Interest towards Learning and Mathematics Achievement among Students in Selected Junior Secondary Schools, Niger State, Nigeria

A. Musbahu (PhD); Oluyemo A. A; Dr. I. Amos & Alhassan D. Safo
Niger State College of Education, MINNA, Niger State, Nigeria

Abstract: **This study assessed interest towards learning and mathematics achievement among students in selected Junior Secondary School, Niger State, Nigeria. Correlation Survey design was adopted for the study. The target population for this study consists of 5,368 (2,705 male and 2,663 female) JSS 1 students in 2012/2013 academic session from 92 public and private Junior Secondary Schools in Zone "B" of Niger State. The sample of this study consist 361 (219 public school students and 179 private school students) and multi-stage stratified random sampling technique was employedin the selection. Two instruments were developed for the study which consists of an Inventory on Students" Interest in Mathematics (ISIM) and a Mathematics Achievement Test (MAT). Descriptive statistic (mean and Standard Deviation), biseria correlation and its associated simple regression of Ordinary Least Square (OLS) method were used to establish relationship between the variables and to test null hypothesis at the 0.05 level of significance. The instruments were validated and the reliability coefficient was established using the test-retest method. The data obtained were analyzed using mean with the criterion mean set at 2.5.The findings of the study revealed that students in private schools excel in Mathematics more than students in public schools but students in public schools are more interested in Mathematics than their counterpart in private schools. Based on the findings of the study, it was recommended amongst others that students should develop positive attitude towards the learning of Mathematics. This can be done through adopting good strategy and study habit.**

Keywords: **Mathematics, Students" Interest, Students" Achievement.**

I. INTRODUCTION

Mathematics is a core subject in Nigerian secondary school curricular. Its inclusion justifies the recognition of Mathematics as being essential tool for national development as it is used by scientists and industrialist. More so, Mathematics is the foundation of all sciences, technology and modern development, and for any nation to survive and develop, that nation has to improve its technology which could be achieved through the effective teaching and learning of Mathematics (Agwagah&Gimba, 2013). In addition, Mathematics as a subject is very important to the daily life of every individual as it aids the development of knowledge and the required skills in problem solving situations. Mathematics is seen as science of structure, order and relation that evolves from counting, measuring and describing the shapes of object. It deals with logical reasoning and quantitative calculations. Mathematics nurtures the power of reasoning, creativity, abstract or spatial thinking, critical thinking, problem-solving ability and even effective communication skills. All applicants for the best employment opportunities will need a good grasp of science, Mathematics, and computer technology. Unfortunately, this important subject has suffered a lot of neglect and hatred which has resulted in poor performance and given rise to poor quality of students. Poor academic achievement in Mathematics could also be attributed to many factors such as, students negative attitude to Mathematics, inadequate motivation from teacher, inadequate supply of instructional material, lack of qualified teachers, use of teacher centered instructional strategies, non - challan attitude to the use of available ICT resources for teaching of Mathematics (Akinoso, 2011, Olafare, Akinoso, Omotunde, &Eguatu, 2016). According to Aliyu and Akinoso (2017), several research efforts have been made to solve the problem of poor performance in Mathematics. Many of such efforts followed the observations ofAkinoso (2015). Some of these efforts are in the improvement of method of teaching, quality of instructional technique employed by teachers and method of presentation before the students in order to improve Mathematics result.

Students" interest towards learning Mathematics and their implications for Mathematics instruction have long been a common concern among Mathematics educators. Interest towardsMathematics has been considered an important factor influencing participation and success in the subject. Mathematics is made up of a set of concepts, facts, principles, and operations that are fundamentals to the existence of every individual (Madu& Hogan, 2010).

