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EFFECT OF LARGE CLASS ON STUDENTS' ACHIEVEMENT IN BASIC ALGEBRA IN LAGOS STATE

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Abstract: This study investigated the extent to which large class size determined the students' achievement in Basic Algebra in Secondary Schools. The research design used was quasi experimental design which adopted a pre test and a post test; two secondary schools were selected in Agege local government area for the study. The research instrument used was student mathematics achievement test (SMAT). Samples of 200 JSS2 students for large class size were used in each of the two schools. The SMAT contained 20 multiple choice questions for the pre test and 30 multiple choice questions for the post test. The ANCOVA analysis (analysis of covariance) was used to analyse the data. The three research hypothesis which guided the study was tested at 0.05 level of significance. Findings revealed that large class size affects the students' achievement in Basic Algebra while school type does not. When combined the large class and the school type the result was significant. This study will be of great important to educational planners, school authorities, educational researchers and the governments. It was recommended that the school management and the government should take necessary steps to maintain the teacher – pupil ratio in all the secondary schools, build more school blocks to cater for students in large class size, and employing more teachers to cater for the students educational needs among others.

Keywords: Effect, large class size, students' achievement, basic algebra.

INTRODUCTION

A school is a place where an individual gets formal education. The more the school provides facilities, the more genuine learning will take place. In this regard, the school building is of great importance. In school, the classroom performs its role in the form of a unit of teaching and learning processes. It is a place where students from different stratum of the society come in close contact with one another for learning a well organized classroom is a sign of best learning environment. Students go to school with varying needs to be satisfied or fulfilled, they derive interest and satisfaction from their varied performances which makes them to be highly sensitive in their endeavours. This satisfaction derived in turn makes the students put in more effort to perform better and to achieve the goal of schooling.

According to the Education code (1935), each student may be provided with separate seat and desk, they should be provided with enough space and the seats should be arranged in such a way that the teacher may move very easily between the rows. The seats in a classroom may have a reasonable space so that students may move or stand easily. Noisy environment results in poor listening as the quieter environment provide good listening. Noisy environment affects reading ability and also affects the teacher instruction, McGuffey(1982).

There are a lot of varying factors that affect the academic achievements of students in mathematics, such as class size, teaching method, student interest, gender, age and among othersClass size is the number of students per teacher in a classroom. It varies from one school to another and from one country to another. In Nigeria, the FGN (2004) recommended that the teacher/student ratio should be 1:40 in the secondary school but this is not the case because of the problem of acute shortage of qualified teachers and large number of students enrolment such that many schools register up to 50 – 100 students and above per class (Ijaiye, 2000). However, class size needs

to be small or normal because it helps in promoting effective teaching and learning of mathematics. Blatchford, Bassett, Brown, Webster(2009) observed that small class size makes it easy for teachers to spot problems and give feedback, identify specific needs and gear teaching to meet them but large classes do not. He found out that pupils in small reading and mathematics classes performed significantly better than those in regular classes.

The class size is one of the most prevailing factors, and a class size is said to be overcrowded when it becomes too large to be handled with the infrastructure and facilities that were made available for the class. The effects of class size on students' learning varies by grade level, student characteristics, subject areas, teaching methods and other learning interventions. This issue is a school related factor because it is the school that determines the number of students that stays in a class. The school management in most schools admit students not minding whether the facilities and infrastructure they have is enough to meet the important role for taking care of the students' needs, even human resources Adeyemi, (2008).

In schools that cannot afford more teachers or building expansions, classes sometimes become overcrowded to the point that children learn under trees and teachers have to spend more time on 'classroom' management than on teaching, which can result in lower student performance. On the other hand, Adeyemi (2008) says class size referred to educational tool that can be used to describe the average number of students per class in a school. Class size means a group which is a set of persons among whom there exists a definable or observable set of relations.

