INFLUENCE OF LEARNING ENVIRONMENT ON THE ACADEMIC PERFORMANCE OF STUDENTS IN MATHEMATICS IN CHANCHAGA LOCAL GOVERNMENT, NIGER STATE

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF SCIENCE EDUCATION FEDERAL UNIVERSITY OF TECHNOLOGY MINNA IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF TECHNOLOGY (B.TECH) IN SCIENCE EDUCATION WITH MATHEMATICS FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE - NIGERIA

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ABSTRACT

The purpose of the study was to investigate the influence of learning environment on the academic performance of students in mathematics in Chanchaga local government, Niger state, Nigeria. Three objectives which include, to find out if the learning environment influences students' performance in mathematics, to identify the some components of learning environment that affect the students' performance in mathematics, to determine the level to which learning environment affects the academic performance of students at secondary schools in mathematics set the basis for the study. The design of the study is cross sectional survey of the descriptive type. The population of the study comprised all the four thousand, four hundred and eighty (4,480) senior secondary one (SS1) students of the nine public secondary schools of Chanchaga local government. Purposive sampling technique was adopted to select three of the schools. And from a class from each school, a sample size of 300 was selected. A multiple data collection method including use of documented materials, observation, and distribution of questionnaire were employed. The reliability of the instrument was determined using Pearson Correlation Coefficient, and the index was 0.79. The Statistical Package for the Social Sciences (SPSS) was used to analyze the data obtained from the questionnaires. The findings of the study revealed that factors of the learning environment which include temperature, seats and sitting arrangements, classroom population and clarity of the board influence students' academic performance in mathematics, with class population, seats and seating arrangement having the highest mean. Based on the findings of the research, the researcher concludes that for a student to perform better in mathematics, factors including classroom temperature, population, seats and sitting arrangement, as well as board clarity should be in ideal state. At the end, recommendations were made which includes; the authorities should come up with modalities to ensure that the aforementioned facilities were provided and maintained. Also, more schools should be built to accommodate the increasing population of the area.

TABLE OF CONTENTS

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

CHAPTER ONE

1.0 INTRODUTION

1.1 Background to the Study

Education is considered as one of the rights of citizens especially in this era of technology, and academic performance is mostly the medium to determine how well a student meets the standard set out by the school. This consists of the students' records in test, examinations, quizzes, assignments, projects and so on. Duruji, Azuh, and Oviasogie (2015), posited that "academic performance referred to the degree of a student's accomplishment in his or her tasks and studies and the most well-known indicator of measuring academic performance is grades which reflect the student's "score" for their subjects and overall tenure." Yusuf (2002), defined academic performance of a student as "the observable and measurable behavior of a student in a particular situation." Therefore, the academic performance of a student in mathematics includes all observable and measurable behavior of that student at moment during the course. This consists of the scores he obtained at any moment from a teacher made test, mid-term test, first term examination and so on. In most of our educational institutions in Nigeria, students' successes are measured by their academic performances in various subjects taken in schools. For example students' performance in mathematics could be determined by the observable and measurable behaviors of the students.

Mathematics is one of the core subjects in Nigerian secondary schools which have been described by Ambali (2014), as "subject which is important in shaping our everyday life and development". He also stressed that Mathematics is "an indispensable subject without which no nation could contemplate progress or development". Also, Agbaje (2013), noted that "mathematics education is the bedrock of science and technology" Mwekaven, Awuhe, Akase and Tombuwua (2015), also have the view that "Mathematics is the subject that enables

scientists and technologists develop relationships among biological, chemical, geographical and physical qualities; understanding and explain natural phenomena".

Mathematics also facilitates and develops problem solving skills in students helps in the progress of a nation scientifically, technologically, and economically as posited by Anaduaka, and Okafor (2013), "Every individual needs mathematics knowledge to function intelligently and efficiently in his or her world. Mathematics is one subject that is an integral part of everyone's life and affects virtually every field of human endeavor, and is a body of knowledge essential for the achievement of scientific/technology nation" Also Kalu and Ogwu (2012), are of the view that "since the Nigerian economy is a developing economy, it requires mathematics that can effectively put science and technology in the forefront of national development".

Furthermore, an improved standard of teaching and learning of mathematics can position a nation in the comity of developed nation as noted by Ale and Adetula (2010), "Mathematics is an undisputed agent of national development and wealth creation. The line of demarcation between the developed and the underdeveloped nations is based on the level of mathematical attainment in ingenuity.

Mathematics also bring about innovation and invention, therefore, there is need for more devotion and concern from stakeholders towards the teaching and learning of its skills. "Mathematics being the bedrock of science and technology, therefore, there is no invention or innovation that does not require the use and application of mathematics" (Oladayo & Charles-Organ 2017). "The level of mathematics understanding among Nigerian population becomes a serious concern for scientific and technological literacy" (Daso 2013).

Therefore, the numerous importance of effective Mathematical skills capable of enhancing the performance and achievement of our young Nigerians at secondary schools and which can result to scientific, technological and economic advancement cannot be over emphasized. However, it is affected by several factors such as teachers, learning materials, socio-economic

background, interest, learning environment, constant practice, population, and so on. In line with this, Chirume and Chikasha (2015), noted that "students learning and achievements are influenced by a variety of factors and those factors could be related to the students, peers, teachers, school, curriculum, family, and so on" Also, Suleiman and Hammad (2019), deduced that "several factors caused students failure in mathematics which include insufficient numbers of qualified teachers, inadequate textbooks, socio-economic background, lack of interest in mathematics, unconducive classrooms, frequent transfer of mathematics teachers, lack of constant study of mathematics and too many students in mathematics classes" De silva, khatibi and Azam (2018) grouped these factors into two namely, contextual factors and the emotional & motivational factors. According to them, the contextual factors include external school factors (socio-economic status and parental involvement) and the internal school factors (which include teachers' quality and school resources). Therefore, this study tends to focus on the school resources which can also be referred to as the learning environment. Amirul, Ahmad, Yayha, Adnan and Noh (2013), described learning environment as "the space allocated for either classrooms, science labs, open spaces and offices" in other words, learning environment is "the social context, psychological and pedagogical which can effect learning achievement and attitudes of the students" (Amirul *et al.,* 2013) "learning environment has two components, the physical and psychological" (Fraser and Kigour 2006 as cited in Amirul *et al.,* 2013).

The psychological component consists of the relationships that exist in the learning environment such as students-students, students-teachers, teachers-parents and so on. while the physical components includes all that can be seen or felt in the learning environment such as classrooms, laboratories, teaching materials, furniture, sitting arrangement, ventilation and many more. Both the physical and psychological components can hinder or shape the process of learning mathematics. Glassman as cited in Shamaki (2015), have stated that "the fact that

learning environment have impact on student's academic achievement has been established since by studies"

Putting the physical components of the learning environment into consideration, Suleiman and Hussain (2014) noted that physical facilities are one of the stimulating factors that play a fundamental role in improving academic achievement in the school system. These include; school buildings, accommodation, classrooms, libraries, furniture, laboratories, recreational equipment, apparatus and other instructional materials. Furthermore their availability, relevancy and sufficiency affect academic achievement positively. Factors such as poor lightening, poor sitting arrangement, over population, unconducive class temperature, can weaken the learning process thereby lowering the performances of the students, it can also lead to poor health, high absenteeism, and also lack of concentration among the students.

On the other side, the aforementioned conditions can cause frustration, uncomfortability and create unfriendly workplace for the teachers. It can also make work stressfull for the teachers and create unnecessary complications which can lower their enthusiasm in the teaching profession and which can have direct or indirect impact on the student's performance. Moore (2008), as cited in Duruji, Azuh, and Oviasogie (2014), explains that student's achievements is lower in schools with deficient building and in improved ones, the results were better" In line with this, Duruji *et al.,* (2014) , posited that " school environment determines how much learning and teaching will be possible"

Thus, one of the basic factors that could affect the effective learning and practice of mathematics skills which shall on the other hand, decrease or increase the student's performance in Chanchaga Local Government could be tagged to the physical environment in which the students learn. "one cannot disconnect greater achievement on mathematics and ideal physical environment such as good sitting arrangement, sufficient chairs, smooth writing

board, conducive temperature etc." (Shamaki 2015). Therefore, for a learning environment to be ideal, the aforementioned components of the environment must be provided.

United Nations Scientific and Cultural Organization (UNESCO), (2018), stressed that well designed schools can positively affect learning by focusing on issues such as location, building materials, size of classrooms furniture, lighting, temperature, ventilation, noise level and so on. Furthermore, UNESCO added that the location should not be too far from student's destination. Furniture should be in adequate numbers with a plan for replacing broken ones. The size of chairs should match that of students, students should have provision for storing their belonging. The population should not exceed the maximum of 45 students per class. The class should be well-lit and painted with light colors and also it should have an ample board with other display spaces among others. Therefore, this research is aimed at investigating the influence of learning environment on the performance of students in mathematics in some selected secondary schools in Chanchaga Local Government.

1.2 Statement of the Problem

Nigeria use a uniform syllabus and curriculum in all secondary schools located in different parts of the country. The secondary schools however can be run by the government (Federal, state or local), private sector, or organizations. Even though the availability of learning facilities and the conditions in which the students learn in these various schools differ, it can be reasonably expected from these candidates to perform uniformly since they were thought using the same curriculum and syllabus.

But the case is not always the same as some schools always perform better than others. Therefore, there is need to find out if the physical learning environment is the factor that lead to the underperformance of our students in mathematics in Chanchaga local government.

1.3 Aim/Objectives of the Study

The aim of the study is to examine the influence of learning environment on student's performance in mathematics in secondary schools.

Particularly, the objectives of the study are;

1. To find out if the learning environment influence students' performance in mathematics.
2. To identify the components of learning environment that affect the students' performance in mathematics.
3. To determine the level to which learning environment affects the academic performance of students at secondary schools in mathematics.

