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TEACHER PERCEPTIONS OF THE EFFECTS OF CLASS SIZE AND ITS INFLUENCE ON BASIC SCHOOLS PUPILS ACHIEVEMENT IN MATHEMATICS

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Abstract

Concerns on pupils' achievement in Mathematics in recent times are largely due to class size and other factors. Stakeholders are equally worried on the need to have enabling classroom environment particularly on class size. Therefore, this study investigated teachers' perceptions of the effects of class size and its influence on basic school pupils' achievement in Mathematics in Abeokuta metropolis of Ogun State, Nigeria. The study was guided by four research questions. The study was a descriptive research of the survey type. Researcher's designed questionnaire validated by two lecturers from the Department of Science Education, University of Ilorin, Ilorin, Nigeria served as the instrument for data collection. Forty (40) basic school teachers were randomly selected for the study. Four (4) research questions were raised and answered in this study. The data collected were subjected to a descriptive analysis using frequency, percentage, mean and standard deviation. Results indicated that basic school teachers perceived workload for teachers, less one-on-one interaction with the pupils as effects of large class which resulted in students' lack of adequate comprehension of the topic taught by the teachers. It was recommended among others that the Nigeria Educational policy makers should ensure implementation of the existing policy on teacher-pupil ratio 1:35 as stated in the National Policy on Education especially in public primary schools.

Keywords: Perceptions, class size, achievement, basic school, mathematics

Introduction

Education has been an important aspect of human life throughout the history of mankind. Education is one of the most fundamental instruments that can be used to bring about positive change in life of an individual and an entire society as far as development is concerned (Wayonyi, 2010). Nigeria like many other developing countries in the world, appreciates the vital role that education plays in equipping its citizens with creative potentials, skills, mental, physical and social abilities and competencies to empower the individual to live in and contribute positively to the development of their society (National Policy on Education, 2013).

Presently, Nigerian's education structure is 10:3:4 in which pupils and students are required to have a successful completion of 10 years formal Basic Schooling (which involves 1 year Pre-Primary, 6 years Primary and 3 years Junior Secondary Education); 3 years senior secondary Education and a minimum of 4 years Tertiary Education (National Policy on Education, 2013).

Basic Education is a major foundation for social-economic and political development of a nation (UNESCO, 2005). Therefore, if the quality of education is undermined, the schools may not give adequate knowledge, skills, and attitudes to pupils that a country needs in its citizens in order to guarantee the role of education in development (World Bank, 2002).

The development of the skills and knowledge of the people of a nation through the education process constitutes one of the prerequisites of national development. UNESCO (2006) states that, most of the pupils that go through Basic Education in developing countries fail to master the Basic cognitive skills as shown by the poor performance in Basic School Examination. Richard (2013) however observes that there are many factors which affect pupils' performance directly or indirectly. Some of these factors are part of the intricate web that affects the operation within the school itself. These affecting factors are: Leadership and decision making, school culture and climate, teacher behavior, pupil behavior, parental support and involvement, socio-economic background of the pupils and poor management of finances and school facilities. One of the factors within the school culture and climate is spontaneous increase in school

population which increases the class size of the pupils, thus the performance of the pupils becomes an issue.

According to Owoeye, (2011) class size has become a phenomenon often mentioned in the educational literature as an influence on pupil's feelings and achievement, on administration, quality and school budgets. Class size is almost an administrative decision over which teachers have little or no control. The first issue that calls for immediate clarification is what number of students should constitute a large class size and what should be described as a small class size?

In describing a small class size, Yara (2011) 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 pupils lack competition and interest with relatively few peers as they get stuck with same teacher for an entire school career.

The description appears to be an anti-type of what obtains in large group. Large school/class size on the other hand is often impersonal, having broader curricula with teachers being given wider support, while students may suffer discipline problems as teachers cannot get to know their students very easily (Owoeye, 2011). In terms of numerical strength, the National Policy on Education (2013) specified 25 in pre-primary, 35 in primary and maximum of 40 in secondary schools. These directives appear unrealistic in urban areas as a result of high population. From studies conducted, the size of large classes range from 30-336 and small from 8-45 (Yara, 2011).

Mathematics, as a subject affects all aspects of human life at different levels. Mathematics is seen by society as the foundation of scientific technological knowledge that is vital in social economic development of a nation (Justice, Osei & Daniel, 2015). Unfortunately, students achievement in this important subject over the years has not been encouraging at the primary, secondary and tertiary levels of education.