Over the years there have been series of investigation to determine the difference in achievement among students in public (Government) and private funded schools and this of course had yield mix findings. Some scholars advised that there is no significant difference in terms of student achievement, however some characteristics such as teaching method, was said to differs (Al-Duwaila, 2012). Whereas Lubienski and Lubienski, (2013) after investigating public and private school in the US they posit that students from public schools has better performance compared to those in private schools in mathematics as a course. Contrary to the above

argument, Olasehinde and Olatoye (2014) argued in favour of private schools has higher performance compared to their counterpart at public schools in Nigeria. The author reported that students in private schools out perform their counterpart in public funded schools.

Achievement in the subject is crucial for students‟ admission into scientific and technological professions. That is why it has been made as a compulsory subject in all primary and secondary schools in Nigeria. Over the years education has focused on access and parity, that is, closing the enrollment gap between girls and boys while insufficient attention has been paid to retention and achievement or the quality and relevance of education.

Statement of the Problem

Mathematics is abstract in nature without adequate concrete visual instructional materials to arouse the interest of the learner in understanding and learning of mathematics in most schools. Observations and reports from examining bodies like WAEC, NECO and JAMB revealed that a high percentage of secondary school students continue to perform poorly in Mathematics examinations. Considering the analysis of the results of the examination conducted by the West African Examinations Council (WAEC) and National Examination Counci (NECO) from 2008-2013 in Nigeria. The poor achievement could affect individual student by getting discouraged and subsequently lost interest completely in mathematics that is fundamental to individual existence. This is because of its abstract nature and mode of presentation by the teachers. It is the believeof most students that mathematics cannot be understood like other subjects unless memorized. The interest in raising the level of achievement in Mathematics has been a major concern to researchers in recent times, and this study investigates the interaction/relationships between students‟ interest towards learning and mathematics achievement vis-à-vis school type (public and private) in geopolitical zone „B‟ of Niger state, Nigeria.

Purpose of the Study

The purpose of the study is to assess students‟ interest towards learning and mathematics achievement vis-à-vis school type (public and private) in geopolitical zone „B‟ of Niger state, Nigeria.Specifically, the objectives of the study intends to:

1. Estimate the relationship between private school students‟ interest and achievement in Mathematics.
2. Estimate the relationship between public school students‟ interest and achievement in Mathematics.

Research Questions

The following research questions were raised to guide the study:

1. What is the relationship between private students‟ interest and achievement in Mathematics?
2. What is the relationship between public students‟ interest and achievement in Mathematics?

Null Research Hypothesis

The following hypotheses will be tested at the 0.05 level of significance:

- *HO_1:* There is no significant relationship between private school students‟ interest and achievement in Mathematics
- *HO_2:* There is no significant relationship between public students‟ interest and achievement in Mathematics.

II. RESEARCH METHODOLOGY

Research Design

The study adopted correlation survey design. Emaikwu (2012) viewed correlation survey as the type of study that seeks to establish relationship between two or more variables. This design is considered suitable because the study is concerned with conditions or relationships that exist among gender, interest and achievement. The study has to do with relationship of the dependent variable (students‟ achievement in Mathematics test) and the independent variables (students‟ gender and interest).

Population

The target population for this study consists of 5,368 (2,705 male and 2,663 female) JSS 1 students in 2012/2013 academic session from 92 public and private Junior Secondary Schools in Zone ‟B‟ of Niger State. The population is made up of 2,705 male students and 2,663 female students from public and private schools in urban and rural areas of the zone. The common characteristic of the population is that they are all JSS 1 students that offered Mathematics as a compulsory subject.

Sample and Sampling Technique

The sample of this study consist 361 **(**219 public school and 142 private school**)** students in 2012/2013 academic session from 12 Junior Secondary Schools in geo-political zone „B‟ of Niger State using. The multi-stage stratified random sampling technique was employed to select the 12 schools for the study from 92 Junior Secondary Schools in Zone „B‟ of Niger State. At the first stage, geo-political zone „B‟ was randomly selected for the study from the three geo-political zones of Niger State. At the second stage, the 92 Junior Secondary schools in zone „B‟ was stratified along school type (public and private). And 3 Junior Secondary Schools from each stratum was randomly selected for the study making a total of 12 Junior Secondary Schools. At the third stage, 361 students were randomly selected from the 12 Junior Secondary Schools; students were stratified before simple random sampling was employed.

