THE EFFECT OF CLASS CLASSROOM SIZES STUDYING MATHEMATICS. A CASE STUDY OF SOME SELECTED SECONDARY SCHOOL, OF YOLA SOUTH LOCAL GOVERNMENT AREA OF ADAMAWA STATE.

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A PROJECT SUBMITTED TO MATHEMATICS EDUCATION DEPARTMENT, SCHOOL OF SCIENCES IN PARTIAL FULFILLMENT OF REQUIREMENT FOR THE A WARD OF BACHELOR OF SCIENCE DEGREE IN MATHEMATICS EDUCATION (B. Sc Ed) UNIVERSITY OF MAIDUGURI

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APPROVAL PAGE

This is to certify that, this project work title; the effect of classroom sizes in studying mathematics. A case study of some selected secondary schools of Yola South Local Government Area of Adamawa State was carried out by Asma'u Hassan Mubi with the registration number DUS/MAT/2015/0036, supervised by Mr. Ezekiel Udonsa of the department of Mathematics Federal College of Education, Yola.

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DEDICATION

This project work is dedicated to Almighty Allah, my dear parents Dr. Hasan M. Mubi and Mairamu Isa Dasong.

ACKNOWLEDGEMENT

ABSTRACT

The study investigated the effect of class size of study academic performance on mathematics in senior secondary schools students. The population are all public secondary schools in Yola South Local Government Area of Adamawa State. The sample of the study comprises of five selected secondary school in Yola South Local Government Area of Adamawa State. The sample of the study comprises of five selected school with 100 selected students and it was guided by research questions and four null hypotheses that were tested on 0.5 level of significant. The frequency count and percentages method were used to analysed the research questions. While chi-square test was used to rest research questions from the study. It was discovered that large and small class have effect on student performance. The finding from the study revealed that overcrowded classroom over population, teacher productivity, school management and management of schools have effect on students' academic performance negatively. The effect of class size in academic performance of students' shows that engaging highly qualified teachers is simply not enough but the number of student assigned to a teacher is also important. The study recommended that the secondary schools should take steps appoint more teacher more classroom should be provided to ensure quality of service delivery.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

As school population increases, class sizes also increases, the performance of students become an issue. Class size has become a phenomenon often mentioned in the educational literatures, 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. Most researchers start from the assumption that size of the class would prove a significant determinant of the degree of success of students. In fact, with the exception of a few, many studies have reported that under ideal situation, class size in itself appears to be an important factor.

Class size refers to an educational tool that can be used to describe the average number of students per class in a school (Adeyemi, 2014). This varies from country to country. Taiwo (2015), saw it as a tool than can be used. To measure the performance of the education system, in relation to size, Stephanie (2016) reported that the rational utilization of classroom space depends upon class-size. This in turn would depend upon the area of the classroom. Re argued that there are approved norms of class-size, 40 pupils per class for grades 1 to 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, Taiwo (2015), compared class-size in some countries and found that Turkey, Norway and Netherlands had class sizes of 20 or more; the United Kingdom, United States of America, Japan, Canada and Ireland had class-sizes of between 15 and 20 while France, Sweden, Denmark, Australia, Italy, Luxembourg and Belgium had sizes

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of below 15.

In Nigeria, however, Okoro (2015) reported that the class-size in secondary schools ranges 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 (2018) 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 (2016) 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 (2017) supported the view points 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 (2015) who reported that the' increase in enrollment in marry institutions which has become major concerns of students could definitely lead to an increase in class size.

Commeyras (2014) however, disagreed with these arguments and reported that effective teaching seems impracticable for teacher educators having large class sizes of 5,075,100 or more. In terms of outcomes, Schultz (2017) classified the outcomes of education into two categories from the economic point of view. These are consumption and investment. Thus, Blaug (2017) argued that the extension of education tends to raise the earnings of those who benefited from it. In this regard, Simkins (2015) 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

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educational system is a productive system in the very sense that it produces outputs especially various forms of learning.

The foregoing review has showing 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 Yola South, Adamawa State, Nigeria.

1.2 Statement of the Problem

It is observed that secondary schools in Adamawa State appear to be densely populated while classrooms seem to be over-congested. Having shown the views of previous researchers on class-size in various countries this resulted in divergent opinions. The problem spotted in this study is to determine what influence class-size have on the quality of output from secondary schools in Adamawa State, Nigeria. This situation seems to be impairing effective teaching and learning process in the secondary schools in the state and hence the reason for embarking on this project.

1.3 Objective of the Study

The objective of this research is to examine the relationship that exists between class size and academic achievement of Mathematics Students in Secondary Schools in Adamawa State.

The specific objectives are:

i.   To examine the impact of class size on the academic performance of students in Mathematics in secondary schools in Adamawa State.

ii.   To examine how quality class size helps in improving the efficiency and effectiveness of teaching and learning of mathematics in secondary schools in Adamawa State.

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iii.   To find solutions to the negative effect of class size on the academic performance of - students in Mathematics in Secondary Schools in Adamawa State.

1.4   Significance of the Study

The Nigerian education system is progressively becoming more and more complex. But the catalogue of sources shows that Nigerian secondary schools class is over congested and thereby leads to a decline in the teaching and learning of mathematics. Experience has shown that class size is a major contributing factor to the assumed teachers' ineffectiveness in many secondary schools in the state. For instance, in the recent years, Nigeria has witnessed rapid educational expansion especially at the secondary school level without corresponding increase in the provision of essential facilities and this has resulted into large school size and eventually large class size, with its attendant problems of lack of facilities for teachers and also lack of good classroom management by the teachers. For instance, it has been observed that students may be too difficult to control by teachers in many of the large classes due to over congestion of students in these classes. Experience has also shown that teachers tend to lose the ability to attain or establish effective teaching in the overcrowded class than small class and this problem of large class size in secondary schools has been attributed to several factors, such as the introduction of too many subjects on primary school time-table, which invariably has given birth to accommodation of all the subjects on the school time-table couple with the shortage of qualified teaching personnel to teach these subjects.

Based on this, the research work contains the researchers' contributions that would be of help and useful to education policy planners, Educationist, Ministry of Education Authorities, Stakeholders, School Administrations and Management in. Senior

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Schools towards helping students to improve the quality of facilities in the education system.

Apart from the above, the research will provide valuable information on the influence of different interacting factors on the effects of class size on the teaching and learning of mathematics among secondary school students. The content of the study will also serve as resource materials for others who want to carry out further research.

1.5 Research Questions

The research seeks to answer the following questions:

i. Are there any difference in the achievement in Mathematics for Senior Secondary School Students in small and large sized classes?

ii. Is there any interaction effect between location of school and class size in the achievement in Mathematics for Senior Secondary School Students in small and large sized classes?

iii. Is there significant difference between the quality of output of students in schools having an average small class sizes and large class size in SSCE Examinations in the State?

iv. What is the impact of class size on mathematics teachers' productivity in secondary schools in Adamawa State?

