

ISSUES OF CLASS-SIZE AND MATHEMATICS ACHIEVEMENT IN SCHOOLS

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Abstract

This study was aimed to examine the influence of overcrowded classrooms on the perception and learning achievement of students in mathematics. The Pre-NCE students of business department, Federal College of Education, Okene was used as a case study. The population of the students is 173. A sample of 80 students was randomly sampled out for the study using stratified random sampling technique. The 80 Students were further subdivided into two groups of 30 Students (NCS) and 50 Students (OCS). The groups denoted as NCS and OCS represent normal class size and overcrowded class size. The data used for the study were obtained from the test scores given to the two groups and were analysed using chi-square test and z- test at 5% significant level. Questionnaire was also administered on the students in order to elicit their responses on their perception about learning in overcrowded Mathematics classroom. The data obtained from their responses were analysed through the content analysis technique. The results of the analyses revealed that there is significant difference in the mean performances of the students in the two groups; and that the number of students who failed or passed is not independent of class-size. Also Boys were found to perform better than girls in the overcrowded classroom. The questionnaire analysed shows that students have negative perception of learning mathematics in overcrowded classroom. Based on the findings, it was recommended that more Mathematics teachers should be employed to reduce teacher - student ratio.

Introduction

Most of the Nigerian governments in the past and present have been battling with problems of education. As a result several educational commissions such as Ashby commission of 1960, the 1969 Curriculum conference, the Longe commission of 1993, Education reform committee of 2006 etc have been set up; to examine Nigeria's educational problems and make recommendations. One of the Nigeria's educational problems is overcrowded classrooms.

Large class-size is therefore, a major issue for students and educators alike. According to Igbokwe (2001), overcrowded classroom is most manifested in Mathematics classes because of the compulsory nature of the subject. Overcrowded classrooms are classrooms with large number of students; a situation of high student-teacher ratio and inadequate space for the Students. Hoffman (1980) described it as the number of Students per Teacher in a class. The National Policy on Education (FRN, 1998) defined class size as the population of a given class in terms of Students and Teacher. Sometimes, Students are found standing outside the class in order to receive their lectures.

Kedney (1989) saw large class-size as a tool that can be used to measure the performance of educational system. In relation to size, Stepaniuk (1969) reported that the rational utilization of classroom space depends upon class-size. The recommended Students population in a single classroom should not exceed 1:30 or at most a maximum of 35 (teacher - Student ratio; 1:35) (UNESCO, 2000, FGN, 2006). In view of this principle which is generally affirmed by many people,

one might expect that strict adherence to this. But statistics from Federal ministry of Education shows that in 1994, there are 782 teachers and 18,296,202 pupils given teacher – pupil ratio of about 1:50 in 39221 primary schools; this keep escalating annually. For public secondary schools in Nigeria as at 2005, students enrolment was 5,422,611 and 122,477 teachers; given teacher –Student ratio of about 1:45. The situations remain the same till now. As a result, Dean (1994) compared class-size in some countries and found that Turkey, Norway and Netherlands had class-sizes of 20 more; the UK, USA, Japan, Canada and Ireland had class-sizes of between 15 and 20 while France, Sweden, Denmark, Austria, Italy, Luxembourg and Belgium had sizes below 15. He argued that few pupils per class are uneconomical as they do not make full use of space, teachers and teaching materials. Adeyemi (1998) too, reported that average class-size influences the cost of education while capital cost could be reduced by increasing the average class-size in schools. Nwadiani (2000) reported that the higher the class-size the lower the cost of education but emphasised that most classrooms are over-crowded; thereby affecting the quality of education. Ajayi (2000) supported the report and stated that, cost of education can be reduced by increasing class-size.

Increase in enrolment in many Schools can definitely lead to an increase in class size. In view of this, Commeyras (2003) stated that effective teaching seems impracticable for Teachers having large class-sizes of 50, 75, 100 or more. A study of overcrowded schools in New York City found that students in such schools scored significantly lower on both mathematics and reading exams than did similar students in underutilized schools. It was also noted by Shapson (1972), Ojerinde (1998), and Eniayeju (1999) that overcrowding in classrooms is one of the many factors that contribute to the poor performance of learners in mathematics. This was supported by Adebogun (2001) where he noted that a teacher in overcrowded class would eventually not be thorough in his teaching but adding to the confusion of the learners. Overcrowding creates so many others problems: Students are not able to get the proper attention they needed, teachers are being overworked with the added weight of extra students to teach, more papers to grade, as well as a strain on resources. The higher student - teacher ratio, the less likely students are to be attentive. Students who need help may need to wait several minutes before the teacher can aid them, as all the other children must be attended to as well. This also puts students with disabilities at a disadvantage because they may not get the individualized attention they needed. Students who have to wait for help from a teacher would also suffer. This waiting period could lead to frustration and disruptive behavior. A more troubling issue is that students in overcrowded schools are more likely to experience violence. With so many Students to look after, bullying and other violent acts may go unnoticed for longer periods of time.