The lucky dip method of random sampling was used in all the stages of sampling. Serial numbers of the elements in the

sampling frame was recorded on pieces of papers folded and mixed thoroughly before respondents were asked to pick at once without replacement. This technique gives the respondents equal opportunity of being selected thereby, reducing the bias effect that may interfere with the validity and reliability of the study. See Table 1 for detail of sample size.

Table 1: Sample Distribution of the Study by School Type, School Location and Gender

S/N	Name of School	School	School	Number of Students		
				Male	Female	
1	JSS Diko	Public	Urban	20	20	40
2	JSS Kwasau	Public	Urban	35	38	73
3	JSS Madalla	Public	Urban	22	20	42
4	JSS Mutumdaya	Public	Rural	10	10	20
5	JSS Gwam	Public	Rural	12	10	22
6	JSS Maikujeri	Public	Rural	11	11	22
7	JSS Hudal Islam College	Private	Urban	15	15	30
8	Niger Baptist High School	Private	Urban	8	7	15
9	Mawo Comprehensive School	Private	Urban	20	20	40
10	Our Lady School Suleja	Private	Urban	13	12	25
11	Bapist School Paiko	Private	Rural	10	11	21
12	Christ the King Junior Seminary Gwada Village	Private	Rural	6	5	11
Total				182	179	361

Instrumentation

The researcher personally developed two instruments for the study which consist of an Inventory on Students‟ Interest in Mathematics (ISIM) and a Mathematics Achievement Test (MAT). ISIM contains 20 items that reveals students‟ interest in Mathematics based on Likert type scale of Strongly Agree (4-points), Agree (3-points), Disagree (2-points) and Strongly Disagree (1-point). This instrument structured in such a way that every item elicits level interest which is scored and summed up the marks of every item to give a total for every student. The lowest mark for each and every item of the ISIM is 1 mark and for 20 items minimum score for the lowest level of interest is 20 marks. Therefore, the highest and lowest score of the inventory were 80 and 20 respectively. The criteria set for the interest inventory is that any student that scores within the range of 20 – 30 (low interest), 31 – 65 (moderate interest) and 66 – 80 (high interest).

Mathematics Achievement Test (MAT) is made up of 20 multiple-choice items with four options A, B, C and D. Each item has one correct option (the key) and three distracters. And every item attracts one mark making the highest scorer who got all the items correctly to have 20 marks and lowest scorer 0. The scores harvested from the MAT were converted to percentages using these criteria: Excellent (70-100), Very good (60-69), Good (50-59), pass (40-49) and fail (0-39). Each instrument has section „A‟ consisting of essential bio-data that will serve as secondary independent variables, while the MAT and ISIM constitute Section B.

Validation of the Instruments

Content validity was ensured for Mathematics Achievement Test (MAT) by developing a test blueprint or table of specification based on the Benjamin Bloom‟s taxonomy of educational objectives in the cognitive domains (as cited in Anikweze, 2010) constituting of: knowledge, comprehension, application, analysis, synthesis and evaluation as presented in Table 2.

Table 2: Table of specifications for 20 items Mathematics Achievement test for JS 1 students

S/N	Content Area	Time	Kno w 10%	Comp 40%	App 45%	Anal. 5%	Syn.	Eva.	Total Items	%
1	Simple equation	2 hours	1	1	2	_	_	_	4	20%
2	Plane shape	2 hours	1	1	2	_	_	_	4	20%
3	Fraction	2 hours		2	2	_	_	_	4	20%
4	Algebraic simplification	2 hours	_	1	2	1	_	_	4	20%
5	Statistics	2 hours	_	3	1	_	_	_	4	20%
Total Items		10 hours	2	8	9	1	_	_	20	100%

The content validity established for MAT instrument by using the e table of specifications (Table 2 in order to have adequate representative samples from all aforementioned five topics. Also,face validity was established for the 20-item MAT instrument by subjecting it to the two experts‟ judgment using validation form of 20 items which gave logical consensus of 0.72 indexes. The two experts were from the Department of Mathematics and Statistics, Federal University of Technology, Minna, Niger State, and the Department of Educational Foundations, Nasarawa State University, Keffi validated the instruments by checking for appropriateness and relevancy of

the items, adequacy and agreement with the blueprint, clarity of expression and size of print.

