

The Influence of Class-size on the Quality of Output in Secondary Schools in Ekiti State, Nigeria

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Abstract: This study examined the influence of class-size on the quality of output in secondary schools in Ekiti State, Nigeria. The population of the study comprised all the 141 secondary schools that presented students for the year 2003 SSC examinations in the State. Sample of 120 schools was selected through stratified random sampling technique. Data were collected through an inventory and were analysed with the use of chi square test, correlation analysis and t-test. Semi-structured interview was conducted with selected principals and education officers. Their responses were analysed through the content analysis technique. The findings revealed that schools having an average class-size of 35 and below obtained better results in the Senior Secondary Certificate (SSC) examinations than schools having more than 35 students per class. The mean scores were higher in schools having an average class-size of 35 and below. The interviewees' responses supported the findings as they supported small class-sizes in schools. It was therefore, recommended that Government should provide more classrooms in all secondary schools in the State to cater for small class-sizes.

Key words: Influence, class size, quality of output, examination, SSC, Nigeria

INTRODUCTION

Class-size is an educational tool that can be used to describe the average number of students per class in a school. Hoffman (1980) described it as the number of students per teacher in a class. Kedney (1989) saw it as a tool that can be used to measure the performance of the education system. In relation to size, Stepaniuk (1969) reported that the rational utilization of classroom space depends upon class-size. This in turn would depend upon the area of the classroom. He argued that there are approved norms of class-size, 40 pupils per class for grades 1-8 and 35 pupils per class for the senior classes; while the standard allocation of class space per pupil is 1:25 square metres. In this regard, Dean (1994) compared class-size in some countries and found that Turkey, Norway and Netherlands had class-sizes of 20 or 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 class-sizes of below 15.

In Nigeria, however, Okoro (1985) reported that the class-size in secondary schools ranged between 35 or 40 students. 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 while Nwadiani (2000) argued that the higher the class-size the lower the cost of education. He contended however, that most classrooms are over-crowded spreading resources thinly and thereby affecting the quality of education. Ajayi (2000) supported the viewpoints and argued that in order to control rising capital cost of education, the average class-size could be increased. These points were also supported by Toth and Montagna (2002) who reported that the increase in enrollment in many institutions which has become major concerns of students could definitely lead to an increase in class-size. Commeyras (2003) however, disagreed with these arguments and reported that effective teaching seems impracticable for teacher educators having large class-sizes of 50, 75, 100 or more.

In terms of outcomes, Schultz (1963) classified the outcomes of education into 2 categories from the economic point of view. These are consumption and investment. Cohn (1975) referred to the consumption aspect as that related to benefits derived by students. He regarded the investment component as including a variety

of outputs related to the enhancement of an individual's or society's productive skills. Thus, Blaug (1983) argued that the extension of education tends to raise the earnings of those who benefited from it. In this regard, Simkins (1981) reported that output represents the immediate results of the system's activities. According to him, the main outputs in education are expressed in terms of learning, that is, changes in the knowledge, skills and attitudes of individuals as a result of their experiences within the educational system. He argued that the educational system is a productive system in the very sense that it produces outputs especially various forms of learning. He expressed that the components of the system could be represented in a model viz: Input--Process--Output. Explaining the model, he alleged that the various inputs are processed in the production of outputs.

Tsang (1988) supported this view and regarded inputs to education as the various ingredients used in producing outputs. He remarked that the output of education consists of educational effects such as cognitive and non-cognitive skills that are learned by students.

Blaug (1970) outlined different concepts of evaluating output. According to him, these concepts include the number of students completing a course; the number of students completing a course of standard length (longer courses being regarded as more output); the number of students with given achievement test scores and the number of students with different future earning capacities. Lord (1984) agreed with these points and enumerated four major areas in which the measurement of output in education could be analysed. According to him, these include the assessment by the teacher; standard examinations as a measure of educational output; other standardised tests for national and local monitoring and market research techniques.

The Organization of Economic Cooperation and Development OECD (1965) gave four criteria that could be used to assess performance as a tool in the measurement of output. These criteria include the rate of progress of pupils through the system; the performance of pupils at the terminal examination measured by the scholarship awarded; the facilities in the schools and the range of subjects offered in the curriculum. Blaug and Woodhall (1968) however, made an attempt to measure the output of education. According to them, the easiest way of measuring how successful a school performed in teaching particular subjects is to compare the achievement of its pupils in specially designed tests. According to the authors, the simplest measure of secondary school output is the annual number of school leavers while the only measure of performance which could be applied to school leavers is the attainment in GCE examinations.

