

# The Effects of Class Size on Students Academic Performance in an introduction to computer science (CMP 111) Course, at Kebbi-state polytechnic Dakin-Gari, NIGERIA

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**Abstract:** Large class size is a big challenge in most public tertiary educational institutions in Nigeria. This study investigated the effects of Class Size on Students Academic Performance in an introduction to computer science (CMP 111) Course, at Kebbi-State polytechnic Dakin-Gari, Nigeria. The study employed quasi-experimental research approach to answer research question (RQ) by using experimental and control group. The experimental group (small class size) and control group (Larger class size) students of National Diploma I (ND I) enrolled in an introduction to computer science course in the school of applied sciences, department of Computer Science and Science Laboratory Technology at Kebbi-State Polytechnic Dakin-gari.

The population of the study comprised fifty (50) students participated as experimental group (small class size) and One hundred and fifty (150) as control group (Larger class size) in the course. Therefore, a total of Two hundred (200) students participated in the study. Data were collected using 20 items essay test questions with reliability coefficients of 0.76 and analysed with SPSS-V21 using independent sample t-test. The investigation were guided by one (1) research question and one (1) null research hypotheses (Ho) at significance alpha value .05 level. The study revealed that class size had an effect on the academic performance of the students where students in small class size recorded higher performance than their peers in large class sizes. Therefore, in this study, it was concluded that classroom size significantly influence academic performance of students in the course. The relationship between classroom size and academic performance was found to be inversely related. Students in large classrooms performed poorly, while students in small classroom size performed better academically. To ensure a more meaningful academic performance among the students, small class sizes are needed to improve the interaction between Lecturers and students. Based on this finding, the study recommended that it is pertinent that the management of the colleges studied pay attention to the class sizes so as to ensure good academic performance.

**Keywords:** Class size, students, academic performance, computer science, polytechnic

## I. INTRODUCTION

Education has received a great deal of attention all over the world. This is because it is the catalyst for any meaningful development in any nation. It is also regarded as the paramount important to the national growth and development. Large class size is one of the problems in the educational sector that developing nations have been grappling with (Uhrain, 2016).

Nigeria, as a developing nation, is no exception and has its own fair share of this problem at the tertiary education level. Most tertiary institutions in Nigeria have extremely large classes, which many people believed, that is linked to lower performance of students. The size of large class in any institution appears to be the major challenges to the lecturers, institution management, and other stakeholders. The realities on the ground are that the student's population far outweighs the facilities, infrastructure and staff of the institutions.

Thus, the truth is that the provisions of facilities do not match the enrolment of the students. This situation has resulted into large class sizes in the institutions (Ngoboka and Schultz, 2002). As the students population increases, class sizes also increase (i.e the students population and class size are directly proportional to each other), the performances of students become an issue.

According to Chileya (2016) class size has become a phenomenon often mentioned in the educational literature as an influence on students feelings and achievement, on administration, quality and school budgets. In his words he noted that, class size is almost an administrative decision over which teachers/lecturers have little or no control. Most researchers start from the assumption that size of the class would prove a significant determinant of the degree of success of students.

In fact with the exception of a few, many studies have reported that under ideal situation class size in itself appears to be an important factor. The first issue that calls for immediate clarification is what number of students should constitute a large group and what should be described as a small group. In describing a small group, Owoeye and Yara (2016) observed that they have few teachers with small pools of talent; offer limited range of subjects and characteristically finding it hard to justify costly investment on libraries... their students lack competition and interest with relatively few peers as they get stucked with same teacher for an entire school career.

Previously cited literature identified various class size effects on classroom management and classroom instruction. Larger class sizes result in less time being utilized for instruction due to more instances of student misbehaviour and off-task behaviour (Aremu and Salami, 2013; Uhrain, 2016). A lack of adequate physical space with which to control student behaviour and to implement non-traditional instructional strategies is also a problem in large classes (Taha, 2021).

Class size affects classroom management, classroom instruction, and the academic achievement of the students (Kusi, 2019). Taha (2021) and Uhrain (2016) found that larger classes are often cited as being harder for the teachers/ lecturers to maintain student discipline, resulting in the focus of the classroom environment being more on student behavior than on student academic performance. Class size directly affects classroom instruction due to larger class sizes requiring teachers to utilize class time for management tasks rather than for instruction. Also, class size directly affects classroom instruction through the interactions of the teachers with the students. Higher levels of interaction between students and teachers, as well as increased levels of students engagement within smaller classes, have been cited in numerous studies (Aremu and Salami, 2013; Kusi, 2019; Owoeye and Yara, 2016; Uhrain, 2016).

The relationship between class and academic performance has been perplexing one for educators discussing factors affecting students' academic performance will require us to look the concept for poor performance (Chileya, 2016). According to (Olalekan, 2013) poor performance is a performance that is adjudged by the examinees and some significant as falling below as expected standard. The interpretation of this expected or desired standard is better appreciated from the perpetual cognitive ability of the evaluator of the performance. While (Kusi, 2019) described poor academic performance as any performance that falls below a desired standard. Large classes are usually as a result of rapid increase in students' enrolment with shortage of teachers/lecturers and lecture halls to match the teaching population.