And, for the of 20 items Inventory on Students‟ Interest in Mathematics (ISIM), the same process applied for MAT to get face validity as earlier explained was adopted to get logical consensus index of 0.76.

Reliability of the Instruments

Inventory on Students‟ Interest in Mathematics (ISIM) and a Mathematics Achievement Test (MAT) was pilot tested on a small portion of the population who are not part of the sampled respondents. The instruments were pilot tested on 20 students. The harvested scores used to determine the reliability of the instruments. Cronbach coefficient Alpha method of estimating reliability was employed to compute coefficients of internal consistency. This is considered suitable because Cronbach coefficient Alpha is more general method of estimating internal consistency for instruments with scales that provide responses on a continuum of „Strongly Agree, Agree, Strongly Disagree and Disagree‟ (Emaikwu, 2011). The reliability coefficients indices were 0.82 and 0.79 for ISIM and MAT respectively. Item difficulty index of 0.50 (average for all items) for MAT was obtained. Finally, item discriminating power for MAT was computed to be 0.40 (average for all items). See Appendices V for details of reliability computation.

Administration

The developed and validated 20-item test, 20 items of interest inventory and answer sheet were administered to the students with the assistance of their teachers in form of the Continuous Assessment (C.A.) test. The researcher supervised the work of the teachers and students. The researcher also made sure that the questions were given to the teachers at the exact time for the test so as to increase the accuracy of the result.

The ISIM was administered first to students after proper guidance on bio-data and left students alone to choose the option that is best suit their level of interest out of Strongly Agree, Agree, Disagree and Strongly Disagree in the inventory by ticking. After 30 minutes the students indicated that they had finished and they were asked to pass the instruments forward from back for collection immediately. The MAT administered after ISIM and 10 minutes was given to fill out the bio-data before attempted the 20 items question within 1 hour allocated time.

The students were left alone to choose from the available 4 options which consists 3 distracters and 1 key (answer) labeled A, B, C and D by shading on answer sheet attached to the instrument. The students were finally asked to pass them forward for collection.

Twenty minutes before the time was allotted for the test takers to go over their work to make all necessary corrections.

Procedure of Data Analysis

Biserial correlation was used for relating private and public students‟ interests with their mathematics achievement under research questions.

The regression equation of Ordinary Least Square (OLS) method, Biserial correlation, t-test statistics and analysis of variance (ANOVA) were used for establishing existence and strength of relationships among private and public students‟ interest and their achievements in mathematics, and tested at 0.05 level of significance.

III. RESULTS AND DISCUSSION

Research Question One

What is the relationship between private students‟ interest and achievement in Mathematics?

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Table 3: Biserial Correlation Coefficient for the Relationship between Private School Students' Interest and Achievement in Mathematics

Variable	n	r_b	R^2
Private School Students‟ Interest in Mathematics			
Achievement in Mathematics	142		
		0.67	0.45

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Table 3 shows the biserial correlation coefficient for the relationship between private school students‟ interests and achievement in Mathematics. Correlation coefficient of 0.67 was obtained for private school students‟ interests and achievement in Mathematics test, signifying a positive relationship between private school students‟ interest and their achievement in Mathematics test. The coefficient of determination of 0.45 indicated that 45% of variation in private school students‟ scores in Mathematics is explained by their interest in the subject.

Research QuestionTwo

What is the relationship between private students‟ interest and achievement in Mathematics?

