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Mathematics Teaching and Learning Environment: What the Policy Says and What is Obtainable with Respect to Classs Size within Bauchi Metropolitan Area

By

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Abstract

The study investigated the Mathematics teaching and learning environment with respect to large class. The main purpose of the study was to find out whether the National Policy on Education recommendation of 1:40 as teacher-to-student ratio was the practice in schools within Bauchi metropolis or not. Ten schools were randomly selected from the schools in Bauchi metropolitan area and used. An interview schedule was designed and used to obtain relevant information from the heads of the selected schools. It was found that the Mathematics teaching and learning environment was characterized by large class size. An average of 106 students per class, and an average of 342 students to one teacher were some of the findings. The study succinctly revealed that the National Policy on Education recommendation of 1:40 teacher-to student ratio was far from being realized. It was recommended that adequate numbers of Mathematics teachers and classroom blocks be provided.

Mathematics as a universal language is needed by both professionals and non professionals, the young and the old, and it is a necessity for a useful living. It is because if its usefulness in everyday life that it is made compulsory both at the elementary and secondary school levels in Nigeria. The teaching and learning environment for this all important subject seems to be in jeopardy (Kadri, 2005). The goal of teaching and learning, especially Mathematics, is to give the teacher access to his individual students and vice-versa. This statement does not seem to be a reality in most

secondary schools today. Many students are not learning the Mathematics they need because the learning environment seems to be characterized by over crowdedness or what is commonly called 'over population' in the class rooms.

Lee and Smith (1995) pointed out that, even though the assigning of many students to one teacher is based on the assumption that students are sufficiently homogeneous to be treated much the same, the issue of large class is an environmental problem. Mathematics teachers are always complaining of their students'' individual differences, and how it is frustrating not to have time to help them sufficiently, not even to attend to most of them at all during normal classroom lessons due to the number in class (Lee, Smith & Croninger, 1997; Lee & Smith, 1997; Max & Wilkins, 2002).

As class size increases, it means having a lot more scripts to mark, a lot more papers to correct, a lot more students to attend to, a lot more problems to deal with, and a lot more insufficient time to attend to all these problems (Bryk, Lee & Holland, 1993; Howley, 1989; Howley & Bickel, 1993; Max & Wilkins, 2002).

The ability of teachers to provide for individual students is compromised by the pressure to provide adequate instruction for a class of 50 and above (Schreiber, 2002). Jungle and Kent (2006), in a study on teaching large classes pointed out that it is easy to ignore the importance of human interaction when instructing in a large class. Effective Mathematics teaching and learning requires understanding of what students know and need to learn and how to challenge and support them to learn what is to be learned well. This interaction takes place in a learner-centered environment (Lee & Smith, 1997). The learner-centered environment is the environment that pays careful attention to the knowledge, skills, attitude, differences and beliefs that the learners bring to the educational setting. Students of all ages bring to the Mathematics class a considerable knowledge-base on which to build (Lee, Smith & Croninger, 1997; Lee & Smith, 1999). They maintained that, the classroom that teachers provide has an impact on the students' ability. Howley and Bickel (1993) and Lee and Smith (1993) pointed out that it would be difficult to convince the high school administrators that the smaller the class size, the higher the achievement of students. Large class size is not only a security risk but also a health risk and indeed, it affects effective teaching and learning. The National Policy on Education,(NPE, 2004) states that the number of students/pupils in secondary/primary schools should not be more than 40 and 35 students/pupils respectively to a class. Freg (2001) reported in Kadri (2005) pointed out that the average size of a Mathematics class in West Europe public schools is 40 students per class to a teacher. The corresponding situation in United States of America is 20 students to a teacher, and an average of 23 in Florida. What is the situation in Nigeria, and in particular Bauchi metropolitan area? This was the focus of this study.

A class is an environment of social intimacy in the school setting for a specified number of students, where they are closely together pursuing the school goals (Kadri, 2005). Educators often talk about class room climate or environment or atmosphere or ambiance and consider it to be important in its own right and influential in terms of students' learning.