According to Benbow (2007), the growth of large classes in the developing world is as a result of global initiatives for universal education and rapid population growth. Naturally, in order to mitigate the effects of rapid population growth, there is the need to expand access to higher education through increasing funding.

The seriousness of the problem is directly linked to the quality of teaching and assessment of students, and finally, the quality of nurses and midwives that are turned out onto the job market. This assertion is shared by other scholars, such as Anderson (2000), whose opinion of likely factors that are associated with class size and students' performance includes aspects directly connected to teaching. Indeed, large class size has become a big challenge to management of Nursing and Midwifery Training Colleges in Ghana. Awoyemi and Adetola (2006) observed that "the quality of provision in the institutions is clearly inappropriate as staff-student ratios become more difficult to manage" (p. 12).

According to Etsey, Amedahe and Edjah (2005), educators are interested in the progress of children especially as it relates to learning. The quality of education of a country can be identified by the examination results of its students (Ankomah, Koomson, Bosu & Oduro, 2005). Information relating to such progress can be gathered from evaluation reports on the child to ascertain the learning outcome. Academic performance, according to the Cambridge University Reporter (2003), is frequently defined in terms of examination performance. Academic performance is what a student is capable of achieving when tested or examined on what he/she has been taught (Otu-Danquah, 2002). Academic performance is affected by a number of factors including admission points, social economic status and class size.

Class-size has been identified as one of the determinants of academic performance of students. It has become a phenomenon often mentioned in the educational literature as an influence on a student's feelings and achievement, on administration, quality and school budgets. As school population increases, class sizes also increase, and the performances of students become an issue. The idea that the number of students within a class affects the student's academic performance, the teacher's classroom management, and the teacher's instructional methods have been discussed for decades (Smith, Molnar & Zahorik, 2003). Previously cited literature identified various class size effects on classroom management and classroom instruction. Larger class sizes result in less time being utilized for instruction due to more instances of student misbehaviour and off-task behaviour (Blatchford, Russell, Basset, Brown & Martin, 2007; Cakmak, 2009). A lack of adequate physical space with which to control student behaviour and to implement non-traditional instructional strategies is also a problem in large classes (Blatchford et al., 2007).

Class size affects classroom management, classroom instruction, and the academic achievement of the students (Finn, Pannozzo & Achilles, 2003; Smith et al., 2003). Blatchford, et al. (2007) and Cakmak (2009) found that larger classes are often cited as being harder for the teachers to maintain student discipline, resulting in the focus of the classroom environment being more on student behaviour than on student academic performance. Class size directly affects classroom instruction due to larger class sizes requiring teachers to utilize class time for management tasks rather than for instruction. Also, class size directly affects classroom instruction through the interactions of the teachers with the students. Higher levels of interaction between students and teachers, as well as increased levels of student engagement within smaller classes, have been cited in numerous studies (Finn et al., 2003; Smith et al., 2003; Blatchford et al., 2007; Cakmak, 2009).

Duncanson (2003) pointed out that the lack of large spaces that students can self-select to work in forces the teacher to schedule all events in a one-size-fits all modality, focus on the delivery of general instruction to all students, and deal with one activity at a time. Large classes may allow students to be more disruptive, allow them to "hide" from participation, engagement, or even attendance, while small classes may more easily lend themselves to pedagogical activities that improve learning, such as hands on activities and student-faculty classroom interaction.

Cotton (2001) observed that a specific benefit associated with a small class size is higher students' performance. Wang (2000) suggested that teachers of smaller classes confront fewer discipline problems, cover subject matter in more depth, have more one-on-one contact with students and keep better track of student progress. According to Schneider (2002), small class sizes often encourage parental involvement, which benefits students and the entire community. Principals in Nursing Training Colleges also report that smaller classes have allowed them to establish and maintain better relationship with students, parents and families (Brophy, 2000). Nathan and Febey (2001) identified similar beneficial outcomes. They argued that smaller classes, on average, can provide a safer place for students; a more positive, challenging environment; higher achievement; higher graduation rates; fewer discipline problems; and greater satisfaction for families, students, and teachers.

The need to determine whether a relationship exists between class size and student academic performance is one that can be traced back to the foundation of the educational system in America (Biddle & Berliner, 2002). Understanding if there is a relationship between the number of students in a classroom and the academic performance of the students is vital to educators. The decision of whether or not to decrease the number of students within the classroom to increase academic performance is one that is only confounded by the abundance of contradictory studies into the topic (Biddle & Berliner, 2002; Milesi & Gamoran, 2006). Hoxby (2000) found no statistically significant performance gains for students in smaller classes compared to students in larger classes. Inconsistent findings of class size studies create the need for additional studies.

In the tertiary institutions, precisely in Kebbi- state, North West Nigeria, little is known about whether large class size influences students' academic performance. This situation has created an empirical gap as to whether class size effects students' academic performance among in the Kebbi-State polytechnic Dakin-Gari, Nigeria. Accordingly, this research investigated the Effects of Class Size on Students Academic Performance in an introduction to computer science (CMP 111) Course, at Kebbi-State polytechnic Dakin-Gari, Nigeria.