Examinations in Nigerian schools dated back to the advent of formal education. Since then examinations have occupied a central place in the Nigerian educational system (Ukeje, 1966). According to him, examination has been the sole criterion of quality in Nigeria and once a higher percentage of the pupils pass their external examinations, the school is considered to be of a high quality. The importance of examinations in Nigeria even extended beyond this point. This importance as entrenched in the Federal Government Nigeria National Policy of Education (1998) was in the fact that all secondary schools should gear their programmes to meet the requirements of examinations being conducted for the School Certificate. Toward this end, Fafunwa (1974) argued that it is an educational truism that examinations control the curriculum and whoever controls a country's examination system controls its education.

The WAEC (1952) Ordinance emphasized the importance of standards in its examinations. According to the Ordinance, standards must be such that the certificates awarded on the basis of performance in the examinations shall not represent a lower standard of attainment when compared with equivalent certificates of other examining authorities. These examining authorities were the Cambridge and London Universities Examinations Boards for the WASC and GCE examinations respectively. Although the SSC examination has replaced the WASC and GCE examinations in Nigeria, it still uses the GCE O and A level standards as its norms since it was pitched between the O and A level standards (Salami, 1992). The pattern of grading candidates' scores in the examinations was such that the distinction grade was represented by A1 to B3. The credit grade was represented by C4 to C6. The ordinary pass grade was represented by D7 and E8 while the failure grade was represented by F9. It needs to be mentioned however, that the distinction and credit grades are the only requisite qualifications for admissions into universities in Nigeria and candidates must have at least five credits in five subjects including English Language in order to qualify for admission (WAEC, 2003). The foregoing review has shown that class-size is a controversial educational tool that has varied from one country to another. Thus, this study was embarked upon to determine the influence of class-size on the quality of output from secondary schools in Ekiti State, Nigeria.

STATEMENT OF PROBLEM

The above review had highlighted the importance of class-size in the school system. It has shown the views of previous researchers on class-size in various countries. In

view of the divergent opinions, the problem of this study was to determine what influence class-size had on the quality of output from secondary schools in Ekiti State, Nigeria? In addressing this problem, the following research questions were raised:

- What relationship exists between class-size and the quality of output from secondary schools in Ekiti State, Nigeria?
- Is there any significant difference between the quality of output of students in schools having an average small class-sizes and the quality of output of students in schools having an average large class-sizes in the SSC examinations in the State?

MATERIALS AND METHODS

This study was designed along the lines of a descriptive survey. Babbie (1973) described a survey as that is conducted for the purpose of making descriptive assertions about some populations. Cressey (1982) saw it as a situation without attempting to manipulate variables while Gay (1996) regarded it as a collection of data from members of a population in order to determine the status of population with regard to one or more variables. Considering the above, the study population comprised all the 141 secondary schools that presented candidates for the 2003 Senior Secondary Certificate examinations in Ekiti State of Nigeria. Out of this population, a sample of 120 schools (85% of the population) was drawn through the process of stratified random sampling taking into consideration the school-sex and school location.

The instrument used for collecting data for the study was an inventory. Good (1973) described an inventory as a checklist or an open instrument compiled to serve educational needs. The inventory comprised items on enrolment figures, number of classes in each school,

number of teachers and students' grades in 5 major subjects in schools' curriculum namely English Language, Mathematics, Physics, Chemistry and Biology in the 2003 SSC examinations. The data collected were analysed with the use of the chi square test, correlation analysis and t-test. Semi-structured interview was conducted with 30 principals of schools and 30 education officers in the State to elicit information on their views about the class-sizes in schools. These principals and education officers were sampled randomly from 141 principals and 232 education officers in the State. The responses of the interviewees were coded and analysed by counting. The proportion of the number of responses to each question was computed through the content analysis technique based on a maximum obtainable score of 100% (Easterby-Smith *et al.*, 1996).

Data description: The average class-size was determined by dividing the total number of students in each school by the total number of classes. Schools in the sample were categorized into 2 groups. The schools with the average class-size of 35 students or below per class were classified into one group while schools with the average class-size of above 35 students per class were classified into the other. Class-size was cross-tabulated with school-sex. The findings are shown in Table 1.

As indicated in Table 1, most of the single-sex schools had 35 students or less average class-size while the bulk of the mixed schools had above 35 students average class-size. The chi-square analysis shows significant relationship between the 2 variables. Class-size was also cross-tabulated with school location (Table 2).