Imoke (2006) remarked that optimum class size in a school system implies rational coordination of educational infrastructure, subject to available number of students in order to attain high level of productivity. Ogunyemi and Hassan (2011) maintained that the issue of large size can be counterproductive. In remote and even local

areas, classes are found to be over – congested which is indeed an indication of the dearth of educational facilities in schools. The issue of large class sizes and the associated consequences is paramount. The phenomenon of large class sizes is fast becoming the vogue of junior secondary schools in Nigeria and in most developing countries. The large class syndrome has been attributed to the expansion in annual students' enrolment.

Ikolo (2011) discovered that there is tremendous increase in the enrolment of students and in the average size of classrooms in junior secondary schools these days from 35 – 40 students to 90 – 110 or even more.This increased number in enrolment has also led to another educational problem, such as students' indiscipline and poor academic performance. Though, open enrolment in schools is laudable, yet the deficiency is in the corresponding provision of adequate infrastructure, inadequate classrooms, shortage supply of teachers, dilapidated structures and classrooms which look like poultry in some schools.(Oyeniran, 2014) said seats and desks which are basic classroom requirements are insufficient and in some secondary schools, students are sitting on ransacked furniture and some sit on bare floor.

Students tend to learn in different type of schools. School type may involve single sex schools and mixed schools(school contains students of different gender, learning under the same learning condition). In past researches it has been discovered that school type may have no significant effect on student academic achievement, this depends on the kind of teaching methods adopted in the schools. Tracey (2005) in his study conducted into gender and effects of school type on achievement with regard to mathematics and physical science concluded that school type has no effects on students' achievement in mathematics.

Muraina and Muraina (2014) revealed that comfortable classroom temperature and smaller classes enhances teachers' effectiveness and

provide opportunities for students to receive individual attention, ask more questions and participate fully in discussion, reducing discipline problems and perform better than students in schools with larger classes. Jacob (2016) in their research on class size and discipline says class size can be controlled by teachers strategizing ways of engaging discipline in the classroom. This is pointing to the qualification and teaching experiences of the teachers teaching these overcrowded classes.

Owoeye and Yara (2010) found out that the performance of students in large classes is low (23%) compared to those in smaller classes (64%). This means that large classes have a negative effect on learning progress, thus it needs to be addressed in order to ensure effective teaching and learning of mathematics in the secondary school in Nigeria. On one hand, there might be more interaction between students and teachers in smaller classes; on the other hand, class size could have positive effects on students' achievement because college students might find better matches to study with in larger classes. Interaction of students among themselves might be very important for college students as they supposed to learn, up to a certain extent independently of the lecturer. A larger class also increases the probability that a student asks a question that benefits the rest of the students in the class. There is little reason to believe that smaller class sizes systematically yield higher students achievements, some studies point in that direction, while almost equal number of studies point almost in the opposite direction (Bakasa, 2012). Students and teachers themselves tend to have divided opinions. This is the issue which the researcher wishes to delve into, revealing the perception of students and teachers on the impact of overcrowded classrooms in teaching and learning mathematics.

STATEMENT OF THE PROBLEM

Basic algebra encompasses the introductory aspect of algebra. It is an important topic in mathematics because it is one of the bedrock of mathematics. This is why it is important for it to be taught well to

student to enable and support a smooth academic achievement in mathematics. Despite the efforts of the teachers in teaching the topic (basic algebra), student's performance is not encouraging and is becoming worse in schools every day. The study hopes to determine the effect of large class size on students' achievement, the effect of school type on students' achievement and the effect of the interaction between large class size and school type on students' achievement in basic algebra.

Purpose of the Study

The major purpose of this study is to specifically:

- determine the effect of large class size on student's achievement in basic algebra?
- examine the effect of school type on student's achievement in basic algebra?
- find out the effect of large class size and school type on student's achievement in basic algebra?

Research Hypotheses

The following hypotheses were formulated:

$H_{O1.}$ There is no significant effect of large class size on student's achievement in basic algebra?

