
EFFECTS OF ASSIGNMENT AND CLASS SIZE ON SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN MATHEMATICS

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ABSTRACT

This study examined the effects of assignment and class size on students' academic achievement in mathematics in some selected secondary schools in Ogbadigbo Local Government Area of Benue State Nigeria. The study adopted the experimental design and t-test analysis was used in analyzing the data. A researcher-made Mathematics Student Questionnaire (MSQ) and Mathematics Achievement Test (MAT) were the two validated instruments used in collecting data for the study. The sample of the study was made up of 150 senior secondary school students randomly selected from secondary schools in Ogbadigbo Local Government Area of Benue State Nigeria. The results showed that the students in small classes performed significantly better compared to those students in larger classes. The finding also revealed that students exposed to regular assignment performed better than those not exposed. It was therefore recommended that policy makers and government should ensure that more classrooms are built and number of students in a class should not be more than thirty (30) for the purpose of effective teaching and learning.

Keywords: Mathematics achievement, class size, Assignment**INTRODUCTION**

In school system, teachers, administrators, parents and the research community have been debating the issue of whether smaller classes are better than larger classes. This debate persists because of the powerful commonsense appeal of small classes to alleviate problems related to the classrooms. Small classes are an integral component of nationally subsidized programs including special education classes for learning disabled students. Slavin and Madden (1995) said that small classes or small groups working with one teacher or tutor also are a key element of programs targeted most often at students at risk.

Class size issue also persists because of the tension between the research findings and the cost of implementation. As school population increases, so also

the class size increases. According to Dror (1995), class size has become a phenomenon often mentioned in the educational literature as an influence on pupils' feelings and achievement, on administration, quality and school budgets. He noted that class size is almost an administrative decision over which teachers have little or no control.

The issue that needs to be clarified more is what number of students make a large group and what should constitute a small group. Eicher (1994) described a small group as that having few teachers with small pools of talent, often limited range of subjects and characteristically finding it hard to justify costly investment on libraries; their pupils lack competition and

interact with relatively few peers as they get hooked with same teacher for an entire school career.

In large class, Eicher (1994) continued, teachers may find it easy to stream students according to ability, while commitment to work may stand a test of time. In terms of numerical strength, the National Policy on Education (1977 revised in 1981 and 2004) specified 20 in pre-primary, 20 in primary and maximum of 40 in secondary school. These specifications however are unrealistic in some areas as a result of dense population and shortage of classrooms. Kolo (1991) from his studies put the size of a large class as ranging from 30-33 and small class from 8-45. Indiana's Prime Time and Star (2003) viewed the average class, size as ranging 21-31. We have learnt much about instructional practices and how students learn. Yet, the controversial issue of classes and its effect on educational practices and student achievement continue to be confusing and often contradictory. Over the past 20 years, there have been many summaries of research on the relationship of class size to academic achievement. The most cited review of class size is the classic meta-analysis of research on the relationship of class size and achievement (Glass and Smith, 1979). The researchers collected and summarized nearly 80 studies of the relationship of class size with academic performance that yielded over 700 class size comparisons on data from nearly 900,000 pupils. The two primary conclusions drawn from this material are:

- a) Reduced class size can be expected to produce increased academic achievement
- b) The major benefits from reduced class size are obtained as the size is reduced <20 pupils.

In a compilation of studies examined by Educational Research Service, Robinson (1990) concluded that research does not support the expectation that class size will of themselves result in greater academic gains for students. He observed that the effects of class size on students learning vary by grade level, pupil

characteristics, subject areas, teaching methods and other learning interventions. In particular, review of the studies concludes that small classes are most beneficial in reading and mathematics in the early primary grades and that the research rather consistently finds that students who are economically disadvantaged or from some ethnic minorities perform better academically in smaller classes.

Slavin (1989) submits that substantial reductions in class size have small positive effect on students and the effect was not cumulative and even disappears in later years. He further asserted that large effects of class size reduction are not likely to be seen until the class size is reduced to one (that is one-on-one tutoring). Bennett (1987) in a review of research, found broad agreement among researchers on the following general conclusions:

- a) Smaller classes result in increased student-teacher contact
- b) Reductions in class size to less than twenty students without changes in instructional methods cannot guarantee improved academic achievement
- c) No single class size is optimal for all grade level

Smaller classes appear to result in greater achievement gains for students with lower academic ability and for those who are economically or socially disadvantaged

- a) Classroom management improves in smaller classes (fewer discipline problems)
- b) Smaller classes result in higher teacher moral and reduced stress
- c) Individualization is more likely to occur in smaller classes
- d) Class size reductions alone do not necessarily lead to adoption of dramatically different instructional methods