1.6 Research Hypotheses

The following null hypothetical statements are made with respect to the objectives of the study:

i. There is no significant difference between the achievement of students in mathematics in small and large sized classes of Senior Secondary Schools.

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ii. There is no interaction effect of school location and class size in students' achievement in senior secondary school mathematics.

iii. There is no significant difference between the quality of students performance on mathematics in schools having an average class-size of 35 students and large class size.

iv. There is no significant relationship between class size and teachers' productivity.

1.7 Delimitation of the Study

The study is specifically talking about the Correlation between the class size and academic performance of Students in Mathematics. The study will concentrate on the effects of class size on the teaching and learning of mathematics in (5) Senior Secondary Schools in Yola South Local Government Area of Adainawa State.

1.8 Limitation of the Study

It is also noteworthy that, hardly would a research study be concluded without constraints. In a case try such as ours where bureaucracy and red-tapism act as constraints in the flow of information and where there is inaccurate data and statistics, there really has to be a problem. Worthy of note is the fact that the work is limited to Yola South Local Government Area of Adamawa State.

Specific instances of constraints related to the data system would include:

i. Lack of standardization in data recording and formats

ii. Inadequate data collection and handling procedure

iii. Privacy of information considerations

iv. Budgetary Limitations

v. Time Constraints

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An impediment to research optimization occasionally arises because it is impractical to analyze the entire problem. This situation may arise due to lack of resources to do the work, which may involve financial problems, time constraint, material cost etc.

1.9 Operational Definition of Terms

The definitions used in the historical class size debate vary according to the researcher. The following definitions are ones that will be used in this research. For the purpose of this study class size was defined as the number of students for whom a teacher is primarily responsible during a school year. A small class was defined as a class having 11 of fewer students. A large class contained 20 or more pupils.

Effect: The word `effect' according to BBC English Dictionary 2002 states thus. An effect is a change, reaction or impression that is caused by something or is the result of something.

Class Size: Class size is typically defined as the number of students for whom a teacher is primarily responsible for during a school year. The teacher may teach in a self-contained classroom or provide instruction in one subject Achilles (2017) gives the following examples of class size: "Average class-size is the sum of all students regularly in each teachers' class divided by the actual number of regular teachers in those specific classes. Regardless of the definition one uses, class size has been difficult to measure due to the dynamic nature of classrooms (adults and students move in and out of classrooms), a variety of classroom models (pull outs, resource rooms, aides, specialists), and a lack of precise measurements of what occurs in schools and classrooms (Pupil-teacher ratios, pupil-professional ratios, class size based on the number of students assigned to a given teacher) (Reinhardt, 2017). The lack of a common agreement as to what constitutes a small class or even an ideal class

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has made it difficult to compare research studies.

Pupil-teacher ratio (also known as teacher-student ratio): Achilles (2017) defined pupil-teacher ratio as the n umber of student in a school or district compared to the number of teaching professionals. All educators may be part of the computation, including counselors and administrators. According to Hanushek (2017), the only data that are consistently available over time reflect pupil-teacher ratios. Determining class size requires one to decide which classes to count. For instance, are physical education and driver's education included? "Class size is generally best defined in the traditional elementary school grades, where a single teacher is responsible for a self-contained classroom, and the definitions gets progressively more problematical as the instructional program becomes more complex" (Hanushek, P. 140). Although there is a slight discrepancy among the actual numbers,

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter will put into account the effect of class size to the academic performance of Senior Secondary School Student's in Mathematics as reviewed by researchers and scholars.

The review of literature was considered under the following sub-headings:

2.1 Theoretical/Conceptual Framework

2.2 Concept of Class Size

2.3 Class Size and Academic Performance

2.4 Class Size and Classroom Management

2.5 Class Size and Classroom Instruction

2.6 Class Size and Teacher's Productivity

2.7 Location of School and Class Size

2.8 Implications of the Review

2.1 Theoretical/Conceptual Framework

Learning is a relatively enduring change in behaviour, which is a function of prior knowledge (practice). The main objective of school as an institution is to bring certain desirable changes in the behaviour of children through the process of learning.

As a process, learning has four attributes:

i. Learning is a permanent change in behaviour. This does not include change due to illness, fatigue, maturation etc.

ii. Learning is not directly observable, but manifests in the lives of the individual.

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iii. It results in some changes of enduring nature

iv. Learning depends on practice and experience

The emphasis of this study is on how the class size (environment) will influence the mathematics (academic performance) of the students.

2.2 Concept of Class Size

Class size is an important factor with respect to academic performance of students' (Eugene M. Lewit). Academic achievement of students especially at the secondary school level is not only a pointer to the effectiveness or otherwise of schools but a major determinant of the future of youths in particular and the nation in general. The medium through which the attainment of individuals and the nation's educational goals can be achieved is learning. Learning outcomes have become a phenomenon of interest to all and this account for the reason why scholars have been working hard. To unravel factors that militates against good academic performance. This phenomenon has been variedly referred to in literature as academic achievement, or scholastic functioning. Academic achievement of learners has attracted attention of scholars, parents, policy-makers and planners.

The basic rationale is that if teachers have fewer students, they can devote more time and attention to each student, including more time diagnosing specific learning needs, critiquing work products, and giving students achievement example.

To understand how class size can affect teaching, consider the following. If a teacher has five classes, the teacher is responsible for 100 students, If each class is increased to 30 students, the teacher would then be responsible for 150 students are 50 percent increase in the aching workload. If a teacher with 20 students in each class spends

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only 15 minutes reading, analyzing and responding to a writing assignment (a short amount of time), the teacher will have to devote 300 minutes to the process for each class - or about five hours - while five classes given writing assignment would require 25 hours.

For a teacher with 150 students, the time required would be 2,250 minutes – or nearly a full 40 hour work week. So if the teacher gave one writing assignment a week in each class, the time required to teach the course and score the writing assignment would likely be between 65 and 80 hours, depending on class sizes.

As this example illustrates, at a certain point class size, for purely logistical reasons, will affect the instructional options available to teachers. Since the demands of lesson preparation, teaching duties and assignment grading can quickly become unmanageable as class sizes increase. And the more students that teachers have, the more likely it is that they will have to rely on instructional methods that require less time to complete, such as grading short answer worksheets or scoring multiple-choice tests. For example, while average class sizes may be reduced in a variety of ways, the two main approaches have been through educational policy and funding mechanisms and by reconfiguring the organizational and instructional systems in a school.

The major goal of the school is to work towards attainment of academic excellence by students. According to him, the school may have other peripheral objectives; emphasis is always placed on the achievement of sound scholarship. Besides, virtually everybody concerned with education places premium on academic achievement; excellent academic achievement of children is often the expectation of parents. At the outset of an activity, students differ in learning as a function of their prior experiences, personalities and social supports. The latter includes the extent that

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parents and teachers encourage them to learn, facilitate their access to resources necessary for learning, and teach them strategies that enhance skill acquisition and refinement. Parent's academic aspirations for their children influence their children's academic achievements both directly and indirectly (Bandura, Barbaranelli, Caprara and Pastorelli, 2016). There is a consensus among researchers and educational scholars that, student's achievement decreases as class size increases. The effect of class size on cognitive-achievement has been debated and researched for many years, this has been inconclusive. Class size refers to educational tools that can be used to describe the average number of students per class in a school. In emphasizing the importance of class-size to the learning teaching process, All Nigerian Conference of Principals of Secondary Schools (ANCOPSS) recommended a maximum of forty students per class for efficient and effective teaching.