1.4 Research Questions

The study seeks the answers to the following questions.

i. To what extent does the classroom temperature affects the performance of students in mathematics at their end of term examination?

ii. To what degree is comfortable seats and well organized sitting arrangements influence students' performance in Mathematics?

iii. To what extent is the population of a class affects the understanding of Mathematics?

iv. To what level does the clarity of the blackboard capable of affecting student's performance in a class?

1.5 Significance of the Study

The findings will enable the administrative unit of the school to be aware of the magnitude of the problem of learning environment and to what extent it influences the student's performance in mathematics so as to plan how to curtail it. This can be achieved by recoloring the blackboard frequently, rearranging the students in the class to seat according to their heights, create enough spaces in the class and allow the students to learn in batches.

The result shall also alert the government on how the poor conditions of some classroom influence the mathematics performance of the students in the affected schools and thereby come up with some policies that can address the problem. This can be achieved through the construction of new classes and other structures, renovation of existing structures and providing other needed material.

Additionally, the parent/guardians can also benefit from the results of this study. It can make them aware of the situation of the environment where their children/wards learn. As a result of this, they can strategize and come up with measures to either reduce the influence or make it a history through the parents-teachers association or any other means.

Non-governmental organizations (NGOs), pro-education organizations, educational foundations, and other stakeholders in education can also benefit from the results of this study by making them to be aware of the problem and contribute their quota in addressing it. This is essential because government alone may not cater for all the needs of the schools.

Finally, the findings could also guide the aforementioned in the course of addressing the problem with suggestions on how to make the learning environment more conducive and ideal, which shall therefore enhance the performance of the students in mathematics.

1.6 Scope of the Study

The study will be confined to the following components of the physical learning environment, seat and sitting arrangements, class population, classroom ventilation, and the writing board. Also it will be delimited to some SS1 students only, selected from three secondary schools in Chanchaga local government of Niger State. The schools are: Government Day Science Secondary School, Tunga, Limawa Model School Minna and Government Day Secondary school, Minna.

Operational Definition of the Key Terms

I. **Learning Environment**: Refers to the physical components that make up a classroom such as furniture, board, ventilation, etc.

II. **Students' Academic Performance**: This refers to the observable and measurable behavior of a student in a field which consists of scores obtained from teacher-made test, first term examination, mid-term test and so on.

III. **Influence**: The effect of one thing on another.

CHAPTER TWO

2.0 REVIEW OF RELATED LITERATURE

In this chapter, the study focuses on literature review on the influence of learning environment on the academic performance in mathematics. The literature covers the following subheadings;

2.1 Conceptual framework:

i. Academic performance and some of its terminologies
ii. Concept of mathematics.
iii. The teaching of mathematics at secondary schools in Nigeria.
iv. Effective teaching of mathematics
v. The concept of learning.
vi. The concept of learning environment.
vii. Ideal learning environment; concept and prospects.
viii. Relationship between variables
ix. A brief overview of Chanchaga local government.

2.2 Theoretical framework

2.3 Empirical studies

2.4 Summary

2.1 Conceptual Framework

2.1.1 Academic Performance

In every task we are carrying out, there is always that feeling to assess how well and how far we go. Performance is defined by Cambridge dictionary (2019), as "how well an activity or job is done." Also, Wikipedia defined performance as "a completion of a task with application of knowledge, skills and abilities". On the other hand, the Collins dictionary defined the word "academic" as "a word which is used to describe things that relate to the work done in schools, colleges and universities, especially work which involves studying and reasoning rather than practical or technical skills" Furthermore, academy is defined by Wikipedia as an institution of secondary education, higher learning, research or honorary membership.

> *The word "academics" was derived from the word akademics, used by the Greeks in 1950s, at time goes on, the place where the great philosopher, Pluto taught was named in Latin as academia, and then changed to academicus in 1580, from then, everything that has to do with scholarly is referred to as academics.* (Online etymology dictionary)

Academia → Academics → Academicus → Academic

(Online etymology dictionary)

Therefore, academic performance of a student can be described as how well the student accomplishes a task in the learning process. Many scholars and publications have contributed a lot in defining and explaining what academic performance is. The Wikipedia has defined academic performance as "the extent to which a student, teacher or institutions has achieved their short or long term educational goals" Also Yusuf (2012), defined academic performance of a student as "the observable and measurable behaviours of a student at any point in time during a course" These measurable and observable behaviours can include a quiz, test, exams,

and so on." Therefore a students' academic performance in mathematics include all what he achieve in mathematics' test, quiz, exams, project and so on at a specific course, term or session.

Academic performance is sometimes regarded as academic achievement. "Many authors use the term academic performance interchangeably with academic achievement and academic success" (Ali, Haidar, Munir & Ahmed 2013). Also, Yusuf (2012) opined that "Researchers have confusedly used these terms and this is not restricted to particular group, it is due to the fact that literature has not provided a definite clarification on the difference existing among the terms." But achievement is mostly considered as successes recorded by students at their final or end of term examinations, while performance is determined by what the student record within the term or session. This is supported by Yusuf (2012) "the difference between academic performance and academic achievement is that, local test or exams made by the teacher is considered when measuring academic performance while standardised test or examination prepared by a national body is used to measure academic achievement of students. And both can be referred to as "outcome". Therefore, in this study, academic performance shall be in consideration rather the academic achievement.

2.1.2 Some Terminologies Associated With Academic Performance

When dealing with academic performance, there are always some terminologies associated with it. These terms include assessment, measurement, evaluation, and test. A teacher when he teaches, he uses measurement in terms of score from a test he applied to the learners to find out the progress made by the students in terms of behavioural change and or, to determine his shortcoming. If the teacher makes a judgement based on the result he obtained, it means he evaluates. Ajayi (2018), stressed that;

> *Assessment is the process of gathering, analysing and interpreting evidence systematically to determine how well*

performance matches certain expectations and standards, thereby using the information to document, explain and improve performance. On the other hand, measurement is the process by which the usefulness of various activities of students, the intelligence, interest, attitude, aptitude, personality and educational achievements of the students are measured on the basis of definite standards and are expressed in definite words, symbols or units. While evaluation is the process of observing and measuring a thing for the purpose of judging it and determining its value either by comparison to similar thing or to a standard.

Also, while assessment is diagnostic, formative in nature and process oriented which provides feedback on performance and area of improvement based observation, evaluation is judgemental, descriptive in nature and product oriented which determines the extent to which the objectives are achieved. Lastly, Test is defined as a means (instrument, device, technique or tool) of measurement that is used to obtain data about a specific trait or behaviour. For example, test can be used to determine students' achievement in mathematics.

2.1.3 The Concept of Mathematics

As stated in a chapter one, mathematics is one of the core subjects in our secondary school which itself is a science that embodied facts, reliable methods, and theories used in solving problems in our daily activities. The Cambridge dictionary defined mathematics as "the science of numbers, forms, amounts and their relationships. Or study of numbers, shapes, and space using reason and usually a special system of symbols and rules for organising them" Mathematics is the branch of science which improve the understanding of other subjects or

discipline, and makes someone creative by developing his thinking ability and reasoning. This has been supported by Yandav, (2017), “mathematics, which sharps the mind and makes it creative, is also the means to develop the thinking power and reasoning intelligence of individuals” also, Yandav opined that “the development of human beings and their culture depend on the development of mathematics… it is also the language of all material science and the centre of all engineering branches which evolve around it, therefore, it is the past, present and future of all sciences.”

The importance of mathematics cannot be over stressed. This is why the federal government makes it compulsory to all students, and a student must possesses at least a credit grade in mathematics at the O’ Level examination to secure admission into higher institutions in Nigeria. Suleiman and Hamid (2019), viewed mathematics as “one of the core and essential subject at primary and secondary levels of education due to its importance and usefulness in everyday activities, and it is seen as gateway to future professions in every variety of fields” Also, mathematics is a very important tool in national development, this got the support of by Ambali (2014), “mathematics is a subject which is important in shaping our everyday life and development and also, is an indispensable subject without which no nation could contemplate progress or development”

Additionally, the study of many science and technology courses at the tertiary level, and the development of the citizens in the act of creativity and innovation relied substantially on the foundation and the commitments laid in mathematics at the school level. This was stipulated by many researchers and scholars across the globe. Mwekaven, Awuhe, Akase and Tombuwua (2015), added that “Mathematics is the subject that enables scientists and technologists develop relationships among biological, chemical, geographical and physical qualities, therefore, understanding and explain natural phenomena” Agbaje, (2013), added that “mathematics education is the bedrock of science and technology” Mathematics also bring about innovation

and invention, therefore, there is need for more devotion and concern from stakeholders towards the teaching and learning of its skills. "There is no invention or innovation that does not require the use and application of mathematics because it is the bedrock of science and technology" (Oladayo & Charles-Organ 2017). "The level of mathematics understanding among Nigerian population becomes a serious concern for scientific and technological literacy" (Daso, 2013).

Mathematics also facilitates and develops problem solving skills in students, more so, helps the progress of a nation scientifically, technologically, and economically as posited by Anaduaka, and Okafor (2013), "Every individual needs mathematics knowledge to function intelligently and efficiently in his or her world. Mathematics is one subject that is an integral part of everyone's life and affects virtually every field of human endeavor, and is a body of knowledge essential for the achievement of scientific/technology nation" Kalu and Ogwu (2012), added that "since the Nigerian economy is a developing economy, it requires mathematics that can effectively put science and technology in the forefront of national development". Additionally, an improved standard of teaching and learning of mathematics in our schools can position a nation in the comity of developed nation as noted by Ale and Adetula (2010), "Mathematics is an undisputed agent of national development and wealth creation. The line of demarcation between the developed and the underdeveloped nations is based on the level of mathematical attainment in ingenuity" From this, we can say that mathematics education; its knowledge, application, teaching and learning including its challenges needed to be studied, investigated and improved. This is why many researches are been conducted every day by scholars, scientists, educationalists and other stakeholders.