As indicated in Table 2, urban schools had more of large classes than rural schools while rural schools had more of small classes. The chi square analysis shows that class-size and school location were significantly related.

Table 1: Cross tabulation of class-size and school-sex

School-sex	Schools with 35 students or less average class-size	Schools with above 35 students average class-size	Total	Chi-Square (Pearson)	Signif.
Mixed	78	34	112	20.1	0.00
Single-sex	06	02	08		
Total	84	36	120		

p<0.05

Table 2: Cross-tabulation of class-size and school location

Location	Schools with 35 students or less average class-size	Schools with above 35 students average class-size	Total	Chi-Square (Pearson)	Signif.
Urban Schools	51	16	67	21.3	0.00
Rural Schools	33	20	53		
Total	84	36	120		

p<0.05

RESULTS

Hypothesis 1: What relationship exists between class-size and the quality of output from secondary schools in Ekiti State, Nigeria?

In order to determine the relationship between each pair of variables, correlation analysis was carried out and a correlation matrix was derived showing correlation coefficients and the probability values for each pair of variables including students' achievement in the year 2001 SSC examinations. The matrix is shown in Table 3. As indicated in Table 3, the values of the probability indicate significant relationship between each pair of variables. The correlation matrix also shows that the variables had large correlation coefficients with the credit performance in the 2001 SSC examinations.

Hypothesis 2: Is there any significant difference between the quality of output of students in schools having an average small class-sizes and the quality of output of students in schools having an average large class-sizes in the SSC examinations in the State?

In order to determine any significant difference in the quality of output of students in the SSC examinations on the basis of class-size, the following hypothesis was examined:

There is no significant difference between the quality of output of students in schools having an average class-size of 35 students and below and the quality of output of students in schools having an average class-size of above 35 students in SSC examinations in Ekiti State, Nigeria.

In testing this hypothesis, the SSC results in English Language, Mathematics, Physics, Chemistry and Biology for year 2003 were used. The quality of output was measured by the examination performance of the students. In computing performance, the frequency counts of the number of students who obtained credit grades 1-6 in each subject in the examinations were transformed from discrete data into continuous data through secondary analysis. The weighted average performance is computed using the formula:

$$P = \frac{n_1A_1 + n_2A_2 + n_3A_3 + n_4A_4 + n_5A_5 + n_6A_6}{N}$$

Where:

P = performance

n_1, n_2, \dots, n_6 = Number of times each grade occurs

A_1, A_2, \dots, A_6 = Numeric weights of each grade

Table 3: Correlation matrix of class-size and other variables

Variables	Credit scores 2003	Class-size	School-sex	School-location
Credit Scores 2003	1.00			
Class-size	0.42	1.00		
School-Sex	0.41	0.34	1.00	
School-Location	0.37	0.25	0.31	1.00

1.00 p<0.05

Table 4: Analysis of the year 2003 SSC examinations on the basis of class-size

Schools with average Class-size of:	N	Mean	SD	t-value	df	2-Tail Signif.
35 and Below	85	0.84	0.83	0.63	118	0.00
Above 35 Students	37	0.38	0.37			

The t-test was used to analyze the data as shown in Table 4. As indicated in Table 4, the probability was less than 0.05. Hence, the null-hypothesis was rejected indicating significant difference between the quality of output of students in schools having an average class-size of 35 students and below and the quality of output in schools having an average class-size of above 35 in the examinations. On a subject basis, the findings are shown in Table 5.

In Table 5, the probability was less than 0.05 in all the subjects indicating significant difference between the achievement of students in schools having 35 and below average class-size and the achievement in schools having 35 and above average class-size. School with class-size of 35 and below had higher mean scores than schools with class-size of 35 and above in the examinations. The content analysis of the interviewees' responses shows a high proportion of the principals and education officers (85 and 82%, respectively) admitting better achievement of students in small class-sizes. They however, opposed to increasing the official teacher quota of one and one half teachers per class in schools.

Analysis of the interviews:

Question 1: What do you think about the ratio of students to teachers in secondary schools in Ekiti State?

Responding to this question, the principals and the education officers agreed that there was a high ratio of students to teachers in schools. Fifteen of the principals (75%) and 16 of the education officers (80%) gave this response. They claimed that the influx of students into schools as a result of free secondary education in the State has led to an explosion in enrolment of students whereas the number of teachers did not increase correspondingly.

Question 2: What do you think about the regularity of inspection of schools by the Ministry of Education in the State?