Adeyemi (2014) in his findings on the influence of class size on the quality of output in secondary schools revealed that schools having an average class-size of 35 and below obtained better results in the Secondary School Certificate Examination (SSCE) than schools having more than 35 students per class. Oguntoye (2011) in his own study found that class-size had negative coefficient with students' academic performance in examination. Fafunwa (2010) postulated that there is a gap in the quality of students in crowded classrooms, using inadequate and absolute equipment, destined teachers, These combined deficiencies perhaps affected the student's academic performance. Adeyela (2017) found in her study that large size is not conductive for serious academic work.

Similarly, Egode (2016) pointed out that an alarming class-size of 100 or more students in the secondary schools leaver the teacher overworked and therefore unable

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to exercise patience and positive attitude. They are also reluctant to offer extra time to build and help the intellectually ill students. Ojoawo and Olatunbosun (2015) in one of his major findings revealed that the class size was found to be negatively related to school academic performance.

The first issue that calls for immediate clarifications is what number of students should constitute a large group and what should be described as a small group? In describing a small group, Bray, J. S. (2018) 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 stocked 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 are 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. They 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 (1995 revised in 2002) specified 20 in pre-primary, 30 in primary and maximum of 40 in secondary schools. These directives appear unrealistic in urban areas as a result of high population.

However, the report by some researchers on secondary school students revealed that the size of school and length of attendance have little or no effect upon pupils' achievement when educational opportunities are comparable. In his conclusion, he asserted that teachers generally, have definite preference for the size of schools on

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which they wish to teach and that the larger the size, the lower the level of students' achievement will tend to be.

The encyclopedia research on class size opined that whether the benefits of reducing class size are regarded as worth their cost or a second choice in improving education depends almost entirely on how the outcomes of pupil achievement, pupil's attitude and teacher's satisfaction are weighed in arriving at a general measure of utility. Clearly, different groups of individuals weigh these factors differently. Most tax-payers are likely to minimize considerations of teacher satisfaction and argue that class size reductions are not worth the price.

In many cases, the quality of the learning environment was strongly correlated with pupils' achievement in mathematics (Carron and Chan, 2017). Two aspects of school climate which are commitment to school and positive feedback from teachers have been shown to affect students' learning gain in mathematics (Hoge, Asimeng, Boarhene, 2018). The social emotional climate of schools is predictive of mother's reports of their school age children alcohol use and psychiatric problems (Kashen, Johnson and Cohen, 2016).

Biddle and Berliner (2017) offered tentative theories to explain why small classes had impressive effects in the early grades. This was when youngsters were first learning the rules of school and forming ideas about whether they can cope with education. Since there was more one-to-one interaction in smaller classes, teachers learned more about individual students. This translates into helping students develop more useful habits and ideas about themselves. Additionally, teachers in small classes had higher morale and thus created a more supportive learning environment. Nye and Colleagues (2015) acknowledge that the reason why small classes led to higher achievement and

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differentially higher achievement for minority students was not clear. They hypothesized that small classes may permit teachers to more effec ively individualize instruction. Small classes may also tend to have fewer disruptions making all-class instruction more effec ive. Resnick (2018) suggested that smaller classes benefited student achievement claiming that teachers in small classes paid greater attention to each pupil. Students in these classes experienced continuing pressure to participate in learning activities and became better more involved students: attention to learning went up and. disruptive and off task behaviour went down. Pedder (2016) believed that class size might impact classroom processes and pupils' learning. He stated that smaller class size allowed teachers to cover more curriculum and student to be more cognitively engaged. These two features led to improved student achievement. Pedder (2019) asserted.

In larger classes, time is needed for non-academic activities related to administrative and organizational procedures and to the management and control of discipline. Reductions in the quantity of learning opportunities constrain teachers from achieving the necessary pace, depth and breadth of curriculums coverage as class size increases. Some researchers and scholars wrote that it was not class size itself that determined student outcomes, but rather smaller classes may provide opportunities for other educational interventions.

In the context of Socio-Science Education, Mathematics has been identified as a very important school subject whose importance in the economic and technological development of any nation.

Consequently, efforts have continuously been made to improve on its teaching and learning especially at the post primary level so as to ensure a sound foundation for later/future studies. Despite these efforts, it has been painfully observed that students' achievement in this subject in Nigeria still remains.

2.3 Class Size and Academic Achievement

Previously Cited Literature identified various class size effects on classroom management and classroom instruction: Larger class sizes result in less time being utilized for instruction due to more instances of student misbehavior and off-task behaviour (Blatchford, 2016b; Blatchford, 2018). A lack of adequate physical spare with which to control student behaviour and to implement non-traditional instructional strategies is also a problem in large classes (Blatchford, 2017).

Teacher and student interactions are more in-depth and focused on student academic and emotional needs in smaller classes, facilitating instructional differentiation

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(Blatchford, Oriatu and Edmond, 2017: Blatchford, Russel, Bassette and Browb (2007). Pedder, (2018). The size of the class impacts the amount of time the teacher has for the management of the class and for the instruction of the students. With decreased instructional time, academic achievement is not likely to increase.

Subsequent literature review will connect class size effects on classroom management and classroom instruction with academic achievement in elementary schools. The issue of class size is one that can be trace to the early nineteen hundreds, yet is still very relevant to the organizational structures of elementary, middle and high schools of today (Biddle and Berliner, 2016). With such a long history one would think that the class debate would be settled by now with conclusive evidence to support or disclaim the assertion that student t achievement is affected by class size.

However, this is not the case, resulting in a plethora of findings as varied as the studies themselves. Most previous studies on class size attempt to narrow the achievement gap present in minorities and economically disadvantaged students upon entering school.

2.4   Class Size and Classroom Management

Research have shown how increasing class size affected student academic achievement with meta-analysis studies showing class sizes of fifteen students or less resulting in the most academic gains (Biddle, 2017).

However, critics of Hanushek's work have cited that his use of class size rations skewed his finding in support of larger class sizes and did not provide educational leaders with the data needed. to accurately increase class sizes (Biddle and Berliner, 2016).