Mathematics, apart from its importance, has many branches and each of the branches has an area that is applied to. These are arithmetic, analysis, geometry and algebra. The arithmetic field is all about numbers and arithmetic operations, algebra consists of equations, analysis is

made of continuity, limits, boundaries, and so on while figures, shapes and sizes constituted the geometry. All of the above fields of mathematics can be used in solving real life problems. On the other side, mathematics could be pure or applied. The pure mathematics is more of theories, concepts and general knowledge of the subject while the applied is the application of the theories and concepts obtained from the pure mathematics in the process of solving problems. That is to say, the applied mathematics is the practical aspect of mathematics

> "*Mathematics is divided into four fields; arithmetic, algebra, analysis and geometry. It can also be categorized under pure or applied, and the study of problems in applied mathematics leads to new developments in pure mathematics, and also, the theories developed in pure mathematics often find applications later. (Yandav, 2017).*

This shows that both the pure and applied mathematics work hand in hand in the real world.

2.1.4 The Teaching and Learning of Mathematics in Nigeria

Nigeria as one of the developing countries puts greater emphasis on science and technology development. And for the country to position herself in the comity of the developed nation, more emphasis have to be made on mathematics education especially at the grassroots. Therefore, there is a need to look into some issues surrounding the teaching and learning of mathematics especially at the secondary school level, which is the medium that connects the primary and the tertiary levels, and also the level at which most individuals develop a self-realisation ability, that is, the adolescence stage. "… mathematics education issues in Nigeria are those policies, events, challenges and development that concern mathematics education which are current in Nigeria of today" (Ibrahim, 2017). These issues include*;*

> *The role of technology in the teaching of mathematic; Nigeria need ICT to aid teaching and learning and educational management especially in*

mathematics. The mathematics phobia in school, that is, the dislike of mathematics by some students, which could be curbed by the proper use and utilization of instructional materials, The quality of the teaching and learning of mathematics, the condition of teachers training institution, School facilities such as classroom, laboratories, workshops, staff office, administrative offices and teaching material, The teachers' competency and mode of teaching, the female participation in mathematics education in Nigeria. (Ibrahim 2017).

Enu, Agyman and Nkum (2015), stressed that "Factors such as teachers method of teaching, and inadequate teaching and learning materials affect students' performance in mathematics. Also, Dauda, *et al.,* (2016), added that "qualification of mathematics teachers, teaching method and instructional material as well as students' attitudes towards the teaching and learning of mathematics are determinants of high performance of students in mathematics in senior secondary schools" Some factors on the other hand affect the students' interest in mathematics which can result to low academic performance or achievement in the subject. "mathematics' interest in secondary school students depend on teachers, students, mathematics anxiety, instructional strategy used by teacher and availability of infrastructural facilities" (Anigbo, 2016).

2.1.4 Effective Teaching of Mathematics

Previously, this study visited some of the contemporary issues and challenges of teaching and learning mathematics in secondary schools in Nigeria. At this point, the study shall focus on

the ways and methods that can be adopted in order to reduce the menace or bring about solutions to the challenges. The challenges above can be categorized into teacher's factor, student factor, policy makers and the learning environment. The teacher can teach effectively if he adopt the following measures as stipulated by (Sinay & Nahornick 2016).

> *Some of the research based instructional strategies that can provide guidance for effective classroom practices for supporting student development in mathematics include; creating a supportive and engaging classroom environment, provide strong mathematics foundation in the early years, create appropriate curriculum standards, develop knowledge of children's development process, implement appropriate classroom activities, teach mathematics in an interdisciplinary manner, maintain positive attitudes about mathematics, and more so be knowledgeable about mathematics.*

The aforementioned recommendations concern the teachers teaching at the lower classes especially those at the foundation classes. But for the general teaching of mathematics especially at the upper secondary level, Sinay and Nahornick (2016), recommended that the teacher should engage in the following;

> *Teaching for conceptual understanding, teaching reasoning skills, promotion of problem solving skills, developing creativity in mathematics, encourage and support collaboration in mathematics among students, provide an enquiry environment, organise a standard and effective lesson plan, promote the use of technology in teaching and learning of mathematics. Develop learners mental mathematics skills, have high expectation from students (believe that all students can learn and do well), assign meaningful*

homework, build positive attitudes in mathematics, reduce mathematics anxiety, provide varied and on-going assignment (such as observation, conversation, demonstration, projects, tests, quizzes, and journals), *support computational thinking among students, reduce visual distractions in the process of teaching mathematics, and make mathematics fun.*

Another notable measure is the use of science, technology, engineering and mathematics (STEM) education in the process of teaching mathematics. This was supported by Sinay and Nahornick (2016), "STEM activities allow students to make mathematics meaningful by making connections and critically think about the world around them"

Another notable aspect of teaching and learning mathematics in the secondary school is the method of teaching. There are many methods of teaching, but not all methods can be effective and yield the desired results in the mathematics class. Some factors that determine what method to be used in teaching a specific topic include nature of the topic, facilities and resources available, purpose and class population. "In the process of teaching mathematics, teacher may adopt any method according to the specific unit of syllabus, available resources, and number of student in a class." (Baig, 2015). Baig added that, "the teaching methods of mathematics include lecture, inductive, heuristic or discovery, analytic, synthetic, problem solving, laboratory and project method" more so, the basic concepts of all branches of mathematics can be explain using the lecture method. Inductive method is suitable in treating algebras, geometry and matrices by establishing laws and formulas, the analytic method is used to prove the laws and formula and the deductive method is suitable in solving all problems of mathematics by the application of these already established laws and formulas, whereas trigonometric laws and theories are best thought practically using the laboratory method. The problem solving method is best used in solving problems that cannot be easily solved with simple procedures or single formula (that is, more advanced problems). The procedures of mathematics are best thought

using the enquiry method while the synthetic method is applied when the learners have achieved some level of mastery in mathematical analysis.

2.1.5 The Concept of Learning

In everyday life, human beings tend to modify, create or acquire some new talents and the way of living or doing things from a new or existing behaviour. Wikipedia defined learning as "the process of acquiring new, or modifying existing knowledge, behaviours, skills values and preferences" " learning is all about change; the change brought about by developing a new skill, understanding a scientific law, changing an attitude…" (Sequeira 2012). With these definitions, it is clear that teaching mathematics involves making an attempt to bring a change in the learners' attitudes or to develop or modify a new or existing skill. Therefore, the teacher has many roles to play in the process of teaching mathematics. He is in charge of using the available instructional materials and improvising the ones that are not available, coordinating the classroom and guiding the students to achieve the desired change of behaviours.

2.1.6 The Learning Environment

Students at the secondary school level spend most of their time learning either formally or informally, directly or indirectly, at home or at the school. They spend at least twenty five hours of their week in the school interacting with the teachers, peers, learning materials and so on. Also at the school, the learning process usually takes place at designated places purposely set aside for the job under some conditions, it can be a classroom, laboratory, learning hall and so on. On the other hand, except during holidays, the students at home are always engaged in assignment, reading, projects, preparation for a test, quiz or exams and so on. All these locations; the classroom ,learning hall, laboratories, work stores and so on, and the conditions; temperature, humidity, air quality, ventilation, light…, the students and the teachers are what make up the learning environment. According to the Cambridge dictionary, environment can

be defined “as the air, water, and land in or on which people… live. Environment can be the condition that you live or work in and the way that they influence how you feel or how effectively you can work” so with this, learning environment can be simply put as where and how someone learns. Amirul, Ahmad, Yahya, Abdullahi, Adnan, and Noh (2013), defined the learning environment as “the social context, psychological and pedagogical, which can affect learning, achievement and attitudes of the students… the learning environment is capable of stimulating students’ engagement, influencing their behaviours, develop their skills and cognitive abilities.”

The learning environment has a role to play in the process of teaching and learning as opined by many researchers.” the learning environment is capable of stimulating students’ engagement, influencing their behaviours, develop their skills and cognitive abilities.” (Amirul *et a*l, 2013). Duruji, Azuh and Oviasogie (2014), argued that “planning the learning environment which include classroom spacing planning, administrative places planning, circulation spaces planning, spaces for conveniences planning, general infrastructure planning, the teachers as well as the students themselves are essential in teaching-learning process” “many scholars are of the opinion that factors of the learning environment are variables that can affect students achievements including performance in examinations” (Duruji, *et al* (2014).

The learning environment has two components; the physical and the psychological. The psychological component consists of the relationships that exist in the learning environment such as students-students, students-teachers, teachers-parents and so on. while the physical components includes all that can be seen or felt in the learning environment such as classrooms, laboratories, teaching materials, furniture, sitting arrangement, ventilation and many more. Both the physical and psychological components can hinder or shape the process of learning mathematics.

A lot of previous research works on the effect of the learning environment have concentrated on the psychological and the pedagogical factors. These factors include emotions, family background, standard of living, motivation, home environment, teaching methods, teacher competency and efficiency, and so on. So there is need to investigate the other components of the learning environment which are the class population, the size of chairs and sitting arrangement and the blackboard, especially at the public schools. This is as a result of the fact that most of the public school teachers are well experienced and spend longer times in their profession.

According to Barret, Zhang, Daries and Barret (2015), the learning environment**,** particularly the classroom has three characteristics. These characteristics are naturalness, individualism, and stimulation. Naturalness contains factors like light temperature and air quality. Individualism is made up of ownership and flexibility, while complexity and color made up stimulation.