$H_{O2.}$There is no significant effect of school type on student's achievement in basic algebra?

$H_{O3.}$There is no significant effect of large class size and school type on student's achievement in basic algebra

Methodology of Data Collection

In the study, quasi experimental research design was adopted. This is because the researcher seeks to achieve cause and effect relationship, that is to say the effect of the independent variable "large class size" on the dependent variable "students' achievement in basic algebra". Two junior secondary schools in Agege local government Lagos state were the target population. Two hundred (200) respondents were

selected as the samples. Purposive sampling method was used for this study, this is because they are public schools.

Instrument of Data Collection

The main instruments for data collection in this study were mathematics achievement tests. The tests contained twenty and thirty questions on basic algebra for both pre-test and post-test respectively. A pre-test was observed before the teaching to check the students' previous knowledge and the post-test was given after the teaching to check the student's achievement and understanding of basic algebra. The instruments were validated by experts and two senior lecturers that are vast in educational research. The reliability of the instrument was determined using test retest method. The reliability coefficient value of 0.87 obtained using Cronbach Alpha method

Method of Data Analysis

Data collected from the field were analyzed using Statistical Package for Social Studies (SPSS) ANCOVA was used to test research hypotheses.

Results

The hypotheses formulated for the study were tested and discussed as shown below:

H_{01}: There is no significant effect of large class size on students' achievement in basic algebra

Table 1: Effect of large class size on Students' achievement in basic algebra

Post test: dependent variable

Source	Type III sum of squares	Df	Mean Square	F	Sig.	Partial Eta. Squares
Corrected model	1629.617a	2	814.809	365.753	0.000	0.781
Intercept	759.629	1	759.629	340.984	0.000	0.625
Treatment	57.135	1	57.135	25.647	0.000	0.211
Pretest	997.013	1	997.013	447.541	0.000	0.686
Error	456.691	205	2.228			
Total	31086.000	208				
Corrected Total	2086.308	207				

a = R. Squared = 0.781 (Adjusted R squared = 0.779)

The result in table 1 indicates that the main effect of treatment (large class size) on the students' academic performance is statistically significant {F (1,207) = 25.647, $p < 0.05$)}. Since the p-value of the F ratio is significant, it follows that H_{o1} regarding the main effect of treatment on students' achievement in basic algebra was rejected. This simply means that the main effect of treatment (large class size) on the students' achievement in mathematics is statistically significant. The partial Eta squared estimated was 0.211, implying that treatment accounted for 21.1% of the variance observed in post-test achievement score.

H_{o2}: There is no significant effect of School type on students' achievement in basic algebra.

Table 2: Effect of School Type on Students' achievement in basic algebra

Post test: dependent variable

Source	Type III sum of squares	Df	Mean Square	F	Sig.	Partial Eta. Squares
Corrected model	1574.6179	2	787.245	315.318	0.000	0.755
Intercept	782.341	1	782.341	313.353	0.000	0.605
Pretest	1514.984	1	1514.984	606.801	0.000	0.747
School type	2.008	1	2.008	0.804	0.371	0.004
Error	511.818	205	2.497			
Total	31086.000	208				
Corrected Total	2086.308	207				

a = R. Squared = 0.755 (Adjusted R squared = 0.752)

The table also showed that the main effect of school type on students' achievement in mathematics is not statistically significant {F (1,207) = 0.804, p > 0.05)}. Since the p-value of the F ratio is not significant, it follows that hypothesis Ho_2 on the main effect of school type on students' achievement was accepted, hence, there is no significant main effect of school type on students' achievement. This implies that school type of the students have no impact on their achievement in mathematics. The partial Eta squared estimated was 0.004, implying that school type accounted for 0.4% of the variance observed in post-test achievement scores.

H_{03}:There is no significant effect of School Type and Treatment on students' achievement in basic algebra.