In search of more definitive data regarding how class size affects achievement, additional studies would be conducted. Often these studies focused on how the number of students in the class affected the routines and practices of the teacher.

i. **Student Misbehaviour:** How the number of students in the class affects the classroom management practices is one area researchers investigated. The literature regarding how class size affects classroom management, including student disciplines, is fairly consistent in its results, showing that class sizes increase, time spent handling non-instructional tasks also increases (Deutsch, 2016: Finn, 2016). Teacher survey data suggested that as the number of students increased in the classroom, instances of student misbehavior also increased. Larger classes (31 or more students) were harder for teachers to manage than smaller classes (25 or less students). Teachers cited that more student misbehavior occurred in the larger classes, resulting in more time being spent on controlling the students rather than teaching (Blatchford, 2017)

ii. Physical Space: Increasing the number of students in the classroom increases the instances of student misbehavior and decreases the = m a t of instructional time (Blatchord et al., 2007: Calunak, 2016). Another classroom mAnagement issue that must be addressed in larger classes is limited classroom space. The lack of physical space is a factor affecting instruction and according to Blatchford et al (2017). Having student closer to each other in physical proximity leads to classroom management issues to the teacher's inability to effectively separate disruptive students from the general population in larger classes. More arguing among the students was also observed in larger classes and contributed by teachers as the students being too close to each other (Blatchford et al:2015).

Edmonds and Martin, (2019) found that for students age 4-11. Students in large

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classes (average of 32 students per class) had more instances of off task behaviour in the form of socializing with peers about non-academic topics and were less likely to pay attention to teacher comments and instructions than students in small classes (average of 19 students per class).

A lack of physical space within larger classes (31 or more students) compared to smaller classes (25 or less students) was cited in teacher surveys as creating an inflexible learning environment (Blatchford 2017). Being unable to change the arrangement of the classroom could hinder the teachers ability to provide student with different types of instructional activities and affect the academic achievement of the students.

A lack of space prevents teachers from being able to use a variety of instructional strategies and to modify the learning environment to better meet the needs of the students (Deutesch. and Firm 2016) In order to provide the best possible learning environment for all students, teachers need to be able to vary their activities. Without the physical space to do this. academic achievement could decrease. Increasing the students in the class affects the amount of space available and implementation of instructional activities.

2.5 Class Size and Classroom Instruction

Initial class size research focused on whether reducing class sizes was effective and cost-efficient. Researchers their focused on how class size affected the practices and routines of the classroom. Research on how class size affected the management practices of teachers found larger class sizes resulted in more student misbehavior (Blatchford, P. 2015). A lack of physical space to separate disruptive students and to

use different types of instructional activities has also been cited in class size research as a disadvantage of larger classes (Blatchford, 17). Larger student populations prevented teachers from being able to interact with their students as much as they would in smaller populations.

This factor also contributed to an increase in classroom management issues (Film, 2016, and Halback, 2017). Teacher reported less job satisfaction due to increased non-instructional workload in larger classes. More discipline issues, less instructional activities, less teacher and student interactions and more non-instructional tasks contribute to less effective instructional time.

i. **Teacher and Student Interactions**

Quality teacher and student interactions increase student engagement and having students more actively engaged in the classroom is a positive of smaller classes. A critical component of quality teacher and student interactions is instructional feedback.

According to Pedder (2016), teachers stated that small classes allowed them to provide students with more individual feedback and more one-to-one interaction and both were identified by teachers as facilitating learning.

ii. **Instructional A Item**

Smaller classes increase teacher and student interactions (Blatchford, 2016). Teacher is smaller classes are able to provide students with more instructional feedback. Daily interactions with interactions with students enabled teachers to assess the instructional and emotional needs of their students. Being able to have quality interactions with their students is an important aspect of smaller class sizes as this facilitates the teacher being able to plan and implement effective instructional activities. (Blatehford, 2018).

Smaller classes facilitate the differentiation of instruction and increased achievement for all students. The number of students in a classroom affects the teacher's instructional practices. Smaller classes allow for more frequent and effective interactions between the teacher and the students resulting in an in-depth understanding of the student's needs and the confidence to use activities to address these needs. Understanding the needs of the students leads to the development and implementation of development and implementation of more effective instructional activities such as direct instruction, inquiry-based instruction and differentiated instruction. Small class sizes facilitates the identification of the needs of all students not just the majority. (Blalchford, 2017).

2.6   Class Size and Teacher's Productivity

Experience has shown that class size is a major contributing factor to the assumed teachers ineffectiveness in many secondary schools in the Adamawa State. For instance, in the recent years, Nigeria has witnessed rapid educational expansion especially at the secondary school level without corresponding increase in the provision of essential facilities and this has resulted into large school size and eventually large class size, with its attendant problems of lack of facilities for teachers and also lack of good classroom management by the teachers. For instance;\it has been observed that student may be too difficult to control by teachers in many of the large classes due to over congestion of students in these classes. Experience has also shown that teachers tend to lose the ability to attain or establish effective teaching in the overcrowded class than small class and this problem of large class size in secondary schools has been attributed to several factors, such as the introduction of too many subjects on secondary school time-table, which invariably has given birth to

accommodation of all the subjects on the school time-table couple with the shortage of qualified teaching personnel to teach these subjects.

Another problem is the problem of inadequate instructional materials such as graphs, pictures, charts and so on which are very germane for effective instructional delivery in secondary schools. These materials are expected to compliment the process of teaching and learning, if they are adequately provided.

Even though teachers appear to vary in their attitudes towards teaching large classes most of them seem not to be favorably disposed to the teaching of large classes and as it is when known, teachers are the backbone of the entire education system, secondary educational system inclusive. Teachers' Productivity therefore appears to be a function of class size among others against this background, this study attempted to investigate the impact of class size and teachers productivity in secondary schools in Adamawa State, using secondary schools in Yola South Local government area as a case study.

Investigators (Adonizio and Phelps, 2015: Adeyegbe, 2015) have identified such factors as: class size, school location, teacher exposure, poor instructional methods, negative attitude of teachers, in adequate/lack of library facilities and poor student background. Talking about class size, parents and educators universally identify is as a desirable attribute of successful school system hence the widely implementation of class size reduction initiatives. Despite this and the plethora of studies available, investigators remain divided on whether smaller classes actually have positive effects on student outcomes (Averett and McLennan, 2017). For instance, Afolabi (2018) investigating school factors and learner variables as correlates of senior secondary mathematics achievement in Ibadan found no significant relationship among class size

and student's learning outcomes. On the other hand, Adeyemi (2014) working on the influence of class size on the quality of output in senior secondary schools in Adamawa State, Nigeria found that schools having an average class size of <35 obtained better results than those having >35.. Data from the Third International Mathematics and Science Study referred to in Averett and McLennan (2017) indicate that larger class size countries obtained higher achievement scores, the same investigator also indicated that although class sizes have fallen dramaticall' in the United States, achievement has not simultaneously increased across all demographic groups. On investigating the effect of class size on student achievement.

Thus the divergent view on the effect of class size on achievement continues. The of this investigation is to add to this discuss by specifically examining the effect of purpose class size on the teaching and learning of mathematics in senior secondary schools in Adamawa State Nigeria. The data to be generated in this preliminary study will serve as baseline information for not only future but a more detailed investigation on this contemporary issue.