The Classroom

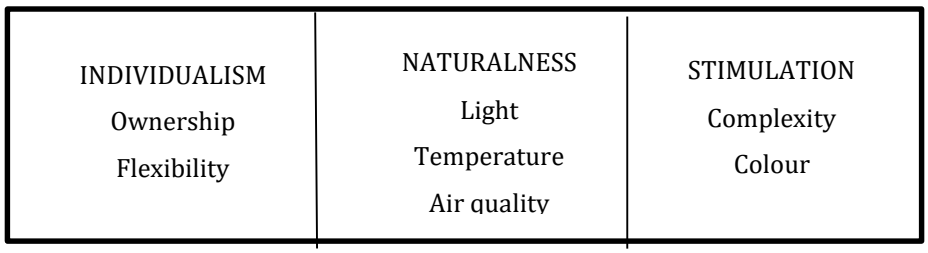

Figure 3.0 Characteristics of learning environment

2.1.8 Ideal Learning Environment

The issue of learning environment has quietly become an issue of concern to students, teachers, school administrations, policy makers, and any other stakeholders in education. Likewise, the need for schools to have an ideal environment where teachers teach effectively and students learn easily, schools where the classes accommodate adequate number of students, and classes where students seat comfortably and see the boards clearly with enough spaces to interact and

keep their belongings safely cannot be over emphasized. In short, environment which can enhance smooth and effective teaching and learning is regarded to as an ideal or conducive learning environment. Hilal (2014), postulated that;

> *For learning environment to be effective, the following criteria should be considered by planners; Dimension (room, aisles, ceiling heights, door widths), Entrances (door location), Windows (placement, treatment), Finishes (walls, ceilings, floors.) Furnishing and equipment (instructor's desk, display surfaces, students' seating), Voice amplification, Acoustics, Accessibility, temperature (Heating, ventilating, air conditioning), as well as Lighting and Projection equipment.*

2.1.8.1 Class Size and Class Population as a Factor of the Ideal Learning Environment

The population of Chanchaga local government is always increasing and as a result, the rate of enrolment into secondary schools increases on daily bases. On the other hand, the rate at which new schools are built (especially the public schools) is very slow. This makes the available ones to be overpopulated as most parents cannot afford to enroll their children/wards in the private school due to the economy factor.

According to glossary of education reform, class size referred to the "number of students in a given course or classroom, especially the number of students being taught by individual teacher in a course or classroom" Yusuf (2015), divided the term class size into three; large class size, medium class size and small class size. The large class size contains a population of 40 students and above. The medium has the range of 30 to 35 students per teacher, while the small class has a population of less than 20 students per teacher. One of the problems faced by the schools regarding this factor is the issue of overcrowding of students in a class. Overcrowding is said

to occur when the number of students in a class surpassed the designated one or when the ratio of the learners to the teacher surpassed the standard in such a way that it can cause hindrance in the process of teaching and learning. The Cambridge dictionary (2019), defined "overcrowding as "a situation when a place contains too many people or things"

Numerous researches have been conducted on the effect of overcrowding on teaching and learning. Iqbal (2012) conducted a research at Khyber Pukhunkhwa, Pakistan, which he titled "overcrowded classroom; a serious problem for teachers" he found out from the research that teachers in the overcrowded classes face some difficulties which include insufficient space between rows in the classes, improper sitting arrangements, inability to maintain discipline, loss of control of the class and inability to pay attention to the each and every student in the class. This shows that there is relationship between students' performance, overcrowding and the physical wellbeing of the classroom.

2.1.8.2 Furniture and Sitting Arrangements as Factors of an Ideal Learning Environment

Another important factor of the learning environment is the furniture and the sitting arrangement of the class. This consists of the seats, desks, shelves and how they are designed, arranged and positioned in the classrooms or any other learning rooms. "Classroom sitting arrangement set the overall atmosphere, or mood for any given classroom, and set the stage for teacher-student relationship. Apart from that, it also provides a framework for the learning environment, where it can foster the learning experience as much as hinder it" (Woodson 2013). When arranging the furniture in a classroom, the desks should be at comfortable height of the learners to enable them write comfortably to avoid backache or any other disorder. The students should have a place to keep their belongings safely. And the arrangement of the seat should be in such a way that no student obstructs another's view due to seat construct and allow

the teacher to see clearly what each and every student is doing. Sitting posture can also affect the students by either reducing or increasing his activeness in the classroom.

> *In a normal school environment, many factors influence the students' sitting posture. The factors include the anthropometric dimension of school children as well as measurement and design of the school furniture School children are repetitively exposed to the hazards of abnormal or awkward postures because of classroom furniture that is often too large or too small which can affect their academic performance, effective learning., because uncomfortable and awkward body postures can decrease students' interest in learning, even doing the most stimulating and interesting lessons*. (Castellucci, Arezes, Molenbroek, De Bruin & Viviani 2016),

Also, in arranging the seats in the class, different approaches can be considered; the seats can be arranged in a u-shape/horseshoe shape, straight rows, or cluster/group seating. "The u-shape arrangement allows students to be more engaging but talk less, while students tend to be passive learners mostly in the straight rows and the cluster seating support students collaboration but on the other hand, reduces teacher control and promote social interaction that can negatively affect learning" (Mabiag, Luig, Miranda & Francia 2019). More so, apart from how the students sit in the class, whom they sit next to is another factor that needs the teachers' attention. Hilal (2014) found out from a research conducted, that students tend to be more tolerant In terms of personal space when they sit next to their close friends and concentrate more when they sit close to the teacher. Also students when they sit in rows, tend to be more attentive and more concentrated but participate more when their sit arrangement is u-shaped.

2.1.8.3 The Teacher's writing Board

When a teacher or instructor teaches mathematics, he may intend to write a formula, solution or steps of approaches or even some important points or definition. In a mathematics class, the idea of teaching and writing on the writing board cannot be overstressed. There are different types of teacher writing boards used in Nigerian secondary schools; writing whiteboards and writing chalkboards are the ones used by the teachers to write on in the process of teaching while display boards, pin-up or bulletin boards, magnetic boards, perforated boards as well as the flannel boards are also used in the learning environment. Other notable boards are the power point projection and the interactive white boards. On the other hand, there is this argument of whether the use of blackboard is more effective than other means (such as the power point) or not. Hendry (2015), opined that;

> *Using a slide to show information that has been pre-printed on it to students is like handling them information down from a high, while writing and talking while inviting them to talk about an information means developing the information together. There is huge advantage of teach and talk if you are teaching mathematics or economics.*

If the board the teacher writes is clear and visible, the rate of students copying wrong formulas, solutions, short notes and so on, would be reduced and the class will not be too boring to the learners. Nwabawa (2016), found out from the study conducted that integrative and dynamic blackboards are more suitable for enhancing students' academic performance at all level.

2.1.9 Relationship between Variables

The variables in this study are related, and the conceptual relationship that exists between them can be represented below;

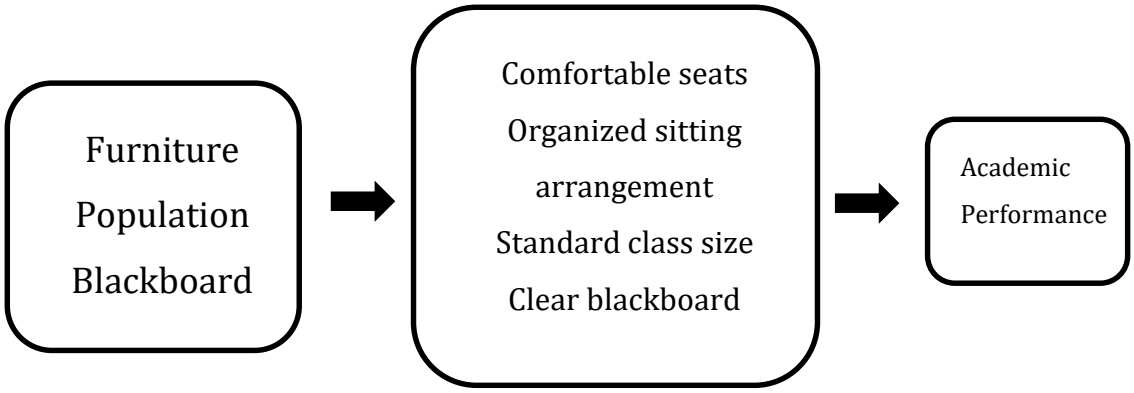

Figure 4.0 The influence of learning environment on students, academic performance in mathematics

2.1.8 Brief Overview of Chanchaga Local Government

Chanchaga local government is one of the two local governments that make up Minna, the

Capital of Niger state. It has a total landmass of 72km^2 with a human population of 201429 according to the 2006 census also shares boundary with Paikoro, Munya, Bosso, and Shiroro local governments of Niger state. (Wikipedia) Also the headquarters of the local government is located at stadium road in the middle of Minna.

Chanchaga local government lies on the longitude of $9^0$37'N and longitude 633'E, on a geographical base which has a basement complex rock of mainly quarries and magnetite situated at the base of hills that are landmarks in an undulating plain. That is, the topography is mountainous. Chanchaga local government is very rocky and a climate typical of the middle belt zone. It has a mean annual rain of 1334mm which is equivalent to 52 inches. The rainy season in the town starts around April and continued to September. The local government was created same time with Niger state in 1976, it was recognised by the federal government in the year 1989 and split into three by the Ibrahim Badamasi babangida administration in 1991. (chanchagalga.ni.gov.ng). The land contain mineral resources such as gold, clay, talc, granite,

marble, dolomite, iron ore, copper, columbite, etc., it is also blessed with agro raw materials such as sorghum, groundnut, maize, mango, shear butter, sheanut, , and cassava among others. (chanchagalga.ni.gov.ng). The local government has many railway networks that connect it to the other local governments of Niger state and extended to other parts of the country, and also it is proximate to the capital of Nigeria, Abuja, This make it very strategic. It also accommodate many of the Niger state administrative building including the state's secretariat, house of assembly complex, the state's library and stadium, and also the state's central market among others. The local government also accommodate some public secondary schools such as Hill-top model school, Limawa model school, Zarumai model school, Women day college Minna, government girls' secondary school, government vocational training centre among others. There also prominent religious institutions in the local government. The main inhibitors of the local government are Gbagys but also presence are many Nigerian tribes like the Nupe, Hausa, Fulani, Kambari, Dibo Yoruba, Igbo, and so many others from other parts of the state and Nigeria at large.