- e) Class size appears to have more influence on student attitudes, attention, interest and motivation than on academic achievement
 - f) Very small classes of five or fewer students produce considerable higher achievement
- Researchers (NCTE, 1986) have identified the following encouraging results from reducing class size and improving instructional methods:
- a) Smaller classes result in increased teacher-student contact
 - b) Students in smaller classes show more appreciation for one another and more desire to participate in classroom activities
 - c) In smaller classes, more learning activities take place
 - d) Smaller classes foster greater interaction among students, helping them understand one another and increasing their desire to assist one another
 - e) Smaller classes allow for potential disciplinary problems to be identified and resolved more quickly
 - f) Smaller classes result in higher teacher morale and reduced stress.
 - g) Less retention, fewer referrals to special education and fewer dropouts are the ultimate rewards of class size reduction

The NEA report (1986) also includes among others that there is typically little to be gained from reductions in class size that do not bring class size <30. Muller et al. (1988) indicated that in a reduced class size, students received more individual attention, received more immediate feedback that both below average and above average students achieved more than a greater variety of instructional materials were used that the instructional atmosphere were less hectic that teachers assigned more homework and that teachers were happier and more enthusiastic about their teaching. In a

statewide class studies, Prime Time and Star (2003) came out with the following results:

- a) Positive outcomes were found for small classes on such factors as time on task, individualized instruction, well-behaved classes and teacher satisfaction
- b) The results for academic achievement were mixed at times, small classes were found to have superior outcomes and at times, the large classes performed better

The most influential contemporary evidence that smaller classes lead to improved achievement is Tennessee's Project Star. Because this program set up randomly selected control and experimental groups of students Project Star (Finn, 2000) found:

- a) Students in smaller classes did better than those in larger classes throughout the k-3 grades
- b) Minority and intercity children gained the most from smaller classes

Fewer studies have examined the effect of class size on students' achievement in post-secondary schools education. Bandier a, et al (2014) examine administrative records from a leading UK university and found a significant negative, but highly non-linear effect of class size on students tests result. They conclude that changes have a significant effect on student achievement but only at the very top and bottom of the class size distribution. Furthermore, they found that students at the top of the grade distribution are mostly negatively affected by class size, particularly in large class sections.

Further study (Folger and Cox, 1991) showed that even after the small-class intervention was disbanded, students who had been in smaller classes had higher achievement in all academic areas compared to students in regular or teacher-aide classes. The study also revealed that pupils who had been in small classes

were rated as expending more effort in the classroom, taking greater initiative with regard to learning activities and displaying less disruptive or inattentive behaviour compared to their peers who had been in regular-size classes.

In a previous study of teacher mobility, Wisconsin and Helming (1991) found that large class sizes and excessive responsibilities contribute to high stress levels of job dissatisfaction among teachers. This research offers new insights into the complexities of teacher workload and by implication suggests avenues by which students' achievement may be enhanced. They further found that teacher in-service opportunities (professional development programmes) must accompany reduced class sizes so that appropriate teaching can be developed and reinforced to boost student achievement.

Johnson (2014) examined the data from 1998 National Assessment of Educational Progress (NAEP) reading examination to analyze the effect of class size on students' achievement, and found no little or no impact. Ajayi and Ogunyemi (1990) in their study of the relationship between instructional resources and students' academic achievement in Ogun State found no significant relationship between class size and student academic achievement. Adeyela (2000) found in her study that large class size is not conducive for serious academic work. Afolabi (2002) found no significant relationship among class size and students learning outcomes. The foregoing differing findings, opinions and observations call for further investigation into the relationship between class size and student academic achievement particularly in Mathematics, which this present study was out to do.

Purpose of the Study

This study specifically sought to investigate the effect of the following school factors:

- (i) Modes of assessment through regular/irregular assignments.
- (ii) Class size (large-above 30 students or small-30 students and below) on students' achievement in mathematics.

Research Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

- (i) There is no significant difference between the achievement of students in large classes and those in small classes in mathematics.
- (ii) There is no significant difference in the performance of students exposed to regular assignment and those not exposed in mathematics.

METHODOLOGY

The study adopted experimental research design to determine the effect of assignment and class sizes on students' academic achievement in mathematics. This is because it enables the researcher to draw causal inferences and to observe whether a variable (i.e the independent variable) caused another variable (the dependent variable).

All the senior secondary two students in Ogbadigbo Local Government Area of Benue State with an estimated population size of nine hundred students from public schools constituted the population for the study.

The subject for the study comprised of 150 senior secondary school students randomly drawn from ten (10) out of the fifteen secondary schools in Ogbadigbo Local Government Area of Benue State Nigeria to reflect all the factors investigated in this study.

Two instruments were used for data collection. These instruments are Mathematics Student Questionnaire (MSQ) and Mathematics Achievement Test (MAT).

The MSQ was structured on a Likert scale and used to classify students under the two factors investigated. The MAT was developed by the researcher which consisted multiple choice objective tests drawn from topics across the SSI mathematics curriculum. This was administered to the students to assess the extent to which mode of assessment (regular or irregular assignment) and the class sizes (large/small) influence students achievement in mathematics.