Adesina (1917) tti'rtiher opined that the alleged falling quality of education, (second education inclusive) could be attributed to the prominence of overcrowded classes in many Nigeria. The concern over the g r ɔ h of school and class of the schools in size as a result. In explosion productivity is directly linked with the of students population possible influence of this explosion on teacher's productivity. Encyclopedia of Education (2018) increase class size and population explosions in schools is a further emphasized that have some matter that requires urgent and adequate attention. The increasᵉ in class size may have some terrible implications for teachers productivity. This is particularly so because with a large class size, it

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becomes therefore difficult for teachers to enforce discipline on their students, quality and quantity of facilities or equipment available to teachers and students for teaching and learning purposes may be affected, and this may in turn jeopardize teachers productivity and students' academic performance.

It is in light of the above observations that the writer wants to find out whether the class size is related to the teachers productivity in secondary schools in Adamawa State or not.

However, factors of inadequate funding of primary school, poor infrastructures, low staff morale over enrolment of students, inadequate supervision of schools among others are some of the factors identified.

2.7 Location of School and Class Size

School location has also been viewed as one factor that affects students' academic performance. Over the past two decades. research has indicated that the educational aspirations of students who study in the rural area lack behind than those of their urban counterparts. (Kannapel and De Young, 2016: Arnold, 2018).

School location also place more importance on personal qualities e.g. being dependable and having the ability to get along with others and less important on specific area of academic performance.

Tanimowo (2017) discovered that the distribution of schools between urban and rural areas shows disorder, lack of planning and in-efficiency. The efficiency here refers to students' academic performance. In line with the above, Ezike (2016) conceptualized urban environment as those environment which have high population density containing a high variety and beauty and common place views.

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Alokan (2010), showed that school location has significant effect on student academics performance in mathematics. Various reviews of literature on influence of location on academic performance is not the same. While some maintain that urban students perform better in mathematics examination that their rural counterparts, others have found that rural students (in spite of all odds) perform better.

The implication is that while people in some area enjoy minimum travelling distances to acquire education. Some people in other places suffer by having to cover maximum distances to acquire education.

2.8 Implications of the Review

The implications of the class size on the students' performance are enormous and as such cannot be overemphasized.

It is observed that school with low class size has tendency to record high students' performance. This is stressed by Adeyemi (2016). In his findings he asserted that the influence of class size on the quality of output in secondary schools revealed that schools having an average class-size of 35 and below obtained better results in the Secondary School Certificate Examination (SSCE) than schools having more than 35 students per class.

It has also been argued that over-emphasized class increases the workload for teacher which may rendered him ineffective. They are also reluctant to offer extra time to build and help the intellectually ill students. Teacher with small class size had higher morale which thus creates a more supportive and conducive teaching and learning environment. This is acknowledged by Nye and Colleagues (2015) that the reason why small classes led to higher achievement and differently higher achievement for

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minority students was not clear. Increasing the number of students in the classrooms increases the instances of student mis-behaviour and decreases the amount of instructional time. (Blatchord, 2016).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the design and procedures used in this study. The Research Design, Population, Sample and Sampling Techniques, Instrumentation, Method of Data Collection and Method of Data Analysis are discussed in this chapter.

3.2 Research Design

This study is survey in nature, to assess the effects of class size on academic performance in Yola South Local Government Area of Adamawa State. Survey research Method according to Sambo (2012) is done by selecting and studying samples chosen from the population to discover the relative incidence, distribution and interrelations of sociological and psychological variables. Therefore, it is ideal for this study.

3.3 Population of the Study

The population for this study consists of all Public Senior Secondary Schools Students in Yola South Local Government Area of Adaanawa State. There are total of fourteen (14) Senior Secondary School in Yola South Local Government Area.

3.4 Sample and Sampling Techniques

Five (5) Secondary Schools in Yola South Local Government Area are to be selected using Randomly Sampling Techniques. Through balloting, the five (5) schools will be picked from the total fourteen public secondary schools in Yola South Local Government Area of Adamawa State. The names of the fourteen (14) schools were

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written on pieces of papers, folded and shuffled. Five schools were picked after replacement. The sample five schools represent the population. From the sample schools, twenty (20) SS 3 students were randomly selected to represent the school. Therefore, one hundred students represent the sample.

From the sample schools, Twenty (20) SS 3 students were randomly selected to represent the school. Therefore, One Hundred students represent the sample Senior Secondary School II students were used because each school as shown in Table 3.1

Table. 3.1: Population of the Sample, Schools (SS 3)

S/N	Name of the Schools	Population	Sample Size
1.	Government Day Senior Secondary School, Wuro-Hausa	87	20
2.	Hammawa Senior Secondary School, Toungo Yola	67	20
3.	Government Day Senior Secondary School, Shagari	80	20
4.	Government Day Senior Secondary School Ngurore	71	20
5.	Government Day Senior Secondary School, Yolde Pate	75	20
	Total	380	100

3.5 Instrumentation

The main instrument to be used for this study is questionnaire. The questionnaire will be of 5-point Likert scale of Strongly Agreed (SA) which carries 5 points, Agreed (A) with 4 points, Strongly Disagreed (SD) with 3 points, Disagreed (D) with 2 points and Undecided (U) with 1 point.

The instrument (questionnaire) is to consist of two (2) sections (Section A and B). Item in section A represent "Bio-data of the Respondents" and information about the prospective respondents. Section B consists of 20 items of questionnaires on Effect of Class Size on Students' Performance, they elicit information to solve the identified

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research questions. However, the instrument for the data collection is to be validated using the Expert Opinion (Supervisor) to check whether the instrument could cover the purpose intended to cover.

3.6   Method of Data Collection

The instrument (questionnaire) is to be administered on the day approved by the school authorities of the selected schools for the exercise. The researchers are to be assisted by the trained research assistants in the administration and collection of the instruments. In each of the selected school, the administration and collection of the instruments will. Be done on the same day of administration.

3.7   Method of Data Analysis

Analysis of the data collected will be based on the use of frequency tables, percentages and Chi-square statistical technique. The frequencies of responses will be found, the scores will be expressed in percentage and presented in tabular form. The result will be presented on the basis of the formulated research questions to show whether or not the research questions should be upheld.

CHAPTER FOUR
PRESENTATION AND ANALYSIS OF DATA

4.0 Introduction

This chapter describes the analysis of data followed by a discussion of the research findings. The analysis findings related to the research hypothesis that guided the study. Data were analyzed to identify, describe and explore the effect of class size to the academic performance of students on Mathematics in Senior Secondary School in the study area.

Data were obtained from students by administered questionnaires, completed by 100 students. Descriptive statistical were taken and the statistical significance of relationships among selected variables was determined using the chi-square and the level of significance was set at 0.05. Research questions identified or raised in chapter one was answered.

4.1 Data Analysis

In this section, the data collected from the research were given in a tabular form the tables provided were used to analyze the research questions as well as the hypothesis.

4.2 Findings

The following are findings of the study;

i. There is significant difference between the performance of students in Mathematics in small and large sized classes of Senior Secondary School.

ii. However, another finding shows that, there is interaction effect of school location and class size on students' performance on Mathematics in Senior Secondary Schools.