Table 4: Biserial Correlation Coefficient for the Relationship between Public School Students' interest and Achievement in Mathematics

Variable	n	r_bR^2
	11	
Public School Students‟ Interest in Mathematics		
Achievement in Mathematics	219	
	0.70	0.49

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Table 4 shows the biserial correlation coefficient for the relationship between public schools students‟ interests and achievement in Mathematics. Correlation coefficient of 0.70 was obtained for public school students‟ interest and achievement in Mathematics test, indicating a positive relationship between public school students‟ interest and their achievement in Mathematics test. The coefficient of determination of 0.49 indicated that 49% of variation in public school students‟ scores in Mathematics is explained by their interest in the subject.

Testing of Null Hypothesis

HO_1: There is no significant relationship between private school students‟ interest and achievement in Mathematics.

Table 5: Regression Equation, Correlation Coefficient and t-test of Significance for Private School Students' Interest and their Achievement in Mathematics

Table 5a: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.669[a]	.447	0.1950	0.465

a. Predictors: (Constanat), private intreast

Table 5b: ANOVA Table

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	330.674	1	330.674	893.062	0.000[a]
	Residual	132.927	141	0.370		
	Total	463.601	142			

a. Predictors: (Constant), private interest
b. Dependent Variable: achievement

Table 5c: Table of coefficients for variables Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	6.81	0.056		1.787	0.301
	Private interest	0.481	0.045	0.845	29.884	0.000
a. Dependent Variable: achievement						

The regression equation is as follows:

$M_{pr} = 6.81 + 0.481 (I_{pr})$

Where: M_{pr} = Private School Students‟ Achievement in Mathematics, I_{pr} = Private School Students‟ Interest Scores

Table 5 shows the regression equation, correlation and t-test results for private school students‟ interests and achievement in Mathematics test. The structured straight line regression equation relating private school students‟ interests and achievement in Mathematics test is $M_{pr} = 6.81 + 0.481 (I_{pr})$ (Table 5c). The equation shows that the estimate of the slope of M_{pr} is positive, which implies a direct relationship between the dependent variable (M_{pr}) and independent variable (I_{pr}). The regression result also indicated that for a unit increase in private school students‟ interest in Mathematics, their achievement in Mathematics will increase by about 0.48 (Table 5c).

Correlation coefficient of 0.669 (Table 5a) was obtained for interests and achievement in Mathematics test, and this signifies a positive relationship between private school students‟ interest and their achievement in Mathematics test. The coefficient of determination of 0.447 (Table 5a) indicated that about 45% of variation in private school students‟ achievement in Mathematics is explained by their interest in Mathematics. Furthermore, at 0.05 level of significance and degree of freedom of 141, the t-test value of 1.787 which is greater than the critical value of 1.645 was obtained. Therefore, since the calculated value of t-test is greater than the critical value, the null hypothesis is rejected. Hence, there is significant relationship between private school students‟ interests and achievement in Mathematics test.

*HO_2***:** There is no significant relationship between public students‟ interest and achievement in Mathematics.

Table 6: Regression Equation, Biserial Correlation Coefficient and t-test of Significance for Public School Students' Interest and their Achievement in Mathematics

Table 6a: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.699[a]	0.489	0.486	0.18950
a. Predictors: (Constant),public interest				

Table 6b: ANOVA Table ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	330.674	1	330.674	893.062	0.000[a]
	Residual	132.927	141	0.370		
	Total	463.601	142			

a. Predictors: (Constant), public interest
b. Dependent Variable: achievement

Table 6c: Table of coefficients for variables Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.29	0.076		1.878	0.301
	public interest	0.521	0.045	0.845	29.884	0.000

a. Dependent Variable: achievement

The regression equation is as follows:

$M_{pu} = 6.29 + 0.521\ (I_{pu})$

Where: M_{pu} = Public School Students‟ Mathematics Scores, I_{pu} = Public School Students‟ Interest Scores

Table 6 shows the regression equation, correlation and t-test results for public school students‟ interests and achievement in Mathematics test. The structured straight line regression equation relating public school students‟ interests and achievement in Mathematics test is $M_{pu} = 6.29 + 0.521\ (I_{pu})$. This equation indicates that the estimate of the slope of M_{pu} is positive, which implies a direct relationship between the dependent variable (M_{pu}) and independent variable (I_{pu})

The regression result also indicates that for a unit increase in public school students‟ interest in Mathematics, their achievement in Mathematics will increase by about 0.52 (Table 6c).