These two instruments were developed by the researcher and were subjected to face content validity by three science educators and four mathematics teachers. The t-test analysis was used to test the effect

of assignment and the class size on the students' achievement in mathematics

RESULTS AND DISCUSSION

The results are presented according to the research hypotheses formulated as shown in the table below:

Research Hypothesis One

There is no significant difference between the achievement of students in large classes and those in small classes in mathematics.

Table 1: t-test analysis of the effect of class size on students' achievement in mathematics

Group	N	X	SD	Df	t-value	t-critical	Decision
Small Class (A)	52	8.33	2.79	148	7.49	1.96	*
Large Class (B)	98	4.06	2.13				

*= Significant at 0.05 levels

The result in table 1 shows a significant difference in in mathematics achievement of students in small and large classes as observed t-value 7.49 significant at 0.05, $df = 148$ is greater than the t-critical of 1.96 ($7.49 > 1.96$). Hence, students in small classes performed significantly better with mean score of 8.33, than students in large classes with the mean score of 4.06 in mathematics. This is due largely to the individual attention given to the students by the teacher. This led to the rejection of the null hypothesis.

This result is in agreement with the findings of Bandiera (2014), who found a significant negative between the class size and student achievement, such that the larger the class, the lower the student achievement will be. Adeyela (2000) also gave credence to this fact in her study that large class size is not conducive for serious academic work.

Also the research of Wisconsin and Helming (1991) greatly supported these results in that large class sizes and excessive responsibilities contribute to high stress levels of job dissatisfaction among teachers. Results also showed that the performance of students taught by teachers in smaller classes was good because the performance of students in the Mathematics Achievement Test was as high as 8.33 mean score on the whole. These results are in conformity with the findings of Muller et al. (1988), which indicated that in a reduced class size, students received more individual attention and more immediate feedback that both below average and above average students achieved more than a greater variety of instructional materials were used that the instructional atmosphere were less hectic that teachers assigned more homework and that teachers were happier and more enthusiastic about their teaching.

These findings are also in agreement with the findings of Bennett (1987), who agreed with the results of researchers that smaller classes result in increased student-teacher contact, greater achievement gains for students with lower academic ability and for those who are economically or socially disadvantaged, improvement in classroom management, higher teacher

moral and reduced stress, produce considerable higher achievement.

Research Hypothesis Two

There is no significant difference in the performance of students exposed to regular assignment and those not exposed in mathematics.

Table 2: t-test analysis of students' achievement in mathematics given regular/irregular assignment

Group	N	X	SD	df	t-value	t-critical	Decision
Students given regular Assignment	52	11	5.71	148	8.68	3.70	*
Students given irregular Assignment	98	3.7	2.85				

*= significant at 0.05 levels

Also, the result in table 2 indicates a significant difference, as the calculated t-value of 8.68 is greater than the t-critical of 3.70 (8.68>3.70), at df = 148 at 0.05 level of significance. Therefore, the null hypothesis is rejected which means there was a significant difference in the performance of students exposed to regular assignment and those not exposed in mathematics. As observed from their mean scores of 11 and 3.7 respectively, students given regular assignment performed better than those not given.

IMPLICATIONS OF THE FINDINGS

Even in the light of the findings, the preponderance of the evidence supports positive effects and academic gains when class size reduction in the schools are well designed and properly implemented. Student achievement however, is not the only factor in play. The possible benefits of smaller classes must be weighed against the costs (Hoxby, 2002). To reduce class size in a meaningful way, schools might need to hire more teachers, more classes, for effective teaching and learning. Hiring more teachers can be especially

difficult in public schools already are straining to fill positions as an aging workforce edges closer to the retirement of fewer young people enter the profession. New standard for teacher quality established by federal legislation could further complicate the supply and demand problem.

CONCLUSION

From the findings, it can be seen that the larger the class size of students being taught the less the performance of the students. There is therefore, the need to make the number of students to be taught in the mathematics classes to be moderate so that the teacher can be able to manage the class effectively and be able to give individual attention to students who may have problem of assimilating the concepts of what has been taught. In spite of the finding in this study, and the discussion thereon, there is no doubt that regular assignment given to students and student activity-based instruction encourage self-paced learning. This enables the students discover and solve problems by themselves. Concepts discovered by students

themselves stick to the memory more than those being spoon fed by the teacher. Manageable number (thirty and below) of students in a class with enough space for the teacher to go round is a boost to learning as effort would be directed to individual differences. Teachers can effectively give assignment, and other practice exercises to the students, mark and result discussed with the students. With these strategies, there would be efficiency in teaching/learning processes in mathematics.

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RECOMMENDATIONS

From the findings of this study, the following recommendations are made:

- (i) Educational policy makers should formulate policies that will ensure that the number of students in a class should not exceed 30 students. This in turn will make the government to provide enough classrooms for the schools.
- (ii) Mathematics teachers should endeavor to give as much assignment as possible to students

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