Mathematics is an important area of learning aimed at driving economies and technological transformation of any society. Therefore, the promotion of the subject is of paramount importance to the development of human kind (Adino, 2012). Mathematics as an embodiment of knowledge, skills and procedures can be used in a variety of ways. It can be used to describe, illustrate and interpret,

predict, explain patterns and relationships in numbers in order to convey and clarify meaning of various issues in life (National Council for Curriculum and Assessment, 2005).

Developed nations seem to have very strong Mathematics policies which have propelled them to higher heights of development. It appears that no country has attained any breakthrough in its economic development without the development of minimum Mathematics base. However, in their advancement in these area schools are faced with the challenge of performance (Owoeye, 2011).

The Nigerian government has underscored the importance of Mathematics literacy in educational institutions. Having recognized the role of Mathematics in national development, the Nigerian government has made Mathematics compulsory in Basic and Post Basic Schools under the 10:3:4 system of education. As such, students performance in Mathematics and Sciences is of great concern to education stakeholders (National Policy on Education, 2013).

Despite the important role that Mathematics plays in society, there has always been the challenge of performance in the subject in Nigeria Basic Schools (Ramani, 2004; Siringi 2005). Therefore, efforts should be made to ensure that Mathematics is widely taught in a way and situation that it would be a subject of personal or developing interest, considering the significant of class size on the performance of Mathematics in Basic Schools.

In recent time, stakeholders are being faced with the challenge of pupils performance in Mathematics in Basic schools. Ojimba (2012) opined that without Mathematics, there is no science and without science there is no modern technology and there cannot be a modern society without modern technology.

Researchers such as Njeru (2003), Orhodo(2003) and Wayonyi (2010) have attempted to identify the factors that affect performance of pupils in Mathematics in Basic schools. Njeru and Orodho (2003), identified adequacy of resources both human and physical to determine performance in Mathematics, however, the performance can be improved by providing adequate teaching and learning resources; physical, human and instructional materials which have been noted to be of crucial importance in determining the achievement of pupils in Mathematics.

Instructional resources are integral part of learning. Wayonyi (2010) opined that adequacy of instructional resources offers opportunities to the

teachers to make learning more effective, lack of instructional resource imposes restriction, which may mean that the learners cannot be taught by methods that would otherwise be most suitable.

Mereku (2003) investigated the extent to which a particular activity based teaching method is employed in teacher's classroom practice and how effectively the method has improved performance. Teacher qualities as measured by their education, knowledge, experience and certification have been linked to higher pupil achievement in Mathematics.

Studies conducted in United States on performance suggest that pupils achievement is higher when teachers have a minor or major university degree in the field they teach (Wenglisky, 2000). Beginning teachers are rarely totally prepared to meet core classroom requirements, including classroom management. Yet, in the context of education reforms, experience may not necessarily translate into better teacher preparedness for certain classroom activities, unless experienced teachers have had continued training to upgrade their skills and their knowledge in those areas (Wanyonyi, 2010).

With all investigations on the factors affecting performance in Mathematics, the researchers were unable to establish the importance of class size on the teaching and learning of Mathematics in Basic schools. However, this study investigated the teachers perceptions of the effects of class size and its influence of basic school Pupils achievement in Mathematics.

Purpose of the Study

The aim of this study was to investigate the teachers perception of the effects of class size and its influence on basic school Pupils achievement in Mathematics. Specifically, the study investigated:

1. the teachers perceptions on the effects of class size on basic school pupils achievement in Mathematics;
2. the teachers perceptions on the effects of School Type (Private or Public) on class size in mathematics;
3. the teachers perceptions on the effects of teaching and learning activities on pupils achievement based on class size; and
4. the teachers perceptions on the effects of teaching and learning process on pupils achievement based on class size.

Research Questions

The research questions that guided this study were:

1. What are the teachers perceptions on the effects of class size on basic school pupils achievement in Mathematics?
2. What are the teachers perceptions on the effects of School Type (Private or Public) on class size in mathematics?
3. What are the teachers perceptions on the effects of teaching and learning activities on pupils achievement based on class size?
4. What are the teachers perceptions on the effects of teaching and learning process on pupils achievement based on class size?

Methodology

This study is a descriptive research of survey type. The justification for the choice of this research type was due to the fact that this study attempted to develop a representative picture of the attitude and characteristics of a large population. It was adopted as the best method available for collection of original data, as a fair representative for a population which is too large to observe directly. It involved the collection of data based on opinion, views, available resources and decision of respondent.