The liberalization of primary and secondary education in 1979 without adequate resources to match with the sharp increase in the class size has led to overcrowded classrooms in Nigeria. The situations got worsen with the introduction of Universal Basic Education (UBE) programme of the Obasanjo administration. It is therefore, the concern of the researcher to investigate the impact of class-size on Students' learning achievement in Mathematics.

Statement of the Problem

Federal College of Education, Okene it has been experienced that there Is constant overcrowded mathematics classrooms and low achievement in mathematics; most especially in Pre-NCE of business department of the College. Is large class-size a hindrance to Students' learning achievement in Mathematics? This is the main problem under study.

Purpose of the Study

Ojonubah (2009) stated that Mathematics achievement of most Mathematics Students in almost all schools in Nigeria today can be described as persistently low. Most of these Students are products of the overcrowded classrooms in question. Thus, it is the objectives of this research to examine the relationship and effect of large class-size on Mathematics achievement.

Research Questions

The following research questions were formulated to guide the study:

1. Is the number of Students who failed or passed independent of class-size?
2. What is the difference in the mean performance of the Students in groups NCS and OCS?
3. Is there difference between boys and girls performances in overcrowded class-size?
4. What is the perception of Students learning Mathematics in overcrowded class-size?

Methodology of Study

Research Design

The study employed descriptive survey. Students scores in Mathematics test were obtained for both NCS and OCS groups and then analysed statistically.

Population and Sample

The population for the study consisted of 173 Students of Pre-NCE Business department of F.C.E. Okene who offered Mathematics courses in first semester of 2009/2010 session. From this population 80 Students were selected using stratified random sampling technique. The strata are based on boys and girls.

Instrument

There were two types of instruments used for this study. The first instrument was test questions. The test questions each consisted of two sections namely, section A and section B. Section A was theory paper of three(3) questions to answer two(2). Section B was objective paper of ten(10) questions to answer all.

The second instrument was a 10-item questionnaire developed by the researcher and validated by experts in mathematics. This was designed to elicit information from the Students on their perception in learning Mathematics in overcrowded class-size. A 2-point scale of either Agree or Disagree was used for the 10-item questionnaire.

Procedure for Data Collection

The randomly selected 80 students from the department were classified into two groups of Normal Class-size (NCS) and Overcrowded Class-size (OCS). The NCS and OCS groups consist of 30 and 50 students respectively. Each group has the same number of boys and girls.

The two groups were taught same topics in Mathematics by the researcher for a period of three months. At the end of each month, the two groups were evaluated using same test. The average scores for each Student was computed and noted. Those who failed or passed in the groups were counted. Also, the mean scores for the two groups as well as mean scores for boys and girls in OCS were computed for further analysis.

At the end of the three months, the questionnaire were administered to the 80 Students that form the two groups. All administered questionnaire were duly completed and retrieved from the respondents for analysis. Their responses were collated which form part of the data for this study.

Data Analysis

The data collected were organised and then analysed using statistical tools, chi-square, z-test, frequencies and percentages at significant level, $\alpha = .05$.

Results

Research Question 1: Is the number of Students who failed or passed independent of class-size?

Table I: Number of Students who failed or passed in group NCS and OCS

Group	Performances of Students		df	χ_c	χ_t	α	Remark
	Failed	Passed					
NCS	5	25	1	14.31	3.84	.05	S
OCS	30	20					

S = significant

From table 1, since $\chi = 14.31 > \chi = 3.84$, it can be concluded that the test value is significant at 5% level and that the number of students who failed or passed is not independent of class-size.

Research Question 2: What is the difference in the mean performance of the Students in groups NCS and OCS?

Table II: Difference between mean performance of the Students in group NCS and OCS.

Group	N	Mean	SD	Variance	Zc	Zt	α	Remark
NCS	30	50.1	3	9	11.6	± 1.96	.05	S
OCS	50	38.4	6	36				

Table II revealed that $Z_c = 11.6 > Z_t = 1.96$. Thus, it can be concluded that there is evidence at 5% level of significance that a difference in population means significantly exists; i.e, there is a difference in the mean performance of students in the group NCS and OCS.