Statement of the Problem

As discussed in the literature, large class size is an impediment or a constraint to effective teaching and learning, especially in the Mathematics classroom. Majanga, Nasongo and Sylvia (2011), found that large class size affected class interaction because teachers were unable to give personalized attention to all the students. The problem for this study was to find out the state of Mathematics teaching and learning environment in Mathematics classroom with respect to class size. Specifically, the study sought to answer the question: Do mathematics classrooms in Bauchi metropolis meet the requirement stipulated in the National Policy on Education with respect to number of students per class to a teacher?

Purpose of the Study

The main purpose of the study was to ascertain the reality in the Mathematics classroom with respect to class size. Specifically, the study sought to:

1. determine students' enrolment and the availability of classrooms in the selected schools.
2. determine the ratio of students to Mathematics teachers in the selected schools.
3. compare the ideal situation (as contained in the National Policy on Education) with what is obtainable in the selected schools.

Research Questions

The following research questions were formulated to guide the study.

1. What are the ratios of the numbers of students to the numbers of classrooms in the selected schools?

2. What are the ratios of the numbers of students to the numbers of Mathematics teachers in the selected schools?

3. Is the ideal situation (as stipulated by NPE) obtainable in the selected schools?

Methodology

Design of the study: The design of the study was the survey research.

Population

The population for the study consisted of all the principals of the public secondary schools in Bauchi metropolitan area. There are 30 secondary schools in Bauchi metropolitan area.

Sampling Technique and Sample Size

A sample of ten schools was randomly selected from the 30 secondary schools in Bauchi metropolis. The principals of these schools were the respondents.

Instrument for Data Collection

An interview schedule was designed requesting the relevant information from the schools and the researcher used it to interview the principals of the selected schools. The relevant information sought included:

1. Number of students' enrolment in the school.
2. Number of available classrooms in the school.
3. Number of teachers who read Mathematics.
4. Number of teachers who are co-opted to teach Mathematics.

Data Collection and Analysis

Data relevant for the study were collected by interviewing the principals of the schools. The principals were told that the information requested was purely for research purposes. The principals cooperated and supplied the needed information willingly. The data obtained were organized into tables, and the appropriate ratios were calculated.

Results

Research Question One: What are the ratios of the number of students to the number of available classrooms in the schools? To respond to this research question, the data collected with respect to numbers of students and numbers of classrooms in the schools were used. The ratios of numbers of students to numbers of classrooms were calculated and presented in Table 1. The table shows the number of students, the number of classrooms and the ratios of students to classrooms. It can be seen from the table that on the average there were 106 students to a class. A closer look at the table reveals that the minimum number of students per class is 71, and the maximum is 131. This is worrisome. It revealed that the schools are overcrowded in terms of number of students per class.

Research Question Two: What are the ratios of the numbers of students to the numbers of teachers teaching Mathematics in the selected schools? To answer this research question, the data obtained with respect to numbers of students and numbers of Mathematics teachers from the selected schools were organized into tables, and the respective ratios were calculated.

Table 1: Student-Class Ratios of the Selected Schools

School	Number of students	Number of classrooms	Ratio
1	1061	15	71:1
2	2880	22	131:1
3	2045	24	85:1
4	2161	18	120:1
5	1364	11	124:1
6	1915	21	92:1
7	1820	14	130:1
8	1120	13	87:1
9	2005	20	101:1
10	1711	14	123:1
Total	18082	172	106:1

Data in Table 2 gives this information. In Table 2, it can be seen that there is an average of 342 students to one teacher. A closer look at the table reveals a minimum number of 187 students and a maximum number of 433 students to a teacher. Mathematics is a compulsory subject at this level and in a school of students' population 2161, there are just 5 mathematics teachers. This number is grossly inadequate.