2.2 **Theoretical Framework**

The relevant theory to this work is Gardiner's model of conceptual systematic change. In the theory, Gardiner (1989) suggested the relationship between the factors that influence students in technology learning environment and therefore developed a model. According to the model, three overlapping circles which he named the sociophere, ecosphere and tecnosphere are the factors that affect the learning activities of individual. This was represented in figure 1.

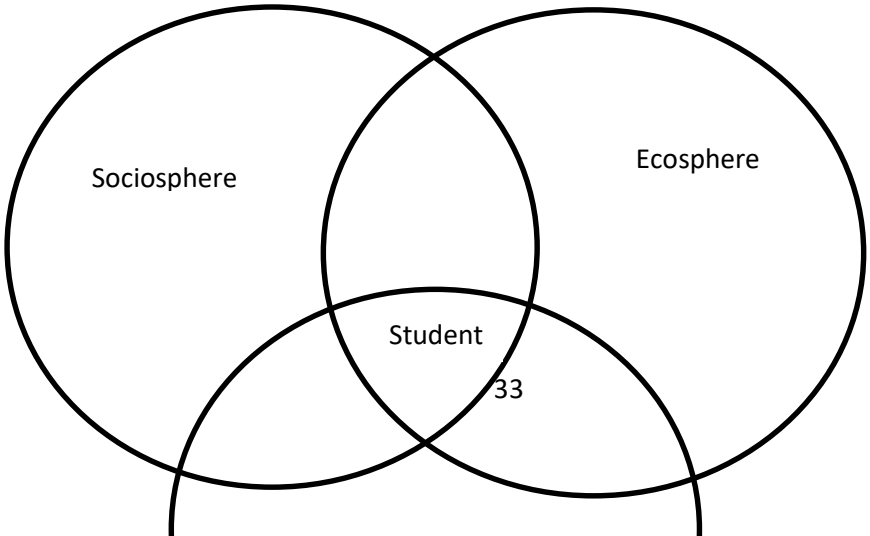

Figure 1.0 Gardiner (1989) Model of conceptual systematic change

Also, according to Gardiner (1989), the sociosphere refers to the individual's interaction with others within the environment. The ecosphere was associated with the individual's physical environment and surrounding and tecnosphere was a manmade learning environment (the present and the future). Gardiner positioned the individual person (student) at the middle and described him as the most complicated component of the system. This shows that a student in influenced by the social, physical and the technological components of the environment.

This theory was later reviewed by Zandvliet (1999), and named it conceptual model of potential factors influencing student satisfaction. He modified Gardiner's terms with words that were clearer and straightforward. The ecosphere was modified as classroom physical environment, the sociosphere as the classroom psychosocial environment and the technosphere was modified to educational technologies. The physical environment consists of air quality, furnishing, teaching and learning equipment, lighting, and space. The psychosocial environment consists of task orientation, involvement, cooperation, autonomy and cohesion. And the diagram was modified as shown below;

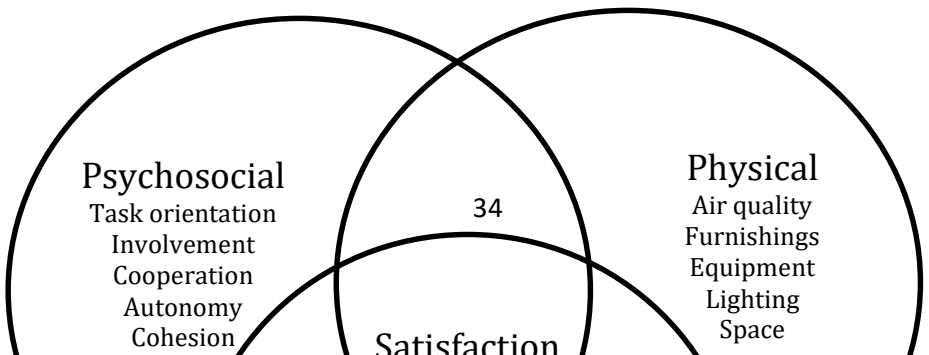

Figure 2.0 Zandvliet (1999), conceptual model of potential factors influencing student satisfaction

Therefore, this study, influence of learning environment on students' academic performance in mathematics is built on this model and shall investigate particularly, the ecosphere component.

2.4 The empirical Studies

The issue of academic performance of students has been a topic of study for long. And researchers have continued to make efforts especially in the subject of mathematics. This is due to the importance of the subject in the field of science and technology and the life on one hand, and the numerous challenges facing the teaching and learning of the subject. In this study, numerous literatures on topics related to the influence of learning environment on academic performance in mathematics have been reviewed and studied empirically. This gives the researcher the insights on how the previous researchers approach the problem, how the resources, methods, design and instruments were been selected, adopted and utilized in their work. In addition to this, it helped the researcher to understand and learn from the achievements, accomplishments, lapses or shortcomings of the previous researches. The following are the literatures revised in this current work;

Sang (2013), conducted a research in Uasin Gishu County, Kenya which he titled "Effect of classroom environment on academic performance in mathematics in pre-school children" the researcher applied the method of survey as his research design. The aim of the study was to find out the effect of instructional materials, furniture and air circulation on the academic performance of pre-school children in mathematics and to compare between the schools that possess those factors and those that don't. The population of the study targeted eleven (11) public schools, fifty two (52) private schools, 129 preschool teachers, 990 preschool pupils and 63 school administrators of the Uasin Gishu County of Kenya. The sample represented 30% of the population which contains four public schools, sixteen private schools, thirty eight preschool teachers, nineteen administrators and two hundred and ninety seven preschool pupils selected through a stratified random sampling. The sampling technique adopte was stratified and purposeful random sampling. The instrument employed by the researcher was the observation, where he went to the scene and an interview, where he interviewed the preschool teachers and the school administrators. Finally, experts validated the instrument at different occasions and two types of reliability check were established by the process of the test and retest and inter-rater reliability. The result indicated that almost 70% of the teachers were well trained, competent for the job and experienced, but inadequacy of learning materials, size of the classes, and absence of students were the factors that affect the preschool pupils' performance in mathematics. Comparing this work with the current study, Sang focused on pre-school children who mostly learn from pictures and shapes and the area of study was Kenya. While the study in process focuses on secondary school students who are at their adolescence stage of life in Nigeria.

Also, Duruji and Oviasogie (2014), conducted a research which tends to find out how the learning environment can affect the students' performance in their external examinations in secondary schools in Ota, Ogun state. The objectives of the research from which the research

questions were formulated was to find the relationship between the learning environment and academic performance in secondary school external examination and the degree of the effect it may cause, and also to compare learning environment between the public and private schools. The methods of data collection used in the research are the use of document materials which contains the records of students' performances in their external examinations from 2009 to 2013 obtained from a sample of three private and three public secondary school, Interviews with the principals and the examination officers and some still pictures of the schools environment after visiting and examining the classes, libraries, laboratories, furniture and equipment, offices, sporting equipment, and conveniences. The findings from the research showed that the learning environment has a significant relationship with the academic performance of students in secondary schools. Additionally, the private schools have better learning environment and perform better in the external examinations than the public schools which have more population and less infrastructure and equipment. But one limitation about this study is that the use of results obtained from external exams cannot be used alone to generalize the effect of physical learning condition on academic performance because it is not new that at most time, most private schools prepare and train their students better against external examinations than public schools. Even though the work also focused on the learning environment, it was aimed at investigating its effects on the achievement of students in the external examinations while this focuses on the students' performance in the tests and examinations set internally, which is organized by the teachers within the school. Additionally, the study focused on SS3 students while this shall focus on SS1 students.

Next is the study conducted by Shamaki (2015). The research was carried out using the method of descriptive survey and experiment designs to find the influence of some components of learning environment on students' academic achievement in Mathematics. The experimental group learns in a dull environment while the control group learns in an ideal environment. The

targeted population of the research was 1682 students in Potiskum Local Government Area of Yobe state from where a sample of 337 students was selected randomly. Also, the researcher adopted a structured questionnaire and an achievement test to collect data. More so, the achievement test was conducted after he taught the students (both the experimental and the controlled) for two weeks for the purpose of the research. The data was analyzed by inferential and descriptive statistical analysis. The result indicated that the components of the learning environment which include lightening, temperature, sitting arrangement, air quality and facilities do affect the learning environment of students' achievement in mathematics. Also it was found from the study, that there is significant difference between the mean score of students taught in ideal learning environment and those taught in dull learning environment. This literature has a limitation, in the process of carrying out the experimental aspect, the researcher taught the experimental and the control groups in two weeks. The factors the study investigated are almost similar to this but he made the use of an achievement test which he conducted after the students were taught in an experimental condition and two weeks study might not be enough to generalize the usual performance of the students because the students if noticed that they were been observed, they might try to focus more and perform better than normal. On the other hand, this work shall investigate the performance of the students from their normal classes and studies which shall be achieved by collecting the students' record from their various schools. Also the research was carried out in Yobe state and focused on students' academic achievements while the current work shall be conducted in Niger state and shall investigate the issue of academic performance.

Another research by Akomolafe and Adesua (2016), which was aimed at examining the significance of physical facilities in enhancing students' motivation and academic performance in secondary schools in the South West Nigeria, indicated that there is significant relationship between the school physical facilities and the students' academic performance, and improved

facilities can motivate the students and make a positive impact on their performance. The research hypothesized that there is no significant relationship between the physical facilities of school and the academic performance of students in secondary school. The designed employed by the researchers was the *ex post facto* which allowed the researchers to find the cause and the effect of relationship between variables. The research adopted a sample of one thousand and fifty senior secondary schools in Osun, Ondo and Ekiti states which covered the population of the secondary school students from the six states of western Nigeria. The instruments used were a questionnaire which was divided into three parts and an inventory of 2012 WAEC results of SS3 students. The instrument was validated by experts and the instrument for reliability was testy-retest method which achieved a coefficient of 0.85. The results from this research has two limitations, first, the inventory used was the result of an exams set by external body, the failure or achievements un this record can be due to many factors such as failure to cover the syllabus, anxiety of the students due to strange faces and conditions etc., and even the teachers factor. Additionally, even though the physical facilities can motivate students, the cause of motivation among students may be psychological, which initiate from home, by peers or even the teachers themselves.

