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Effect of Class Size on Mathematics Students Academic Performance in Wudil Zone Kano State, Nigeria

Dr. Isa, Surajo Gaya

Lecturer, Department of Computing and Mathematics Education,
Kano University of Science and Technology, Wudil, Nigeria

Dr. Mamman, Musa Auwal

Lecturer, Department of Computing and Mathematics Education,
Kano university of Science and Technology, Nigeria

Abstract:

The purpose of this study was to ascertain the effects of class size on students' performance in learning mathematics especially SS III Students in Wudil education Zone. The research design used was expo-factor. A sample of 2745 out of a total of 16552 students in the zone was randomly selected. Two research hypotheses were posed. The data collected and tested was obtained from 2014, 2015 and 2016 National Examination Council (NECO) SSCE results in the selected schools. The data was tested using t-test. Results from the study revealed that large class size does not significantly affect mathematics students' performance. It was recommended that Kano State Ministry of Education should make efforts to have small classes in our secondary schools.

Keywords: Class size, performance

1. Introduction

Mathematics is one of the most important school subjects in the curriculum worldwide. It is a subject that has direct relationship with other subjects, particularly technical and sciences. Mathematics is also a subject that cuts across primary and secondary schools as a compulsory subject and must earn a credit to secure admission into higher institutions.

Umameh (2011) in Tshabalala and Ncube (2013) were of the view that mathematics is bedrock and an indispensable tool for scientific, technological and economic advancement of any nation. In addition to that, Davies and Hersh (2012) describe mathematics as the important subject not only from point of view of getting an academic qualification at school or college, but also is a subject that prepares the students for the future irrespective of which work of life they choose to be part of. Mefor (2014) summarized it all by saying that, mathematics relates to everything in the universe from the smallest to the largest. Umameh (2011) added, that mathematics is intimately connected to daily life and everybody's lifelong planning. Therefore, mathematics is a subject that education and human life cannot function effectively without it. Equally in Nigeria, mathematics is given all the necessary importance in the curriculum and all policies related to education, right from primary to higher levels. In relation to that, Federal Republic of Nigeria (2014) categorically stated that mathematics is one of the core or basic subjects for all primary and secondary school children. In spite of the importance of mathematics, there is a general low level of students' performance in mathematics examination (Ajagun, 2000).

Among the reasons for the student's low academic performance are: anxiety (Isa, 2017), mathematics phobia (Bature, 2016) and how instructions are delivered (Nizoloman, 2013). Little attention is given to the learning environment (Oghenetega, 2017). Oghenetega (2017), among many others, emphasized the importance of the learning environment in relation to the students' performance. The class size stands high in discussing learning environment

Although class – size meant different thing to different people, it can be viewed as the mean of students in a class in a school (Akpomi, 2018). Many scholars believed that students achievement depends to a large extent on class – size (Yara, 2010). To some researchers and scholars, class size is determined by dividing the number of registered students by the number of classes (Akpomi, 2018) Yara (2010) argued that class size is the number of students a teacher teaches at a given period of instruction.

Ngoboka and Schultz (2002) asserted that, the effects of class size on students' performance revolve around how teachers and students behave in large and small classes. They argued that lesson/lecture time in large classes are often more fragmented among students which usually force teachers to resort mainly to passive learning, giving less or no homework in addition to the fact that teachers may find it difficult if not impossible to know each student's personally. Class size also affects effective allocation of time to students which in turn affects the effectiveness of teachers (Etuk, 2004). Good teaching techniques that are possible with small class size may not equally be possible with large class size. (Yusuf, Onifade & Bello, 2016).

2. Statement of the Problem

This study aims at finding out the effect of class size on mathematics students among senior secondary schools in Wudil Zone, Kano State.

3. Research Questions

This research attempts to provide answers to the following questions:

- What is the students' enrollment and number of teachers in selected senior secondary schools in Wudil Zone, Kano State?
- To what extent does class size influence mathematics senior secondary schools students' performance in Wudil Zone, Kano State?
- Is there any significant difference between male and female mathematics students' performance in the selected schools?

4. Objectives of the Study

This study is meant:

- To find out the effect of class size on mathematics students' performance in selected senior secondary schools in Wudil Zone, Kano.
- To determine whether or not there is difference in mathematics students' performance among male and female students in the selected schools.

5. Research Hypotheses

The following hypotheses were raised to guide the study:

- There is no significant difference in the performance of mathematics students when class size is large or small.
- There is no significant difference in mathematics performance between male and female students when class size is either large or small

6. Purpose of the Study

A major purpose of the study is to explore the effects of class size on mathematics students' performance in selected senior secondary schools in Wudil, Kano State.

7. Significance of the Study

It is expected that this study will be beneficial to:

- Students
- Teachers
- Government
- And future researchers

8. Methodology

8.1. Research Design

The research design for this study is descriptive survey and significantly the ex – post facto type. This is because the researcher did not attempt to manipulate the variables since they have already occurred Cohen, Mansion and Morison (2000).

8.2. Population

The target population consisted of all the 16,552 students across the 25 schools in Wudil Zone, Kano State.

8.3. Sample

From a total of 25 senior secondary schools in the zone, 4 with total of 2745 students were randomly selected as the sample for the study.

8.4. Sampling Techniques

Simple random sampling technique was used.

9. Data Collection

9.1. Instrumentation

Research instrument used was observing of students' final year SSCE results for three(3) consecutive years (2014, 2015 and 2016).

9.2. Validity and Reliability of the Instrument

Standardized public examinations conducted by the National Examination Council (NECO) with reputable validity mechanisms was used. In other word, NECO assures the public that its examinations are subjected to the rigorous process of validity and are highly reliable.