Table 2: Teacher-Student Ratio of the Selected Schools

School	Number of students	Number of teachers	Ratio
1	1061	3	354:1
2	2880	7	412:1
3	2045	5	409:1
4	2161	5	433:1
5	1364	4	341:1
6	1915	7	274:1
7	1820	5	364:1

8	1120	6	187:1
9	2005	7	287:1
10	1711	4	428:1
Total	18082	53	342:1

Research Question Three: Is the Ideal situation (as stipulated by NPE) obtainable in the selected schools? To respond to this research question, the numbers of classrooms and teachers obtainable in the selected schools were tabulated against the expected (ideal) numbers of classrooms and teachers with respect to students' enrolment. This was to allow for easy comparison, and to clearly see the situation on ground. Data in Table 3 shows this information. It can be seen from the table that the ideal situation is far from the reality. From the table, it is clear that both the numbers of teachers and classrooms are grossly inadequate. The recommended number is 40 students to a teacher, and that translates to having 40 students per class. Table 3 shows that in a school where 27 mathematics teachers were required there were only 3 mathematics teachers. This is just about one tenth of what is required. From the table it is evident that the numbers of mathematics teachers and classrooms obtainable and the numbers expected are incomparable.

Table 3: Numbers of Teachers and Classrooms against the Ideal

School	Number of Students	Number of Teacher S	Expected No. of Teachers	Number of Classromms	Expected No. of Classrooms
1	1061	3	27	15	27
2	2880	7	72	22	72
3	2045	5	52	24	52
4	2161	5	54	18	54
5	1364	4	34	11	34
6	1915	7	48	21	48
7	1820	5	46	14	46
8	1120	6	28	13	28
9	2005	7	50	20	50
10	1711	4	43	14	43
Total	18082	53	454	72	454

Discussion

The finding with respect to research question one revealed over crowdedness in classrooms, with an average of 106 students per class. This finding is in line with

the finding of Kadri (2005), who lamented that the teaching and learning of Mathematics have been affected negatively by large class size. This study also revealed that the number of students to one teacher is very high; an average of 342 students to a teacher is worrisome. Even in the tertiary institutions where learners are adults and the lecture method is the common method of instruction, this number is on the high side. The number of classrooms and the number of teachers in these selected schools are grossly inadequate. A situation in which a school with students' enrolment 2880 has only 7 teachers (and not all of them read mathematics) and 22 classrooms shows how wide the gab is between the expected number of Mathematics teachers and the number available and how congested the learning environment is.

Majanga, Nasongo and Sylvia (2011) in their study found that the teacher-to-student ratio has increased from the recommended 1:40 students per class to between 1:60 and 1:90 students per class. They pointed out that large class size affects class interaction, because teachers find it difficult to give individual attention to all students, give adequate assignments to test what has been taught and take full control of their classes. They also noted that because of large class size, the expected interaction activities between teacher-students and student-student were not exploited. The class size in this study is more worrisome, as it is higher than the one found by Majanga, Nasongo and Sylvia (2011). This therefore means that meaningful interaction which is an essential factor in effective learning is not realized in the schools. Interaction between teachers and students and among students themselves is very important and beneficial to the students as it enhances learning. The scenario found in this study makes teachers to resort to using traditional lecture method in teaching and also forces them to rush over the lessons, interacting with the brighter students only, ignoring the weaker and slow learners.

Conclusion and Recommendations

This study revealed that classrooms and Mathematics teachers are in short supply in schools in Bauchi metropolitan area. The average number of students per class was as high as 106 as against the recommended 40 students per class. Similarly, the high teacher-to-student ratio of 1: 342 is alarming and unacceptable in teaching and learning environment particularly in Mathematics classroom lesson. The study has shown clearly that the much desired interaction that is needed in Mathematics classroom lessons is far from being a reality because of over population and there might be no meaningful learning, as studies have revealed high negative relationship between large class size and students' performances (e.g. Lindsay, 1982; Feldman, 1984; Umar, Iliyasu, & Elizabeth, 2008).

Based on the findings of this study, the following recommendations were made:

1. There is the urgent need for the building of more classrooms to cater for the increase in the students' enrolment in schools.

2. The Government and school administrators should ensure compliance to the National Policy on Education recommendation of 40 students per class.

3. The almost absence of Mathematics teachers in some schools and the high teacher-to- student ratio is an indication that the teaching and learning of the subject is in jeopardy hence, the need for stakeholders to as a matter of urgency employ adequate and qualified Mathematics teachers.

4. In the meantime, school administrators in collaboration with experts should organize training workshops and seminars to educate teachers on how to manage large class sizes.

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