Research Question 3: Is there difference between boys and girls performances in overcrowded class-size?

Table III: Difference between mean performance of the boys and girls in OCS group.

Group	N	Mean	SD	Variance	Zc	Zt	α	Remark
Boys	25	40.2	6.32	40	2.33	± 1.96	.05	S
Girls	25	36.3	5.48	30				

The result of table III showed that $Z_c = 2.33 > Z_t = 1.96$. This implies that, there is a significant evidence at 5% level that the population means of boys and girls in OCS group are different. Hence, it can be concluded that the performance of boys and girls in OCS group are not the same. That is, the mean score of 40.2 for boys is truly better than the mean score of 36.3 for girls.

Research Question 4: What is the perception of the Students learning Mathematics in overcrowded classroom?

Table IV: Mathematics students' perception of overcrowded classroom.

Here, the 80 students under study are made to respond to each item in the table shown below. In each item, the students were categorized under two headings based on their responses of either Agree or disagree. The number of students who agree or disagree were recorded under the frequency (freq) column and their percentages computed were entered into the percentage (%) column.

	Items	Agree		Disagree	
		Freq	%	Freq	%
1	Individual attention is lacking in overcrowded Mathematics class.	60	75	20	25
2	Gifted Students benefit better in overcrowded mathematics class.	46	57.5	34	42.5
3	In large class-size, effective teaching seems impracticable for maths teachers	43	53.8	37	46.2
4	Instructional activities are affected negatively in overcrowded classroom.	41	51.3	39	48.7
5	Learning Mathematics in overcrowded class-size crates stress.	72	90	8	10
6	There is no effect in absenteeism from overcrowded Mathematics class.	58	72.5	22	27.5
7	In overcrowded Mahts classroom, confusion and frustration are the answer.	70	87.5	10	12.5
8	It is not possible to perform well in Maths in overcrowded Maths class.	74	92.5	6	7.5
9	I hate Mathematics class because it is always noisy.	67	83.7	13	16.3
10	In overcrowded classroom, it is difficult to concentrate on a task in Maths class.	71	88.8	9	11.2

From table IV, it was revealed that the items 1 – 10 have higher percentages of students that agreed than those that disagreed to the items. It can therefore, be concluded that most students have negative perception of large class-size.

Findings

1. The Students in NCS performed significantly better in Mathematics than the Students in OCS.
2. In an overcrowded Mathematics class, boys perform better than girls.
3. Students' achievements in Mathematics depends on class-size.
4. Students have negative perceptions of learning Mathematics in an overcrowded classroom.

Discussion

As revealed in the analyses and indicated in the findings, class-size influences negatively the achievements of students in Mathematics. The study has shown that students in NCS performed significantly better in Mathematics than Students in OCS. In addition, Students' achievement and class-size are dependent variables. The significant difference in performance obtained in NCS group was in agreement with Barber (1988), Correa (1993), Massey (1997), and O'Connor (1994) who reported that large class-size is capable of reducing students' level of achievement and that small class-size or NCS favours better achievement of Students. By implication, academic achievement and large class-size are negatively related. However, the findings of Ibrahim (1992) do not agree with the findings of this study. He stated that academic achievement and class-size are independent since class-size may have little or no effect on teaching effectiveness.

Attempt was made to find out whether there is significant difference in the Mathematics achievement of boys and girls both in OCS. The study showed that there was significant difference in their Mathematics performances with boys achieving better than girls. The result may be due to the following reasons:

- (i) Girls are more feminine than boys such that overcrowded classroom with its' associated problems might hinder girls performance more drastically than those of boys.
- (ii) Girls are likely to need individual attention than boys during Mathematics learning.

Lastly, it was revealed in the study based on the facts in table IV that Students generally developed negative perception for learning Mathematics in an overcrowded classroom. This is capable of making students to develop hatred for Mathematics thereby resulting to perpetual low performance for the subject both in internal and external examinations.

Conclusion

The problem of overcrowded classroom in Schools in Nigeria is an already known and existing problem in our societies. Thus, the management and solution to this problem is the responsibility of all stake-holders in education. Note that, a problem identified is a problem solved.

Recommendations

The findings of this research has many implications and as such the following recommendations were made.

Issues of Class-Size and Mathematics Achievement in Schools

Government and individuals operating private schools should build more classes and recruit more teachers in already existing schools to reduce teacher – student ratio.

More Schools should be established both in urban and rural areas.

The problem of overcrowded classrooms in our Schools should not be an issue for government alone; rather individuals, parents, voluntary organisations, communities etc should join hands with the government in order to reduce large class-size to the barest minimum.

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