Next is the research work by Okafor, Maina, Stephen, Ohambele (2017) from the department of architecture, Ahmadu Bello University, Zaria. The research was aimed at investigating the impact of school environment on students' academic performance by comparing the performance record of students who learn in buildings that were designed purposely for teaching and learning and those converted from residential to school. The method adopted by the researchers is the case study type of three schools in Zaria. The population covered all SS I and 2 students of Zaria local government and a sample of 255. The instruments used in the research are questionnaire that collected data of the type of building of the schools and how the spaces and design can affect performance of students, physical measurements of classroom

spaces and the principals were interviewed. The questionnaires were analyzed after completion with the aid of SPSS. The results from the questionnaire indicated that visual comfort, spaces in the schools and the classes, quality of indoor air, noise, school appearance and day lighting are some of the factors affect the performance of the students. While the result from the interviews with the principals showed that noise from conveniences, playground, laboratory, staffrooms, noise from the streets, absence of some instructional material and technical workshops, bad smell from toilets and homes affect their performance. Even though but this study and the study in process are all about the physical learning condition, the purposes differ as this was about the effect of a building that was not initially built for the purpose of teaching and learning and the one that has been set originally for teaching and learning purpose.

Next is the research conducted by Belaineh (2017). The research was titled "students' conception of learning environment and their approach to learning and its implication on quality education. The aim was to evaluate the learning environment and its implication on quality education from Mizan Tepi university students perception and to examine the students learning approach. The population of the study targeted 4693 students of Mizan Tepi University, Ethiopia. The sample of the study was 414 which was obtained in three steps. A purposeful stage that selected all the faculties, departments from the faculties were selected by a simple random sampling while individual students were selected stratified sampling questionnaire was used by the researcher as instrument with the aid of inventory for students that measure the learning approach of the students. The data was analyzed using SPSS, PPMC, and ANOVA. The result from the findings indicated that the teachers' activities in the learning environment and the approach the students employ are directly and strongly related. Also it shows that students tend to perform well when they perceived the learning environment as supportive and perform low when otherwise. This reviewed work focused on the university

students, their learning approach and the teachers factors in Kenya, while the current work focused on the physical factors at the secondary school level in Nigeria.

Next is the research conducted by Malik and Risvi (2018). The research was aimed at examining the perception of secondary school students on the effects of classroom learning environment on their academic performance. The area of study of the research was Rawalpindi and Islamabad, Pakistan. The population covered all the secondary schools within the scope of the study. 516 students from 27 mathematics classes were randomly selected from 24 secondary schools that were also selected randomly. The researchers used a questionnaire as instruments and the students' achievements records of one session. The instrument was validated by experts and the reliability of the instrument was 0.85 as measured using *Cronbach Alpha*. Finally, the data was analyzed in order to find the relationship between the variables, that is, the learning environment and the mathematics performance of the students with the aid of Pearson r, regression and ANOVA. The results of the study showed that involvement of students during teaching have significant effect over academic performance of students than personal relevance, teacher support, cooperation and emphasis on understanding. While investigation and equity have no relationship with students achievement in mathematics at secondary school level. The current research aimed to adopt many of the methods adopted here but the aims of the two works vary in the following ways; this study focused on the psychological component of the learning environment while the current work aimed at the physical components. The study was conducted at Pakistan while the current work shall be conducted in Nigeria, and Nigeria and Pakistan have different educational and economic status, educational policies and cultures.

Next is the research conducted by Ezike (2018), the study was titles "classroom environment and academic interest as correlates of achievement in senior secondary school chemistry in Ibadan south west local government area, Oyo state, Nigeria. The researcher adopted a

descriptive survey research method and a correlational approach. The target population for the research was all the SS2 chemistry students in the twenty nine senior secondary schools in Ibadan South Local Government Area. A random sampling technique was also adopted where 208 senior secondary school students were selected for the study. Also, the study adopted three instruments; questionnaire which was used to collect data from the students, Students' academic interest scale which covered factors such as motivation, organization, self-awareness and responsibility and a chemistry achievement test. The results from the investigation showed that there is positive significant relationships between classroom environment and academic achievements and also it discovered that a significant relationship exist between academic interest and achievement of students in chemistry. On the other hand, the result also showed that the combination of classroom environment and academic interest of students predicted achievement in chemistry at senior secondary school level. One limitation to this study is that the researcher used a test developed by him for the population, this cannot be used to generalize performance or achievement of the students in chemistry but for conditions like placement and so on. Also the current study tends to focus on mathematics which is totally different in nature from chemistry in many ways such as abstractness, perceptions, phobia…

Next, the topic of influence of learning environment was also addressed by Fidelis, (2017). The study was titled "learning environment as correlate of students' academic achievement in junior secondary school integrated science" and was based on the hypothesis; there is no significant relationship between mean perception of students on their classroom environment and their academic achievement in integrated science. The study was conducted by the means of correlational design study. The population also covered all the JSS2 integrated science students of 0gbo-Egbema-Ndoni Local Government Area of Rivers State. 4 schools with 2000 students were selected from the population by a simple random sampling technique. The instrument adopted for the research was four point likert-type questionnaire and the students' end of year

scores in integrated science. The instrument was validated by experts. The result showed that there is low mean perception of students of integrated science on their classroom environment and there is also a positive perception between the mean perception academic achievements of the students. But something worthy of noting here is that the study reviewed concentrated on junior secondary school students, psychological components of the learning environment and integrated science while the current study shall focus physical components of learning environment, mathematics and SS1.

Despite the numerous literature revised, it can been that the impact of learning environment on students' academic performance is yet to be found as most researchers concentrated on academic achievement and ignored the performance from which the achievements is developed. Therefore, more study should be done on learning environment and its influence on the performance of the students at secondary school level. In other to achieve that, this research ought to use the secondary schools of the same type, that is, all public schools who have equal maintenance and whose teachers are mostly transferred from one to the other by the ministry of education. The study shall use the termly assessment of these schools, these are assessments made by the teachers within the schools and these can give more accurate figure of the performance of the students and the Magnitude of the influence of the environment rather than external examinations which always have special preparation from the stakeholders of every secondary school.

2.5 Summary of Literature Review

As clearly seen in this chapter, this research is built on the model of conceptual systematic change and conceptual model of potential factors influencing students' satisfaction. Also In this chapter, the issue of academic performance and some factors that associate with it have been clarified. More so, the concepts of learning environments, ideal learning environment

and their factors have been efficiently been addressed. Additionally, Learning, its concept and theory have been attended to in like manner after a detail explanation of mathematics, its teaching and learning, challenges and prospects. Besides, a brief description of the area of this study has been provided.

In the last part of this chapter, empirical works have been carried out on some of the previous literatures that are related to this work. The researcher studied, analyzed and objectively criticized this works and found a reason to carry out new studies at different region with more suitable method and manner of approach which shall efficiently fill the gap. Most of the work reviewed focused on students' academic achievements which is been measured by standard tests or examinations prepared mostly by national bodies. It is always known that many schools make special preparation for the standard tests and examinations such as the West African Examination Council (WAEC), National Examination Council, (NECO), Joint Admission and Matriculation Board (JAMB), and so on, and this help the students to perform more than usual. Some students attend external lesson classes just for the sake of passing these standard examinations. Therefore, the results obtained from these examinations do not always showcase the real performance of the students in mathematics. And some of the work reviewed organized an achievement tests on which their work depends on. This also cannot give the real and clear picture of what the performance of the students is because a single test which is not standard cannot be fear enough to explain students' understanding and performance. Some also conducted their research on SS3 students who have spent more than two years in the senior secondary level and might have identified some of their weaknesses and worked towards it. Therefore, this work focuses on the students' performance which is determined by what the student does within the term or session and measured by a local tests or examinations made by the teachers. This shall give the clear picture of the students' performance in their local and less prepared examinations. And the work shall use the SS1 students who spend less than a

year in the senior secondary category and who are still under control of many factors that affect learning and performance.

To achieve this, the researcher tends to gather data by three means, the use of questionnaire, observation and the students' performance in mathematics for a complete term.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

In this chapter, the methodology and procedures used in conducting the study on the influence of learning environment on students' performance in mathematics is presented. The chapter explains the research design, area of study, population, sampling design, the research instruments, method of data collection, statistical analysis, pilot study and finally summary.

3.1 Research Design

Design can be described as an outline, a general arrangement or plan from which something may be made. (Gambari, 2017). The design adopted in this research is cross sectional survey type of descriptive research. It was used because it gives the opportunity to collect data from large number of students about some components of learning environment so as to find out their opinion, interests, and attitude preferences by administering a well-structured questionnaire. The record of the students' scores in mathematics for a session was obtained from their various schools. This will enable the researcher to find out the performance of the students. The researcher also snapped the pictures of the students' classrooms.

3.2 Population of the study

According to the Niger state ministry of education, the number of public schools in Chanchaga local government and their total population is 9 and 4480 respectively. Therefore, the population of the study is the entire SS1 students of public schools in Chanchaga local government of Niger state. Three schools were targeted; Government Day Science College, Tunga, Government Girls Day Secondary School, Minna, and Day Secondary school, Limawa.