Table 5: Analysis of the year 2003 SSC examinations on subject basis

Subjects	Schools with average		Mean	SD	t-value	df	2 Tail Sig.
	Class-size of	N					
English	≤35	84	0.19	0.18	3.21	118	0.00
	>35	36	0.09	0.13			
Math	≤35	84	0.24	0.21	3.65	118	0.00
	>35	36	0.12	0.13			
Physics	≤35	84	0.19	0.21	7.36	118	0.00
	>35	36	0.09	0.10			
Chem.	≤35	84	0.28	0.27	7.31	118	0.00
	>35	36	0.14	0.13			
Biology	≤35	84	0.24	0.23	4.13	118	0.00
	>35	36	0.12	0.12			

The principals and the education officers disagreed on the regularity of inspection to schools by officials of the Ministry of Education. While fifteen of the principals (75%) claimed that the inspection of schools by the Ministry of Education was not enough, 17 of the education officers (85%) reported that the inspection of schools by the Ministry of Education is adequate but more attention should be given to it.

Question 3: Is the approved one and one half teachers per class baseline for calculating teacher quota in schools adequate?

In response to this question, the views of the principals and education officers were in marked disagreement with one another. While 16 of the principals (80%) had the opinion that the one and one half teachers per class baseline is grossly inadequate and should be increased to 2 teachers per class, nineteen of the education officers (95%) claimed that the baseline is adequate if teachers could be posted to schools equitably according to the quota and hence, should be allowed to remain for sometime.

Question 4: What suggestions do you think can bring about an improvement in the student-teacher ratio in schools?

Responding to this question, there were some agreements between the views of the principals and education officers. There were also some differences. For instance, 17 of the principals (85%) and fifteen of the education officers (75%) were of the opinion that more teachers should be employed into the teaching profession in the State. Likewise, sixteen of the principals (80%) were of the view that NCE teachers should be appointed in large numbers and be posted to schools while eighteen of the education officers (90%) were of the view that more degree holders should be employed in accordance with the provision of the National Policy on education and posted to schools in such a way that would allow equitable distribution of teachers in all schools without

prejudice. In the same vein, 18 of the principals (90%) reported that the student-teacher ratio could be increased even beyond 40:1 in order to reduce cost and allow more intakes of students into schools. Contrary to this view, seventeen of the education officers were of the opinion that such an increase would not allow effective teaching and learning processes to take place in schools. However, 15 of the principals (75%) and 17 of the education officers (90%) suggested that parents should assist in financing schools through donations and endowment funds in order to build more classrooms and procure more specialist teachers. Although all the principals were of the view that the student-teacher ratio is not the only variable that could affect the performance of students in the examinations, the education officers were of the opinion that the student teacher ratio could still play an important role in the performance of students. All the principals and education officers agreed on the need for regular inspection and monitoring of schools by the State's Ministry of Education.

DISCUSSION

In the foregoing, the influence of class-size on the quality of output from secondary schools in Ekiti State, Nigeria was examined. In the process of the study, class-size was found to be significantly related with school-sex, school location and the quality of output from secondary schools in the State. The significant difference found in this study on the quality of output was consistent with Correa's (1993) findings that increased class-size tends to lowers students' level of achievement. The findings also agreed with Barber's (1988) findings depicting statistical significant differences in favour of small classes. The findings were consistent with O'Connor's (1994) and Bain (1995) findings that pupils in smaller class-sizes achieved better results than pupils in large class-sizes while Massey (1997) reported a positive correlation between achievement and class-size. The findings were however, at variance with Kiesling's (1966) findings that performance may not at all be related to class-size and Ibrahim (1992) who claimed that class size seems to have little effect on teaching effectiveness.

Nevertheless, the findings agreed with Sommers' (1990) findings that a smaller class-size is a significant variable in achievement and that students in smaller classes scored significantly higher especially in Reading and Mathematics than students in larger classes. The findings agreed with Alebiosu's (2000) findings that students in small classes consistently make significant achievement gains than their counterparts in large classes. The findings also agreed with Oderinde's (2003) reports that the classrooms in schools are often few for the large number of students in a class thereby affecting their achievement level.

CONCLUSION

Based on the findings, it is concluded that class-size is a critical factor in determining the quality of output from secondary schools in Ekiti State, Nigeria. Students in schools having small class-sizes had better quality of output than students in schools having large class-sizes. It is therefore, recommended that the State Government should build more classrooms in all schools. In doing this, much emphasis should be given to the provision of more classrooms in the State' annual capital budget. Likewise, the approved teacher quota of one and one-half teacher per class should be allowed to remain but should be properly used in the distribution of teachers to schools.

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