Table 3:Effect of School Type and Treatment on Students' achievement in basic algebra

Post test: dependent variable

Source	Type III sum of squares	Df	Mean Square	F	Sig.	Partial Eta. Squares
Corrected model	1628.503a	3	542.834	241.890	0.000	0.781
Intercept	709.082	1	709.082	315.971	0.000	0.608
Pretest	1567.284	1	1567.284	698.390	0.000	0.774
School type	53.899	1	53.899	24.018	0.000	0.105
Treatment * School type	54.014	1	54.014	24.069	0.000	0.106
Error	457.804	204	2.244	24.069		
Total	31086.000	208				
Corrected Total	2086.308	207				

a = R. Squared = 0.781 (Adjusted R squared = 0.777)

The result in table 3 indicate that the interaction effect of treatment (large class size) and school type on students' achievement is statistically significant {F (1,207) = 24.069, P < 0.05)}. Since the p-value of the F ratio is significant, it follows that H_{O3} regarding the interaction effect of treatment and school type on students' achievement in mathematics was rejected. The partial Eta squared estimated was 0.106, implying that treatment accounted for 10.6% of the variance observed in post-test achievement score.

Findings of the Study

The following findings were revealed by the study based on the research questions answered:

- Large class size affect students' achievement in basic algebra
- School type does not affect students' achievement in basic algebra

- The interaction of large class size and school type affect students' achievement in basic algebra

Discussion

The findings from the study show how school type, class type and their interaction affect the students' achievement in basic algebra. The post test was used as a basis determine the achievement of students in basic algebra, (that is it represented the dependent variable) while the pretest was used as a covariant along with other independent variables.

Large class size affects students' achievement in basic algebra

The findings on the effect of large class size on student's achievement in basic algebra. A pre-test and post-test were used in carrying out this research. The results from the table show that there is significant effect of overcrowded classroom on student's performance in basic algebra. This is in accordance with what was discovered by Ikolo(2011) in the effects of classroom size on students' academic performance of secondary school students

School type does not affect students' achievement in basic algebra

The findings on the effect of school type on the students' achievement in basic algebra. The results show that there is no significant effect of school type on students' achievement in basic algebra in the various school types. There is similarity in the performance of students in the single sex schools and in the mixed schools. This is in accordance with what was discovered by Tracey (2005) in the effect of single sex schooling on girls achievement in physical sciences.

The interaction of large class size and school type affects students' achievement in basic algebra

The findings on the effect of large class size and school type on student's performance in basic algebra. A pre-test and post-test was used in carrying out this research. The results from the table show that there is significant effect of large class size and school type on students' achievement in basic algebra. This is in accordance with what

was discovered byIkolo(2011) in the effects of classroom size on students' academic performance of secondary school students.

CONCLUSION

Based on the findings this study there are so many psychological as well as sociological problems that are faced by the teachers and students in large class size which may hinder the students' achievements in basic algebra. Therefore teachers may assign some class work to students as home work to reduce the amount of time that he or she is going to spend in classwork in the classroom. These assignments are to be marked by the teacher to ensure that all the students do it, and corrections should be done on each of the assignments. Teachers should also divide the members of the mathematics class into segments/ group so that the class size can be reduced and teaching and learning can be more effective. If teachers make use of these solutions they can reduce the intensity of the problems faced in the classroom while teaching basic algebra.

RECOMMENDATIONS

On the basis of the findings and discussion in this study; the researcher hereby makes the following recommendation:

1. Management have to take necessary steps to maintain the teacher – pupil ratio in all the educational institutions.
2. Government/ voluntary organization should help in building more school blocks to cater for increase in students' enrolment and employing more teachers for the increment.
3. Group learning can also be useful in a classroom with large class size, it can be adapted when class size cannot be controlled

Contribution to the knowledge

The results of this study will be useful to the government (Federal & State) to plan for the increase in the students' enrolment yearly.

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