Population, Sample and Sampling Techniques

The population of this study covered all the 93 private and 108 public basic schools in Odeda Local Government, Abeokuta, Ogun State, Nigeria. The target population comprised all basic school mathematics teachers some selected public and private basic schools in Odeda Local Government Area, Abeokuta, Ogun State, while forty (40) basic schools mathematics teachers were randomly sampled across the Local government including public and private schools. The criteria for the selection of schools were:

- The school must be have been approved by the State Ministry of Education.
- The school must have at least two or more arms of basic classes.
- The school must have presented pupils for Common Entrance Examination to upper basic school (Junior Secondary Schools).

It should be noted that classes with up to 35 pupils were classified as small class size; while class with over 35 pupils were classified as large class size. The questionnaire adopted was designed for the Mathematics teachers to elicit responses on class size and academic achievement of pupils in Mathematics.

Research Instrument

The instrument for data collection for this study was a structured questionnaire. The questionnaire consisted of three parts, section A deals with bio-data of the teachers, Section B comprised questions on the effects of class sizes on basic schools pupils achievement in Mathematics using the four likert scale of Strongly Agreed, Agreed, Disagreed and Strongly Disagreed.

Validation of Research Instrument

To ensure the validity of the instrument for data collection, the researchers gave the instrument to two lecturers in the Department of Science Education, University of Ilorin, Ilorin, Nigeria for content and face validation. Their advices and suggestions were incorporated into the final draft of the instrument.

Procedure for Data Collection

The researchers personally visited the sampled schools on different days to administer the instrument for data collection. A total number of 40 copies of the bio-data forms were distributed at the different schools. The researcher sought the approval of the head teachers to distribute the questionnaire, explained the procedure to the teachers. The researchers waited to collect the questionnaire same day in order to avoid lost in transit.

Data Analysis Techniques

The collected data was statistically analyzed using descriptive and inferential statistics. Frequency count and percentage, mean and standard deviation were used to answer the four research questions raised in the study.

Results

Research Question 1

What are the teachers perceptions on the effects of class size on basic school pupils achievement in Mathematics?

Table 1: Perceived Effect of Class Size on Pupils Achievement in mathematics

ITEMS	SA (%)	A (%)	D (%)	SD (%)	$\bar{X}$	sd
Large class size results in workload for teachers and less one-on-one interaction with the pupils.	20(50.0)	20(50.0)	0(0.0)	0(0.0)	2.50	0.51
Increase in enrolment increases class size in basic schools.	21(52.5)	17(42.5)	2(5.0)	0(0.0)	2.47	0.60
Small class sizes allow teachers to spend more time on Mathematics skills which can increase pupils' achievement.	18(45.0)	17(42.5)	3(7.5)	2(5.0)	2.28	0.82
Small classes for Mathematics are preferable for pupils.	14(35.0)	21(52.5)	5(12.5)	0(0.0)	2.22	0.66
Large class size contributes to pupils' poor achievement in Mathematics.	18(45.0)	14(35.0)	3(7.5)	5(12.5)	2.13	1.02

On the basis of class size, large class results in workload for teachers and less one-on-one interaction with the pupils has the most perceived effect (mean = 2.50) on pupils achievement, followed by while large class size contributes to pupils' poor achievement in Mathematics has the least perceived effect on pupils achievement.

Research Question 2

What are the teachers perceptions on the effects of School Type (Private or Public) on class size in mathematics?

Table 2: Perceived Effect of School Type (Private or Public) on class size in mathematics

ITEMS	SA (%)	A (%)	D (%)	SD (%)	$\bar{X}$	Sd
Populations of pupils in public school are higher when compared to those in private school.	26(65.0)	13(32.5)	1(2.5)	0(0.0)	2.62	0.54
One-on-one interaction between the teachers and their pupils lead to improvement in pupils' achievement especially in Mathematics.	18(45.0)	20(50.0)	2(5.0)	0(0.0)	2.40	0.59
The observation of 1:35 teacher-pupil ratio recommended by National Policy on Education (NPE) by private basic schools improves one-on-one interaction between the teacher and the pupils.	16(40.0)	22(55.0)	2(5.0)	0(0.0)	2.35	0.58
The influence of parents on private schools enable them have a controllable number of pupils in class thereby indirectly observing the NPE recommendation.	8(20.0)	24(60.0)	6(15.0)	2(5.0)	1.95	0.75
The type of School affects pupils' achievement especially in Mathematics	6(15.0)	21(52.5)	11(27.5)	2(5.0)	1.78	0.77

Considering school type, it was deduced from the findings that the population of pupils in public school has higher perceived effect (mean = 2.62) on pupils' achievement compared to those in private school while the school type affects pupils' achievement especially in Mathematics recorded lower perceived effect (mean = 1.78) on pupils' achievement.