Correlation coefficient of 0.699 (Table 6a) was obtained for public school students‟ interests and achievement in Mathematics test, suggesting a positive relationship between public school students‟ interest and their achievement in Mathematics test. The coefficient of determination of 0.489 indicated that about 49% of variation in public school students‟ scores in Mathematics is explained by their interest in Mathematics. Furthermore, at 0.05 level of significance and degree of freedom of 218, the t-test value of 1.878 which is not less than the critical value of 1.645 was obtained. Therefore, since the calculated value of t-test is greater than the critical value, the null hypothesis is rejected. Hence, there is a significant relationship between public school students‟ interests and achievement in Mathematics test.

IV. SUMMARY OF FINDINGS

The major findings obtained in this study are summarized as follows.

1. The regression result indicated that for a unit increase in private school students‟ interest in Mathematics, their achievement in Mathematics will increase by 0.48, while for a unit increase in public school students‟ interest, and their achievement will increase by 0.52. There is also a significant relationship between interests and private school students‟ achievement, and between interests and public school students‟ achievements in Mathematics test.
2. Students in private schools excel in Mathematics more than students in public schools but students in public schools are more interested in Mathematics than their counterpart in private schools.

V. DISCUSSION OF RESULTS

The regression result indicated that for a unit increase in private school students‟ interest in Mathematics, their achievement in Mathematics will increase by 0.48, while for a unit increase in public school students‟ interest, their achievement will increase by 0.52. This may be due to more availability of qualified Mathematics teachers in public schools who are better paid, better supervised by government agents and thus spend longer period on teaching the subject as opposed to linguistic styles private schools where teachers are poorly remunerated and thus not motivated to spend much time on the subject. The private school teachers teaches using the aforementioned facilities which makes teaching process to be convenient compared to publc schools where the only ventilation is classroom windows (Hareesol*et al.*, 2016). The students in private schools excel more in Mathematics than students in public schools but students in public schools have more interest in Mathematics than their counterpart in private schools. This finding is consistent with that of Olasehinde and Olatoye (2014) who showed that students from private schools performed better than those from public schools. This result agrees with that reported by Hareesol*et al.*, (2016) that private schools have been found to be better than public as the private schools are more integrated than public schools and that private schools produce better cognitive outcomes just as they control for student quality. However, this finding, as noted earlier, contrasts with the work of Yusuff and Adigun (2010) that school type, gender and location have no significant influence on student‟s academic achievement. It was acclaimed that socioeconomic status does have high correlation with performance in mathematics after investigating public middle school pupils in Florida in the USA (Harmandez, 2014)

From foregoing, it is thus evident that there may be other factors that affect achievement in Mathematics like the length of time devoted to teaching the subject and teaching strategy in use in addition to environment, quality of teaching, attitude and availability of teaching aids. But, if Students in public schools really show interest in Mathematics they may have a chance of performing better than students in private schools.

VI. CONCLUSIONS

It is therefore concluded that the best teaching practice that is capable of enhancing the students‟ achievement in Mathematics in Junior Secondary Schools in the “Zone B” of Niger State should be welcomed and employed by both private and public schools in rural and urban areas. It is believed that increasing the level of interest of students will

have a profound effect on their achievements in Mathematics in both internal and external examinations.

VII. RECOMMENDATIONS

Based on the findings of this study, the following were recommended:

1. Government and non–governmental organizations should provide materials needed or necessary for the teaching of Mathematics and motivating students‟ interest. These materials include text books, instructional materials and so on.
2. The students should develop positive attitude towards the learning of Mathematics. This can be done through adopting good strategy and study habit.

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