9.3. Data Collection Procedure

The data used in this study was collected directly from the principals of the four(4) schools used on the permission of Wudil Zonal Education Officer.

10. Data Analysis and Results Presentation

10.1. Data Analysis

T-test was used to analyze the data collected.

10.2. Presentation of Results and Discussions

S/N	School	2014	2015	2016
1	GDSS KUNDUM SUMAILA	SS3A 39	SS3A 58	SS3A 97
		SS3B 40	SS3B 60	SS3B 104
2	GDSS WUDIL	SS3A 107	SS3A 123	SS3A 128
		SS3B 107	SS3B 120	SS3B 128
3	GSS INDABO	SS3 36	SS3 28	SS3A 37
				SS3B 39
				SS3C 35
4	GSS SARINA	SS3 20	SS3 37	SS3A 38
				SS3B 39
5	Total			

Table 1: Showing Number of Students by Year

Table 1 above shows the number of students by year in the four (4) selected schools in Wudil Zone as at 2014, 2015 and 2016.

S/N	School	Number of Students Registered/Number of Students Pass by Year					
		2014		2015		2016	
		No Reg	No Pass	No Reg	No Pass	No Reg	No Pass
1	GDSS KUNDUM SUMAILA	79	78	118	118	201	201
2	GDSS WUDIL	214	210	243	233	256	223
3	GSS INDABO	36	19	28	20	111	103
4	GSS SARINA	20	19	37	37	77	73

Table 2: Table Showing Number of Registered Students and Number of Students Who Passed NECO by Year by School

Table 2 shows the number of registered students and number of students who passed NECO by year by school

Variable	N	Mean	SD	Df	t cal	T crit.	Decision
Large classes	293	117.4	58.3	347	0.38	1.96	Not significant
Small Classes	56	28	8				

Table 3: Comparison of Academic Performance between Large and Small Size Classes in 2014
Sig. At $P < 0.05$

In order to test the research hypothesis that, will there be a differences in performance of students taught mathematics by teachers having small class size and those taught mathematics by teachers having large classes in Wudil zonal education Kano state Nigeria. An independent sample t-test was performed from the above table the average mean for 2014 was $m = 28$ for small class and $m = 117.4$ for large class.

The result revealed that, the average score for students in small class size $m = 28$, $SD = 8$ at t-value of ($t = 0.38$, $df = 347$, p -value = 1.96) thus based on the obtained p-value of 1.96, $p > 0.38$, no statistically significant difference exist between small class size and large class size in SSCE Mathematics subjects due to population in wudil educational zone.

Variable	N	Mean	SD	Df	t cal	T crit.	Decision
Large classes	361	200.9	54.7				Not significant
Small Classes	65	34.4	4.3	424	0.39	1.96	

Table 4: Comparison of Academic Performance between Large and Small size Classes in 2015
Sig. At $P < 0.05$

In order to test the research hypothesis that, will there be any differences in performance of students taught mathematics by teachers having small class size and those taught mathematics by teachers having large size classes in wudil zonal education Kano state, Nigeria. An independent sample t-test was performed from the above table, the average mean for 2015 was $m = 34.4$ for small class size and $m = 200.9$ for large class size.

The result was revealed that the average score for students in small class size $m = 34.4$, $SD = 4.3$ at t-value of ($t = 0.39$, $df = 424$, p -value = 1.96) thus based on the obtained p-value of 1.96, $p > 0.39$, no statistically significant differences exist between small class and large class in SSCE Mathematics subjects due to the population in wudil educational zone.

Variable	N	Mean	SD	Df	t cal	T crit.	Decision
Large classes	457	231.3	23.2				Not significant
Small Classes	188	96.8	13.6	643	0.30	1.96	

Table 5: Comparison of Academic Performance between Large and Small Size Classes in 2016
Sig. at $P < 0.05$

In order to test the research hypotheses that, will there be any differences in performance of students taught mathematics by teachers having small class size and those taught mathematics by teachers having large class size in wudil zonal education Kano state, Nigeria. An independent sample t-test was performed from the above table the average mean for 2016 was $m = 96.8$ for small class and $m = 231.3$ for large class.

The result also revealed that the average score for student's in small class size $m = 96.8$, $SD = 13.6$ at t-value of ($t = 0.30$, $df = 643$, p -value = 1.96) thus based on the obtained p-value of 1.96, $p > 0.30$, no statistically significant differences exist between small class and large class in SSCE Mathematics subjects due to population in wudil educational zone.

11. Discussion

This study was centered on examining the differences between small and large classes in mathematics academic performance in NECO examinations in the selected secondary schools. Findings from the study revealed that, there is no statistically significant difference in students' academic performance in small and large classes in 2014, 2015 and 2016 in the selected schools.

This finding is not in agreement with those of Yusuf, Onifade and Bello (2016) as well as Akpomi (2018). The result is however consistent with the findings of Hill (1998) as cited by Ngoboka and Schultz (2002) who reported that the size of the class did not have a significant effect on student performance. According to Hill as reported "large class size may be more of an expectation issue rather than a performance issue".

12. Conclusion

The t-test results did not show any significant effect of class size on mathematics students' performance. In other words, there is no evidence to support the hypothesis that academic performance is higher for students in small classes as compared with those in large classes. Other variables usually overlooked or neglected might contribute to the believe that small classes produce better results.

13. Recommendations

Based on the findings of the study, the following recommendations are made:

- More studies are needed especially in other remote variables when studying effect of class size.
- Findings of this study notwithstanding, the state Ministry of Education should take necessary steps to have manageable classes in our secondary schools.
- Workshops and seminars for secondary school mathematics teachers should be encouraged.
- Mathematics teachers should make efforts to develop the attitude of managing as well as controlling classes in respective the class size.
- Government should employ more mathematics teachers in addition to building more classrooms.

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