## **II. RESEARCH QUESTION**

This investigation attempted to answer the research question:

What are the effect of Class Size on Students Academic Performance in an introduction to computer science course in Kebbi state polytechnic Dakin-Gari, Kebbi state, Nigeria?

**III. RESEARCH METHODOLOGY****Research Design**

This study used a quasi-experimental approach to answer research question (RQ) by using experimental and control group. The two Groups of the course met the same days (Mondays and Fridays) for the same time period (2 hours) and were offered in the early morning and mid-day time slots. There was no difference in scheduling for the two Groups and both were allowed the same (long) effective teaching time to complete complex concepts in the same time period (Henebry, 1997). The course had no prerequisites at the end the two groups undergoes a post-test. Collected data were analysed using mean, standard deviation and t-test statistics to find significance differences in academic performance between the groups.

**IV. PARTICIPANTS AND SAMPLING**

In this investigation, students of National Diploma I (ND I) Computer Science, Electrical and electronic engineering and Science Laboratory Technology (SLT) from Kebbi-State Polytechnic, Dakin-gari were selected. Purposive random sampling were used to select Two hundred (200) students in the class. The students were randomly selected into two groups. Group 1 named large class consisted of 150 students while the second group, Group 2 named small class with 50 students.

**V. DATA COLLECTION/ ANALYSIS**

This investigation involves two groups of an introduction to computer science course, a normal-size group (with enrolment of 50 students) and a larger group (with enrolment of 150 students). The two groups were taught by the same Lecturer during first semester 2022, using the same lecture presentations as the primary method of instruction, and the same textbook. The lecturer administered the same exams, all multiple-choice questions to the two groups, assigned the same homework problem sets, and used the same grading policy. Twenty (20) items essay test questions which has a reliability coefficients of 0.76, indicating that it was reliable to assess the academic performance of the experimental and control groups at the end of the treatments. The test was conducted as an instrument to collect data for the study. The students from both groups were expected to score a maximum of hundred (100) marks. The Data collected were analysed using independent sample t-test in Statistical Package for Social Sciences version 21 (SPSS-V21).

**VI. RESEARCH HYPOTHESES**

**H<sub>0</sub>:** There is no significant difference in the academic performance of group 1 (normal class size) taught introduction to computer science course and group 2 (larger class size). The hypotheses were tested at .05 level of significance difference

**VII. DATA ANALYSIS, RESULT AND DISCUSSIONS**

This research question investigated the effect of class size on the academic performance of the students. There were two categories of class size which included 50 and 150 students. An independent sample t-test was employed to analyse the data, and the results are shown in Table 1. The independent sample t-test results in Table 1 showed that there was a significant difference in the academic performance between the two groups  $t(200) = 1.606$ ,  $p\text{-val} = .736$ ,  $df = 3$ , mean difference = 7.433 and 95% Confidence Interval (CI) = [-3.284628, 27.151294]. The mean and standard deviation score for small class size and larger class size, students performed best where the class size was small 50 ( $M=67.20$ ,  $SD=0.53$ ) than those in larger class size 150 ( $M=51.58$ ,  $SD=1.97$ ). Based on the multiple comparison result, it was established that the academic performance was better in smaller class sizes than larger class sizes. Based on these results, the null hypotheses that "There is no significant difference in students' academic performance due to class size in an introduction to computer science course (CMP 111) Course, at Kebbi-state polytechnic Dakin-Gari, Nigeria" was rejected while the alternative hypothesis that "There is a significant difference in students' academic performance due to class size in an introduction to computer science course (CMP 111) Course, at Kebbi-state polytechnic Dakin-Gari, Nigeria" was accepted.

**Table 1: Post-test result on an Introduction Computer science course**

Test	Group	Class size	Mean	Std.	df	MD	t-test-val	p-value
CMP 111_Post_Test	EG_ (small size)	50	67.20	0.53	3	7.433	0.994	.736
	CG_ (Large size)	150	51.58	1.97				

**NOTE: EG = Experimental Group; CG = Control Group; Std. = Standard Deviation; df = Degree of Freedom; MD = Mean Difference; t-test-val = T test value; P-val = Probability Value.**

### **VIII. RECOMMENDATIONS**

The researchers provided the following recommendations:

1. The Lecturers of the institutions studied should adopt teaching approaches that focus on learners, provide prompt feedback to students, and make teaching real through the use of relevant teaching aids to boost academic performance of the students.
2. The lecturers could design their instructions in a manner to encourage students to support each by sharing ideas and assisting each other.

### **IX. CONCLUSIONS**

Based on the statistical evidence, the study concluded that students in small Class room performed better academically than their counterparts in very large class. Therefore, the study concluded that classroom size significantly influence of academic performance of students at the two groups. The relationship between classroom size and academic performance was found to be inversely related. Students in large classrooms performed poorly while students in small classroom size performed better academically. The implication is that lecturers of the large classes are unable to communicate lessons effectively to students, while the students in large classes are unable to ask questions in class. To ensure a more meaningful academic performance among the students, small class sizes are needed to improve the interaction between lecturers and students.

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