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iii. Also, the finding revealed that there is quality of students' performance on Mathematics in school having an average class size in Senior Secondary School.

iv. Finally, finding also suggested that there is relationship between classes and teachers productivity in Academic performance on Mathematics in Senior Secondary Schools.

4.3 Discussing of Findings

From the data collected for this study on the Effect of Class Size to the Academic Performance of Senior Secondary Schools in Mathematics in Yola South Local Government, it has been found out that there is significant difference between the performance of students on Mathematics in small and large size classes of Senior Secondary School. This agrees with the findings of Ogunoye (2015) found out that class size has negative coefficient with Students' Academic Performance in examination also Furlowa (2000) postulated that there is a gap in the quality of students in crowded classroom, using in adequate and absolute equipment disillusioned teachers. Similarly, an alarming class-size of 100 or more students in the secondary schools leaves the teacher overworked and therefore unable to exercise patience and positive attitude, they are also reluctant to offer extra time to build and help the intellectually ill students. Oyoawo (2015) in one of his major findings revealed that the class size was found to be negatively related to school academic performance. It has also been found out that, there is interaction effect of school location and class size on Students' Performance on Mathematics in Senior Secondary Schools. This agreed with the findings of Blatchford, et al 2017, that teachers and students interactions are more in-depth and focused on student classes, facilitating instructional differentiation.

Also Petter (2016) found that small and average classes allowed them to provide

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students with more individual feedback and more one-to-one interaction and both Adeyebe, (2015) have also identified such factors as; Class size, school location, teacher exposure, poor instructional methods, negative attitude of teachers, in adequate/lack of library facilities and poor students background.

Also from the finding, it revealed that there is quality of Students Performance on Mathematics in school having an average class size in Senior Secondary School. This finding is consistent with Adeyemi (2019) in his findings on the influence of class size on the quality of output in Secondary Schools revealed that schools having an average class-size of 35 and below obtained better result in Senior Secondary School Certificate Examination (SSCE) than school having more than 35 students per class.

Class size and academic performance of student in large classes was very low (23%) compared to those students in smaller classes (64%). Rennick (2017) suggested that smaller classes benefited student achievement claiming that teachers in small classes paid greater attention to each student.

Finally, it has also been found out that there is relationship between classes and teachers productivity in Academic Performance in Mathematics in Senior Secondary Schools. This findings is consistent with the reports of Blatchford et al (2014) that small class sizes facilitates the identification of the needs of all students not just majority in (2017) he also found out that smaller classes increase teacher and student interaction. Teacher in smaller classes are able to provide students with more instructional feedback. Daily interactions with student enable teacher to assess the instructional and emotional need of their students.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 Introduction

In this chapter, Summary of the Study Findings, Conclusion, Recommendation for acting and Recommendations for future research will be discussed.

5.1 Summary

This research which has specifically carried out to determine the effect of class size on the academic performance of students on effective teaching of mathematics. It was discovered that large class size has negative effect on teaching effectiveness. This study was carried out in Yola Sought Local Government Area of Adamawa State. The background of the study, statement of the problem, objectives that served as a guide to the set based on the effect of class size and students' academic performance on mathematics in Senior Secondary School. Related to these are four hypothesis, Significance of the study will be stated, basic assumptions made and finally, the delimitation, limitations and operational definition of class size of the study were highlighted.

The literature was reviewed under the following sub ending and also looked at the theoretical framework chosen for the study consist of four attributes, one for academic performance, one for class size, one result in some changes of enduing nature and for practices and experience. It also reviews the following sub-endings;

- Concept of class size
- Class size and academic performance
- Class size and classroom management

- Class size and classroom instruction
- Class size and teacher's productivity
- Class size and school location
- Implication of the review

The literature review also looked and addressed issues pertaining to class size on Academic Performance of Students on Mathematics, teacher productivity and school location academic performance, instructional materials has been identified and explained ' which facilitate understanding of all necessary concepts to the study.

Meanwhile, the methodology adopted for the study was presents, design and procedures used in this study were also made the research design population, sampling and sampling techniques were also present. Instrumentation, method of data collection and method of data analysis were discussed.

A total number of one hundred responded to the questionnaire including male and female and they all respondents effectively. These respondents were drawn from (5) Secondary Schools in Yola South Local Government Area of Adamawa State through balloting the five (5) schools was picked from the total fourteen (14) Public Secondary Schools in Yola South Local Government Area of Adamawa State.

During these sampling techniques stage, the name of the fourteen (14) Schools were written on pieces of paper folded and shuffled. Five schools were picked after replacement. The sample five schools represent the population.

Moreover, from the ample schools, twenty (20) SS II students were randomly selected to represent the school. Therefore, One Hundred Students represent the sample. The population of this study also comprises of all the SS II male and female students were

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used because they are 'r most senior in school since SS III have finished their WAEC exams when conducting this research, hence the study simply seek the effect of class size on academic performance of students in senior secondary schools.

More so, from the analysis of the data obtained the main instrument that was used for this study is questionnaire. The questionnaire was structured on effects of class size on Academic Performance of Students in Senior Secondary School on Mathematics. It consists Question Items (Appendix 1) consists .of two parts, section A deals with bio-data of the students developed by the researcher from existing records in relation to the objectives of the study. The questionnaire were made of 5-point Likert Scale of Strongly Agree (SA), which carries 5 points, Agreed (A) with 4 points, Strongly Disagree (SD) with 3 points, Disagreed (D) with 2 points and undecided (U) with 1 point.

Also, in the section B consists of 20 items of Questionnaire on Effect of Class Size on Students' Academic Performance on Mathematics in Senior Secondary School, they elicit information to solve the identified research questions. However the instrument for the data was checked by expert (supervised whether the instruction could cover the purpose that was intended to cover.

The data collected were subjected to a descriptive analysis frequency table, percentages and chi-square statistical technique. The frequencies of responses were found the scores were expressed in percentage and presented in tabular form. The results were presented on the basis of the formulated research question.

From the study, the researcher :find out that class size affect teaching and learning of Mathematics in Senior Secondary Schools of Yola South Local Government Area of Adamawa State.

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5.2 Conclusion

The findings of the study led to the following conclusion. Class size whether large or small has negative effect on student academic performance on mathematics in senior secondary schools. Also, class size affects the teaching and learning of Mathematics in Senior Secondary Schools. The teacher/students interaction and location of school also has significant influence on the students' Academic Performance on Mathematics.

From the result it can also be concluded that class size, teacher's interaction, teachers and school location in both rural and urban areas have great significant different productivity in academic performance of students performance on Mathematics in Senior Secondary School in Yola South Local Government Area of Adamawa State.