The distribution of the population is presented in table 3.1

Table 3.1

Name of school	Population
Government Day Science College, Tunga.	670
Day Secondary school, Limawa.	376
Government Day Secondary School, Minna.	144
Total	1190

Source: Niger state ministry of education

3.4 Sample and Sampling Techniques

The sample of the research is 299. It was obtained using the Yaro Yamane formula for finite population; $n = N / 1 + N (e)^2$

Where n= sample size

N= the finite formula

e= level of significance

1 = unity (constant)

This gives $\frac{1190}{1+ (1190)(0.05)^2}$

= 299.37

=299

The three schools were purposely sampled out according to their location in the local government, that is, each from different part of the town. The technique used in sampling is the simple random sampling. The researcher used a simple balloting system where the three schools were arranged in alphabetical order, then the letters A,B,C where written separately on three different papers and mixed in a container. Then the first paper that was picked out of the container was attached to the first school and the second to the second school then the last was attached to the last school on the list. The letters ABC represent SS1A, SS1B and SS1C respectively.

GDSCT ---------- SS1A

GDSSM ----------SS1B

LMSM----------SS1C

3.5 Research Instrument

The instruments used to obtain data are;

Research questionnaire: A Likert questionnaire named “Learning Environment Questionnaire” was administered to the sampled students. The questionnaire contains

15 items. 5 for classroom temperature, 5 for seats and sitting arrangement and 5 for classroom population and the classroom black board.

The students' performance records for one session.

Photographs of the classes were taken after observing the classrooms.

3.6 Validity of the Research Instrument

Copies of the questionnaires were scrutinized for content, organization and ambiguity by experts from the Federal University of Technology, Minna. It was validated after some observations and recommendation were made and effected, which involves paraphrasing and dropping of some items.

3.7 Reliability of the Research Instrument

The researcher, in other to obtain consistent results from the instrument, used the test and retest technique where the same instrument was administered to the same participants at different times. Also the photographs were obtained by different observers. The questionnaire has a Pearson correlation coefficient of 0.79.

3.8 Method of Data Collection

As mentioned earlier, the instruments used to collect data in the study were structured questionnaire as well as students' performance records for one session including some photographs of the classes where the students learn. Therefore, the research instruments were administered as follows;

300 questionnaires were administered directly to the selected sample. All the students completed and returned the questionnaires to the researcher with the help of a school teacher.

During observation, the researcher went to the school, observed and recorded the kind of chairs and the sitting arrangement in the classes, the availability of fans and windows, the clarity and the position of the class board. Also, the population of the students was obtained from the CA form obtained from the examiners of the various schools.

3.9 Method of Data Analysis

Data analysis is the statistical technique or tools employed in analysing a research data. (Gambari, 2017). The information obtained was gathered, analysed and summarized.

Questionnaire: The data collected using the questionnaire was subjected to descriptive statistical analysis by computing the Mean and the Standard Deviation (SD) of each of the items using the Statistical Package for the Social Sciences (SPSS). For it used the 4 point scale, the decision rule was to reject an item whose mean falls below 2.5. The data from the observation was recorded and tabulated. Also the record of the students' performance in mathematics for a term was obtained from the examiners of the various schools, the scores of each school were summed up and the mean score was calculated and compared.

CHAPTER FOUR

4.0 DATA PRESENTAION AND ANALYSIS

Statistical and non-statistical methods were used to analyse the raw data collected from the field through observation and questionnaires in both qualitative and quantitative manner. Therefore, the research analysis is presented in the form of tables after which recommendations and conclusions were made. The qualitative findings are the observation made by the researcher during the research study on the influence of learning environment on the students' performance in mathematics. While the quantitative findings are responses obtained from the students by the use of the questionnaires.

4.1 Observation

In the process of this research, the researcher visited the three schools and made several observations. Table 4.1 displays the result of the observation.

Table 4.1: Result of the observation

Schools	Window Glasses or Panes	Fans	Type of Seats	Type of Sitting Arrangements	Place to Keep Belongings	Type of Board used in the class	Clarity of the class board	Class Popula-tion
A	Absent	Absent	Long benches and desks	Horizontal	Students keep bags on the floor in their laps.	Chalk and Blackboard	Poor	Above 80
B	Absent	Absent	Long benches and desks	Horizontal	Students keep bags on the floor in their laps.	Chalk and Blackboard	Poor	Above 80
C	Present	Absent	Long benches and desks	Horizontal	Students keep bags on the floor in their laps.	White board and marker	Clear	Below 80

4.1.1 Classroom Ventilation

During the visit to the school, the researcher observed that the SS1 classes of the two out of the three schools have no windows glasses or panes to regulate the temperature during cold season, and this may have an implication on the class conduciveness especially during mathematics classes since it's usually taught at the early hours of the days. Also, none of the classes of all the schools has a fan or electricity supply.

4.1.2 Seats and Sitting Arrangement

In all the three schools visited, the students use the long benches and desks to seat and write on respectively. These long benches will not support any sitting arrangement except that of the traditional horizontal arrangements which does not support group learning and has some limitations in the process of teaching and learning mathematics. Also, the seats are not enough for the population of the students in the classes. In one of the schools, some of the classes have no single seats in it and some with only two to three benches and desks, these always force the students to vacate the classes and move to the next class which also suffers from insufficient

seats. Also the students sitting at the back benches don't see clearly what is written on the board and sometimes don't focus on the lesson since the teacher cannot clearly see what they do if he stands before the board.

4.1.3 Black Board's Clarity and Position

Two of the three schools visited use the blackboard and chalk method while the other one uses the white board and marker. For those that use the blackboard, the board paintings make the writing blurred, and therefore, not clear. And for all the three schools, it was observed that the students sitting at the back get obstructed by those sitting at the front. But the board was well positioned at the middle.

4.1.4 Classroom Population

The population of the students in all the classes observed was above 80. In one of the schools, students from different classes gathered in one class with available benches and desks.

4.2 Answers to the Research Questions

The researcher analysed the data obtained from the Learning Environment Questionnaire (LEQ) with the help of the SPSS and presented it as follows;

4.2.1 Research question 1: To what extent does the classroom ventilation affects the performance of students in mathematics at their end of term examination?

Table 4.2: the mean and Standard Deviation of responses of the students with regard to the classroom temperature

	My classroom	**My classroom**	**High temperature**	**The classroom ventilation**	**At times, I preferred staying**

	is well ventilated	temperature is conducive	makes the class uncomfortable	affects my performance in mathematics	outside because of the classroom temperature
Mean	2.97	2.37	3.08	2.92	2.88
Standard Deviation	1.039	1.002	1.005	1.129	1.014
	Accept	Reject	Accept	Accept	Accept

Table 4.2 indicated that the respondents agreed that their classes were ventilated but not conducive, and both the classroom ventilation and temperature affect their performance in mathematics and make them feel uncomfortable respectively. This seems like there was a contradiction, no, the responds was due to the fact that all the classes have opposite windows which allow the free flow of air but the temperature and other factors of the weather cannot be controlled due to the absence of the windows pane/glass and fans.

Also, from table 4.2, it can be concluded that despite the classes of the students were averagely ventilated due to the windows that are available and fairly conducive especially when the weather is not hot, high class temperature really affects the students' performances in mathematics.

4.2.2 Research question 2: To what degree is comfortable seats and well organized sitting arrangements influence students' performance in Mathematics?

Table 4.3: Mean and standard deviation of students' responses with regards to seats and sitting arrangements

	There are enough seats in my classroom	There are enough spaces to keep our belongings in the classroom	The seats in my classroom are well arranged	Good sitting arrangement can improve the understanding of mathematics	No student obstructs another's view due to seat construct
Mean	1.83	2.01	2.26	3.49	1.67
Standard deviation	1.070	1.079	1.088	0.801	0.849
	Reject	Reject	Reject	Accept	Reject

The results from the table 4.3 displayed that the mean of the students who accept that their class has enough seats and those that agreed that there was enough spaces to keep their belongings is only 1.83 and 2.0 respectively, therefore, it means both were rejected. The respondents also disagreed that the seats in their classes were well arranged and no student obstruct another in the class. But majority of the respondents agreed that good sitting arrangement can improve their understanding of mathematics and hence perform better.

Therefore, it can be concluded that the classes have inadequate seats, have no spaces for students to keep their belongings, the seats are not arranged and students obstruct one another in the classes due to seat constructs. And finally, the students can do better if all the aforementioned factors are fixed.

4.2.3 Research question 3 and 4: To what extent is the population of a class and the blackboard painting and clarity affects the understanding of Mathematics?

Table 4.4: Mean And standard deviation of the students' responses with regards to the population of the class and the clarity of the board

	The population of the students does not affect learning of mathematics	High population in my class makes the class uncomfortable	I can perform better when the population is less	I can see clearly what the teacher write from my sitting position	Dull board painting affects my understanding of mathematics
Mean	1.74	3.01	3.49	2.97	2.23
Standard Deviation	0.956	1.081	0.793	1.039	1.061
	Reject	Accept	Accept	Accept	Reject

The data in table 4.4 indicated that the students when asked whether popultion does not affecty their learning of mathematics disagreed with a very low mean of 1.74. But they strongly agreed that high class population makes them uncomfortable in the class and with less population they can do better in mathematics with a mean of 3.01 and 3.49 respectively. lastly, they disgreed when they were asked if dull board affects their understanding of mathematics

4. 3 Students' Mathematics Performance

Below is the statistical analyses of the students' performance record which was obtained from the examiners of the various schools.

Table 4.3: Mean of the students'academic performnace in a term

	Number of students recorded	Sum of the scores recorded by the students in a term.	Mean Score
School A	88	3982	45.25
School B	88	2523	28.67
School C	88	5312	60. 36
Total	264	11817	44.76

The results from table 4.3 indicated that the performance of the students in two of the three schools in the term is below average. And genarally, the SS1 students of the three schools

performed below average. This was due to the inadequate seats in their clasroom, high population of students in the classes, inappropriate sitting arrangements in the classes, poor ventilation and absence of clear board. Also, the students in school C with less class population, average number of seats with clearer board, obtained the highest marks and therefore have the highest mean.