Research Question 3

What are the teachers perceptions on the effects of teaching and learning activities on pupils achievement based on class size?

Table 3: Perceived Effect of Teaching and Learning Activities on Pupils Achievement

ITEMS	SA (%)	A (%)	D (%)	SD (%)	$\bar{X}$	Sd
Pupils socialize easily when there are fewer of them in a class thereby enhancing learning.	4(10.0)	5(12.5)	18(45.0)	13(32.5)	3.00	0.93
Pupils participate actively in large Mathematics classes.	2(5.0)	6(15.0)	24(60.0)	8(20.0)	2.95	0.75
Teaching large class provides teachers with greater flexibility, enabling them to use a variety of teaching methods.	6(15.0)	10(25.0)	15(37.5)	9(22.5)	2.67	1.00
Pupils perform better in large Mathematics class if the teacher is qualified.	7(17.5)	14(35.0)	19(40.0)	3(7.5)	2.38	0.87
Teaching large class is enjoyable.	16(40.0)	21(52.5)	3(7.5)	0(0.0)	1.67	0.62

On the basis of teaching and learning activities on pupils achievement, the findings of the study showed that out of the listed five items, teaching large class was found most enjoyable (mean = 3.00) while the fact that pupils interact easily when there are fewer of them in class and enhances learning has less perceived (mean = 1.67) effect of teaching and learning activities on pupils achievement.

Research Question 4

What are the teachers perceptions on the effects of teaching and learning process on pupils achievement based on class size?

Table 4: Perceived Effect of Teaching and Learning Process on Pupils Achievement

ITEMS	SA (%)	A (%)	D (%)	SD (%)	$\bar{X}$	Sd
Appropriate teaching and learning strategies improve pupils' achievement especially in small class.	24 (60.0)	13(32.5)	3(7.5)	0(0.0)	2.53	0.64
Available teaching and learning resources improve pupils' achievement if they are effectively used.	20 (50.0)	20(50.0)	0(0.0)	0(0.0)	2.50	0.51
Teachers' effective use of teaching and learning strategies influence learning in a large Mathematics class thereby improving pupils achievement.	12 (30.0)	25(62.5)	3(7.5)	0(0.0)	2.23	0.58
Teachers of public basic schools adopt better teaching and learning strategies for Mathematics than teachers of private basic schools.	12 (30.0)	12(30.0)	12 (30.0)	4(10.0)	1.80	0.99
There are enough teaching and learning resources for Mathematics in public basic schools than private basic schools.	7(17.5)	10(25.0)	20 (50.0)	3(7.5)	1.53	0.88

The findings based on the effect of teaching and learning process on pupils achievement recorded higher perceived effect (mean = 2.53) on the use

of appropriate teaching and learning strategies to improve pupils' achievement especially in Mathematics classes while the availability of enough teaching and learning resources for Mathematics in public basic schools than private basic schools has less perceived (mean = 1.53) effect on pupils' achievement

Discussion

From the findings emanating from the study, the results revealed that large class size results in workload for teachers and less one-on-one interaction with the pupils which hindered pupils from proper assimilation of the contents taught by the teachers. Also, it was revealed from the study that population of pupils in public school are higher when compared to those in private school which hindered teaching and learning effectiveness. On the perceived effect of teaching and learning activities on pupils' achievement, the findings showed that pupils socialize easily when there are fewer in a class thereby enhancing effective learning, while on perceived effect of teaching and learning process on pupils' achievement, the results of the finding indicated that appropriate teaching and learning strategies improve pupils' achievement especially in small class. The findings of the study are therefore in accordance with Warue and Guaranti (2005) who stated that teachers, where they have the choice, prefer smaller classes because it is expected that smaller classes lead to better teaching and learning. In smaller classes, it is relatively easy to manage pupils and they offer better opportunity for teachers to pay attention to individual pupil or have close monitoring for the pupils' progress for a better achievement in examinations.

Conclusion

Based on the findings of this study, it can be concluded that teachers prefer smaller classes to larger ones. Hence, pupils tend to perform academically better in small class than in large class.

Recommendations:

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

- i. Nigeria Educational policy makers should ensure implementation of the existing policy on teacher-pupil ratio 1:35 as stated in the National Policy on Education especially in public primary schools.

- ii. Government should provide enough classrooms for schools to accommodate the teacher-pupils ratio in order to ensure easy classroom management and control, thus improve the outcome of the learning and performance of pupils in mathematics.

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