5.3 Recommendations

On the basis of the findings of the research, the following recommendations were made:

i. The schools must set its priority right to ensure resources are channeled to areas that are more important. Such as provision of lecture halls, seating places, teaching and learning equipment and other infrastructural facilities to ensure easy teaching and learning.

ii. Government must expand the existing secondary schools to ensure quality delivery of their mandate, instead of establishing more secondary schools which amounts to adding to the problem.

iii. Teacher should be given refresher courses on managing large classes from time to time.

iv. Base on the analysis of data collected, government should expand the available facilities

and try to provide enough classroom for students.

v.   Restructuration of class size require more facilities, therefore stakeholders should endeavour to provide required facilities and instructional materials for the teaching and learning the schools.

vi.   Government should implement policies especially the one that stipulate class size, that is the National Colleges of Education recommendation which demands teacher pupil ratio (1 :40)

vii.   The schools must set its priority right to ensure resources are channeled to areas that are more important, such as provision of lecture halls, seating places, teaching and learning equipment and other infrastructural facilities to ensure easy teaching and learning.

viii.   Government must expand the existing secondary schools to ensure quality delivery of their mandate, instead of establishing more secondary schools which amounts to adding to the problem.

ix.   Teachers should be given refresher courses on managing large classes from time to time

x.   Based on the analysis of data collected, government should expand the available facilities and key to provide enough classrooms for Students.

5.4   Suggestions for Further Studies

The time frame for this research is seemingly minimal. Thus, the constraints to extending the work to cover more areas. The researcher therefore suggests that this research should be carried in and out in other part: of the state to establish more classes for effective and excellent academics performance in Mathematics.

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APPENDIX

Federal College of Education, Yola
In Affiliation with University of Maiduguri,
Mathematics Education Department,
P.M.B. 2042 Yola,
Adamawa State,

Dear Respondent,

RESEARCH QUESTIONNAIRE

I am a final year student of the above mentioned school carrying out the research titled: "Effect of Class Size to the Academic Performance of Senior Secondary School Students in Mathematics Yola South Local Government Area of Adamawa State".

Therefore, I am soliciting for your assistance to enable me undertaken this research by responding to questions provided below.

Please you are requested to tick (√) in the column of your choice and all information would treated confidentially.

Yours faithfully,

Asma'u Hassan Mubi
DUS/MAT/2015/0036

QUESTIONNAIRE

Section 'A' Personal Data

Sex: Male ( )   Female ( )

Age: 15 – 25 (   )   25 -35 (   )   35 – 45 (   )   50 and above (   )

Educational Qualification:

Secondary ( ) NCE ( ) Diploma ( ) HND ( ) Degree ( ) Master ( )

Occupation: Student ( )   Teacher ( )

Section 'B'

Questionnaire for Teachers

S/N	ITEMS	SA	A	SD	D	U	TOTAL
1.	Most students in large classes do not perform well in their class activities						
2.	Class size does not determine Student's Academic Performance.						
3.	Issues of poor performance is as a result of large class size						
4.	The class size (smaller large) enabled students to achieve its learning objectives						
5.	Students in small class size perform better						
6.	School location determine the class size/volume						
7.	Urban schools are more populated than rural schools						
8.	School location contributes to overcrowded classes						

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9.	Over population in schools lead to problem of class size						
10.	Noises from school located near market and the large class size affects students in mathematics class						
11.	Congestion in classes leads to decline in moral and academics standards						
12.	Students understand the lessons taught in large class						
13.	Class size have effect on school facilities and Resources						
14.	Over populared classes can lead to indiscipline among the students						
15.	Overcrowded classrooms have increased the possibilities for mass failure and make students to lose interests in mathematics						
16.	Method of teaching employed by some teachers affect the performance of students in large class.						
17.	Most teachers find it difficult to teach overcrowded classes						
18.	School with large class size find it difficult in using instructional materials for mathematics						
19.	Overcrowded classes has effect in classroom Management						
20.	Students have individual attention from the teacher in small classes						

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Hypothesis I:

There is no significant difference between the achievements of students in Mathematics in small and large sized classes of Senior Secondary Schools. Table 1: Descriptive Statistics

Table I

S/N	Items	SA	A	SD	D	U	Total
1.	Most students in large classes do not perform well in their class activities	40	35	11	8	6	100
2.	Class size does not determine Student's Academic Performance.	6	15	41	35	3	100
3.	Issues of poor performance is as a result of large class size	51	35	7	2	5	100
4.	The class size (smaller large) enabled students to achieve its learning objectives	6	4	52	30	8	100
5.	Students in small class size perform better	36	:31	13	20	0	100
	Grand Total	139	120	124	95	22	500

Table 2.

S/N	O	E	(O-E)	(O-E)2	$\frac{(O-E)^2}{2}$
1.	40	27.8	12.2	148.84	5.35
2.	6	27.8	-21.8	475.24	17.09
3.	51	27.8	23.2	538.24	19.36
4.	6	27.8	-21.8	475,24	17,09
5.	36	27.8	8.2	67.24	2.42
6.	35	24	11	121	5.04
7.	15	24	-9	81	3.34
8.	3S	24	11	121	5.04
9.	4	24	-20	400	16.67
10.	31	24	7	49	2.04
11.	11	24.8	-13.8	190.44	7.68
12.	41	24.8	16.2	262.44	10.58
13.	7	24.8	-17.8	316.84	12 . 76
14.	52	24.8	27.2	739.84	29.83
15.	13	24.8	27.2	739.84	29.83
16.	8	19	-11	121	6.37
17.	35	19	16		13.47
18.	2	19	717	289	15,21
19.	30	19	11	121	6.36
20.	20	19	1	1	0.05
21.	6	4.4	1.6	2.56	0 . 5 8
22.	3	4.4	-1.4	1.96	0.45
23.	5	4.4	0.6	0.36	0.08
24.	8	4.4	3.6	12.96	2.95
25.	0	, 4.4	-4.4	19.36	4.4
	Grand Total				162.8

$X^2 = \sum \frac{(O-E)^2}{E} = 162.8$

df = (degree of freedom) (C-1) (r-1)

where C = 5, r = 5

(5-1) (5-1)

4 x 4 = 16

Df = 16 at 0.05 level of significant, the t – critical value is 26.3

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From table 2 above, it can be seen that the t-calculated value is greater than the t-critical value, the null hypothesis that there is no significant difference between the performance of student in mathematics in small and large sized classes of Senior Secondary Schools is rejected. Therefore, there is significant difference between the performance of students in mathematics in small and large sized classes of senior secondary school.

