reject
5	Lack of incentives for Math teachers	5	5	-	-	3.5	Accept

The above table shows that the mean scores associated with the factors instructional Materials is very important, inadequate qualified teachers and lack of adequate textbooks was accepted and considered as factors affecting the teachers teaching Mathematics.

Hypotheses testing

HO_1: Lack of qualified mathematics teachers will not have significant effect on student learning mathematics.

Table 5: Observed and Expected Frequencies of Qualified and Unqualified Teachers.

s/n	Factors	Mean	s.d	N	df	x^2 cal	Critical Value
1	Qualified teachers Unqualified teachers	66.3 34	20.2 28	10 46	98	7.56	3.84

An analysis of this hypothesis based on the data in appendix I, gave calculated chi-square value of 7.56 and critical value was 3.84. This shows that the calculated x^2 was greater than the critical value, therefore, the null Hypothesis was rejected lack of qualified mathematics teachers was found to be one of the factors that affect the students, performance.

HO_2: There is no significant difference between the learning mathematics of Boys and Girls in senior secondary schools within Gombe metropolis of Gombe state.

S/N	FACTORS	MEAN	S.D	N	df	t_{cal}	t_{table}
1	Boys Gils	67 56	20 21	60 60	98	3.43	1.980

From the analysis of appendix, the calculated t-value was 3.43 and the t-value table was 1.980. This showed that the calculate t-value was greater than the t-value table, therefore, the null hypothesis was rejected; this means gender was a factor that affect the students performance in mathematics.

HO_3:

Learning mathematics in boarding secondary schools will not be significantly different in mathematics achievement test from their counter part in day Secondary schools.

S/N	FACTORS	MEAN	S.D	N	df	t_{cal}	t_{table}
1	Boarding Students Day Students	67.30 63.38	29.6 25.3	56 64	98	0.96	1.980

The boarding schools had their mean performance 67.30 while day schools had their mean performance 63.38 respectively. This showed that boarding schools learning mathematics was better than day schools. Using analysis for t-value, the calculate t-value was 0.96% and the t-value table was 1.980. The showed that the calculate t-value was less than the t-value table, therefore the null hypothesis was accepted. Schools system did not affect the students learning of mathematics.

Conclusions and Recommendations

Conclusion

This study discovered the following as the factor affect the students learning of mathematics.

1-Lack of qualified mathematics teachers affect students performance negatively some teachers may be lacking in subject matter.

2-Gender difference is another factor that influenced students learning mathematics, most girls feel weakened with the erroneous information that mathematics is difficult to understand. This believes affect some students negatively.

3-Students need text books to read at home and work on their assignments, lack of text books therefore is injurious to students' progress in mathematics.

4-Most teachers do not cover their scheme of work before the examination. This practice affects the students' progress negatively.

Recommendations

After discovering the factors that affects the students learning mathematics in this study, the researchers made some recommendations.

1-Both federal and state governments should employ only professionally qualified teachers to teach mathematics especially N.C.E, B sc /ED etc.

2-Mathematics teachers should be devoted to their duties by covering the content of mathematics in each class beginning from J.S.S to S.S.S levels of education. This will enable the students not to miss any of the links in the structure of mathematics at each level and as contained in the curriculum. Any topic not taught in one class posses a learning problem in the next class.
3-The size in Nigeria secondary schools should be reduced to manageable standard of (35-40) students per class. This will help the mathematics teachers to be more effective in teaching and making assignment, home works etc. There is high probability of success in teaching lesser number of students.
4-The federal government should make available and affordable mathematics text books to students by subsidizing the cost of books.
5-More incentives and better condition of service like: prompt payment of salary, annual reward, increase in salary, promotion as and when due, seminars should be organized with pay, overtime pay, motorcycle and car loans be given to who are fit to have them etc to mathematics teachers to encourage more dedication in the job.
6-There should be constant supervision of mathematics teachers, they should be made to plan lesson before going into the class to teach the subject.

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