Hypothesis II:

There is no interaction effect of school location and class size on student's achievement in Senior Secondary School Mathematics

Table 3: Description Statistics

S/No.	Items	SA	A	SD	D	U	Total
1.	School location determine the class size/volume	30	25	20	15	10	100
2.	Urban schools are more populated than rural schools	25	20	35	15	5	100
3.	School location contributes to overcrowded classes	46	24	16	10	4	100
4.	Over population in schools lead to problem of class size	36	30	24	10	0	100
5.	Noises from school located near market and the large class size affects students in mathematics class	50	20	15	8	7	100
	Grand Total	187	119	110	58	26	500

Table 4:

S/N	O	E	(O-E)	(O-E)2	(O-E)²/...
1.	30	37.4	-7.4	54.76	1.46
2.	25	37.4	-12.4	153.76	4.11
3.	46	37.4	8.6	73.96	1.98
4.	36	37.4	-1.4	1.96	0.05
5.	50	37.4	12.6	158.76	4.24
6.	25	-23.8	1.2	1.44	0.06
7.	20	23.8	-3.8	14.44	0.61
8.	24	23.8	0.2	0.04	0.00
9.	30	23.8	6.2	38.44	1.62
10.	20	23.8	-3.8	14.44	1.61
11.	20	22	13	4	0.18
12.	35	22	13	169	7.68
13.	16	22	-6	36	1.64
14.	24	22	2	4	0.18
15.	15	22	-7	49	2.22
16.	15	11.6	3.4	11.56	0.99
17.	15	11.6	3.4	11.56	0.99
18.	10	11.6	-1.6	2.56	0.22
19.	10	11.6	-1.6	2.56	0.22
20.	8	11.6	-3.6	12.96	1.11
21.	10	5.2	4.8	23.04	4.04
22.	5	5.2	-0.2	0.04	0.01
23.	4	5.2	-1.2	1.44	0.28
24.	0	5.2	-5.2	27.04	5.2
25.	7	5.2	1.8	3.24	0.62
		Grand Total			39.1

$X^2 = \sum \frac{(0-E)^2}{E} = 39.1$

df = (degree of freedom) (C-1) (r-1)

where C = 5, r = 5

(5-1) (5-1)

4 x 4 = 16

Df = 16 at 0.05evel of significant, the t – critical value is 26.3

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From the table 4 l i v e, it can be seen that t-calculated value is more than the t-critical value, the null hypothesis that there is no interaction effect of school location and class size in student's performance on mathematics in Senior Secondary School is rejected and concluded that there is interaction effect of school location and class size on student's performance on mathematics in Senior Secondary School.

Hypothesis v:

There is no significant difference between the quality of student's Performance on Mathematics Students in schools having an average class-size of 35 Students and large class size.

Table 5: Descriptive Statistics

S/N	Items	SA	A	SD	D	U	Total
1.	Congestion in classes leads to decline in moral and academics standards	40	10	35	5	10	100
2.	Students understand the lessons taught in large class	20	15	40	15	10	100
3.	Class size have effect on school facilities and Resources	37	33	10	8	12	100
4.	Over populated classes can lead to indiscipline among the students	46	24	10	10	10	100
5.	Overcrowded classrooms have increased the possibilities for mass failure and make students to lose interests in mathematics	30	20	15	20	15	100
	Grand Total	173	102	110	58	57	500

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Table 5:

SA	O	E	(O-E)	$(O-E)^2$	$\frac{(O-E)^2}{E}$
1.	40	34.6	5.4	29.16	0.84
2.	20	34.6	-14.6	213.16	6.16
3.	37	34.6	2.4	5.74	0.16
4.	46	34.6	11.4	129.96	3.76
5.	30	34.6	-4.6	21.16	0.61
6.	10	20.4	-10.4	108.16	5.30
7.	15	20.4	-5.4	29.16	1.43
8.	33	20.4	12.6	158.76	7.78
9.	24	20.4	3.6	12.96	0.64
10.	20	20.4	0.4	0.16	0.01
11.	35	22	13	169	7.68
12.	40	22	18	324	14.73
13.	10	22	-12	144	6.55
14.	10	22	-12	144	6.55
15,	15	22	-7	49	2.23
16.	5	11.6	-6.6	43.56	3.76
17.	15	11.6	3.4	11.56	0.99
18.	8	11.6	3.6	12.96	1.12
19.	10	11.6	-1.6	2.56	0.22
20.	20	11.6	8.4	70.56	6.08
21.	10	11.4	-1.4	1.96	0.17
22.	10	11.4	-1.4	1.96	0,17
23	12	11.4	0.6	0,36	0.03
24.	10	11.4	-1.4	1.96	0.17
25.	15	11.4	3.6	12.96	1.12
Grand Total					70.37

$X^2 = \sum \frac{(O-E)^2}{E} = 70.37 \; E$

df = (degree of freedom) (C-1) (r-1)

where C = 5 . r 5

(5-1) (5-1)

4 x 4 = 16

Df = 16 at 0.05 level of significant, the critical value is 26.3

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From the table 6 above, it can be seen that t-calculated value is greater than the t-critical value, the null hypothesis that there is no significant difference between the quality of performance on mathematics students in schools having an average class size of 35 students and large class size in Senior Secondary Schools is rejected and concluded that there is quality of students performance on mathematics in schools having an average class size of 35 students and large class size in senior secondary school.

Hypothesis IV:

There is no significant relationship between class size and teachers productivity

Table 7: Descriptive Statistics

S/N	Items	SA	A	SD	D	U	Total
1.	Method of teaching employed by some teachers affect the performance of students in large class.	52	23	15	7	3	100
2.	Most teachers find it difficult to teach overcrowded classes	40	35	20	5	0	100
3.	School with large class size find it difficult in using instructional materials for mathematics	47	33	10	5	5	100
4.	Overcrowded classes has effect in classroom Management	43	27	14	9	7	100
5.	Students have individual attention from the teacher in small classes	48	22	15	10	5	100
	Grand Total	230	140	74	36	20	500

Table 6:

SA	O	E	(O-E)	(O-E)²	(O-E)²/E
1.	52	46	6	36	0.78
2.	40	46	-6	36	0.78
3.	47	46	1	1	0.02
4.	43	46	-3	9	0.19
5.	48	46	2	4	0.09
6.	23	28	-5	25	0.89
7.	35	28	7	49	1.75
8.	33	28	5	25	0.89
9.	27	28	-1	1	0.04
10.	22	28	-6	36	1.29
11.	15	14.8	0.2	0.04	0.002
12.	20	14.8	5.2	27.04	1.83
13.	10	14.8	-4.8	23.04	1.56
14.	14	14.8	-0.8	0.64	0.04
15,	15	14.8	0.2	0.04	0.002
16.	7	14.8	-0.2	0.04	0.006
17.	5	7.2	-2.2	4.84	0.67
18.	5	7.2	-2.2	4.84	0.67
19.	9	7.2	1.8	3.24	0.45
20.	10	7.2	2.8	7.84	0.63
21.	3	4	-1	1	0.25
22.	0	4	-4	16	4
23	5	4	1	1	0.25
24.	7	4	3	9	2.25
25.	5	4	1	1	0.27
Grand Total					20.04

$X^2 = \sum \frac{(O-E)2}{E} = 20.37$ E

df = (degree of freedom) (C-1) (r-1)

where C = 5 , r 5

(5-1) (5-1)

4 x 4 =16

Df = 16 at 0.05 level of significant, the critical value is 26.3 From the table 8 above, it can be seen that t-calculated value is less than t-critical value, the null hypothesis that there is no significant relationship between class size and concluded that there is

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relationship between classes and teachers productivity accepted a teachers productivity in academic performance on mathematics in Senior Secondary Schools.