Therefore, this result indicated that schools with adequate and well arranged seats, clear board, good ventaltion and controlled temperature, less population, usually perform better academically in mathematics than those who lack the afforementioned.

Also, the study shows that classroom population and sitting materials recoreded the highest mean of 3.46, therefore, have more influence on the performance of students in mathematics the temperature followed them with 3.08, then ventilation and the least was the clarity of the board.

Additionally, the findings from the study agree with the study conducted by Shamaki (2015), which revealed that inadeaquate learning facilities are a common future in public schools and there is difference in the mean performance between those that learn in ideal environment and those learn in otherwise. It also agree with Chikasa (2014), Duruji and Oviasogie (2014) which found out that the physical factors of the schools affect the performance of the students.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

In this chapter, the researcher demonstrated whether the research work has answered the problems that were initially stated at the beginning of the investigation. The summary of the most significant results and findings of the research are discussed. Lastly, recommendations on what need to be done as a result of the findings were made.

5.1 Summary of the Research

The aim of the investigation was to find out the influence of the learning environment on the academic performances of students in mathematics in Chancahaga local government. Three research objectives to guide the study were made. The first objective was to find out if the learning environment influences students' performance in mathematics. Secondly, to identify some components of learning environment that affect the students' performance in mathematics. And finally to determine the level to which learning environment affects the academic performance of students at secondary schools in mathematics.

The nature of the study was descriptive and the research design adopted was survey. This design was selected in order to help the researcher understand the problem at hand in a systematic and in an objective manner. The population of the study was the entire SS1 students of Chanchaga local government. The population targeted three schools, but due to challenges in accessing and covering the entire SS1 classes, the researcher selected a representative sample through the random sampling technique and one class was selected from each of the three schools. The sample size was 300. Data was collected through observation, questionnaire and the continuous assessment sheet of the students. The collected data was coded and analysed using the Statistical Package for the Social Sciences (SPSS).

5.2 Conclusions

Based on the result of the study, the following conclusions were made.

Most of the SS1 classes at the public secondary schools in Chanchaga local government are ventilated, but have no window glass/pane, fan or have access to electricity to regulate the class temperature. Therefore some factors of the weather frustrate the students and make the class less conducive for learning and hence affect the students' performances in mathematics.

The seats in the classes were long benches and desks with no places for the students to keep their belongings, inadequate and also did not carter for the population of the students in the classes. These made the classes uncomfortable and therefore influence the academic performances of the students in mathematics.

The findings also indicated that the classes were overcrowded. This has a direct influence on the performance of the students in mathematics.

Also, the results showed that the students' performances in mathematics was below average, and was influenced by the learning environment.

5.3 Recommendations

One of the main challenges that were found out from this research is the issue of seats and sitting arrangement in the classes. Therefore, the authorities should strive to provide enough

and modern seats in the classes and also engage in some modalities that can take care of the broken ones.

Since the findings established that the classes were ventilated, the authorities should provide adequate resources to fix the glasses or panes to the windows so that the temperature can be regularised.

Also, the government should build more schools so as to carter for the growing population of Chanchaga local government.

Since the boards in the classes were well positioned, it should be replaced or repented frequently in order to be seen clearly.

The ministry of education should regularly supervise, record and upgrade the physical learning environment of the schools. Additionally, the government should increase the budget allocation to the schools.

Also, companies, philanthropies, non-governmental organisations should assist the government in identification, voicing out and funding the public schools.

5.4 Suggestion for Further Study

As discussed in the literature review of this work, there are numerous factors related to the physical environment that influence the academic performance in the secondary schools in Chanchaga local government which need further research. Therefore, the followings should be included in the further research.

Further research should be conducted to find out whether the effect of the learning environment on the academic performance is gender sensitive.

Further research should be conducted to check the government allocation and implementation of budget of secondary schools.

Further research work on the influence of physical learning environment on the academic performance of other subjects should also be conducted.

Lastly, further research should also be carried out on the effective and efficient seats and sitting arrangements in the classroom.

REFERENCE

Abubakar, A., Hilman, H., & Kaliappen, N. (2018). New Tools for Measuring Global Academic Performance. *SAGE Open July-September 2018: 1 –10.*

Adesoji, A. F., & Olatunbosun, S. M. (2008). Student, teacher and school environment factors as determinants of achievement in senior secondary school chemistry in Oyo state, Nigeria. *The Journal Of International Social Research Volume 1/2 Winter 2008.*

Adesua, V. O., & Akomolafe, C. O. (2016).The Impact of Physical Facilities on Students' Level of Motivation and Academic Performance in Senior Secondary Schools in South West Nigeria. *Journal of Education and Practice. ISSN 2222-1735 (Paper) ISSN 2222-288X (Online). Vol.7, No.4, 2016. www.iiste.org*

Ajayi, V. (2018). Difference between Assessment, Measurement and Evaluation in Science Education. *https://www.researchgate.net/publication/322908173*

Ale, S. O. & Adetula, L. O. (2010). The national mathematical centre and the mathematics improvement project in nation building. *Journal of Mathematical Sciences Education. 1(1)1-19.*

Ali, S., Haider, Z., Munir, F., Khan, H., Ahmed, A. (2013). Factors Contributing to the Students' Academic Performance: A Case Study of Islamia University SubCampus. *American Journal of Educational Research, 2013, Vol. 1, No. 8, 283-289*

Ambali, A. (2014). Mathematics is key to national development. *www.unilorin.edu.ng*

Amirul, A. J., Ahmad, C. N., Yahya, A., Abdullah, M. F., Adnan, M., & Noh, N. M. (2013). The physical classroom learning environment. *2nd International Higher Education Teaching and Learning Conference 2013, Malasia.*

Anaduaka,U. S., & Okafor, C. F. (2013). Poor performance of Nigerian students in mathematics in senior secondary certificate examination (ssce): what is not working? *JORIND 11(2) December, 2013. ISSN 1596-8303.* *www.ajol.info/journals/jorind*

Baig, F. (2015). Application of teaching methods in mathematics at secondary level in Pakistan. *Pakistan Journal of Social Sciences (PJSS) Vol. 35, No. 2 (2015), pp. 935-946.*

Belaineh, M. S. (2017). Students' conception of learning environment and their approach to learning and its implication on quality education. Educational Research and Reviews. Vol. 12(14), pp. 695-703, 23 July, 2017. Article Number: 6D2C41365248. ISSN 1990-3839.

Chirume, S., & Chikasha, A. S. (2014). A Critical Analysis of the Factors Affecting Achievement in Secondary School Mathematics in Zimbabwe: A Case Study of Gweru District. *Merit Research Journal of Education and Review (ISSN: 2350-2282) Vol. 2(9) pp. 194-202, Septembeer,2014.*

Daso, P. O. (2013). Mathematics education for sustainable development: Implications for scientific and technological literacy. *Academic Research International ISSN-L: 2223-9553, Vol. 4 No. 5 September 2013.*

De Silvai, I., Khatibi, A., & Azam, S. M. F. (2014). Home environmental factors affecting students' academic performance in Abia State, Nigeria. *Rural environment Education. Personality Jelgava, 7 – 8.02 2014.*

Dokubo, I. N. (2015). The Effects of Learning Environments on Vocational and Technical Education Programmes on Rivers State, Nigeria. *International Journal of Humanities Social Sciences and Education (IJHSSE) Volume 2, Issue 9, September 2015, PP 182-186 ISSN 2349-0373 (Print) & ISSN 2349-0381*

Duruji, M. M., Azuh, D., & Oviasogie, F. (2014). Learning environment and academic performance of secondary school students in external examinations: A study of selected schools in Ota. *Proceedings of EDULEARN14 Conference 7th-9th July 2014, Barcelona, Spain. ISBN: 978-84-617-0557-3*

Enu, J., Agyman, O. K., & Nkum. D. (2015). Factors influencing students' mathematics performance in some selected colleges of education in Ghana. *International Journal of Education Learning and Development Vol.3, No.3, pp.68-74, April 2015.*

Felix, O., & Charles-Ogan, G. (2017). Teaching mathematics creatively in the junior secondary classes. *Global journal of educational research. Vol 15, 2016: 1-6 ISSN 1596-6224*

Hendry, C. (2015). Chalkboard teaching in the age of technology. *Reflections The Best Of Teaching And Learning Services (2015 – 2016.)*

Ibem, E. A., & O. Owoseni, A. (2017). A study of students' perception of the learning environment: case study of department of architecture, Covenant university, Ota Ogun state. *Proceedings of INTED2017 Conference 6th-8th March 2017, Valencia, Spain ISBN: 978-84-617-8491-2*

Ibrahim, L. (2017). Contemporary issues in mathematics education in Nigeria. *Multidisciplinary Journal of Research Development, Volume 26 No 1, April, 2017-ISSN 1596-974X*

Khan, P., & Iqbal, M. (2012). Overcrowded classroom: a serious problem for teachers. *Elixir Edu. Tech. 49 (2012) 10162-10165*

Malik, R. H., & Rizvi, A. A. (2018). Effect of Classroom Learning Environment on Students' Academic Achievement in Mathematics at Secondary Level. *Bulletin of Education and Research August 2018, Vol. 40, No. 2 pp. 207-218*

Obaki, S. O. (2017). Impact of classroom environment on children's social behaviour. *International Journal of Education and Practice 2017 Vol. 5, No. 1, pp. 1-7 ISSN(e): 2310-3868*

Okafor, C. A., Maina, J. J., Stephen, H. & Ohambele, C. C. (2016). Impact of School Environments on Academic Performance: Feedback from Senior Secondary School Students. *Joint International Conference (JIC) on 21st Century Human Habitat: Issues, Sustainability and Development, 21-24 March 2016, Akure, Nigeria, page number 1175-1182*

Oladayo C. E., & Charles-Ogan, G. (2017). Mathematics education: a panacea for technological development in nigeria. *54th Annual conference of the mathematical association of Nigeria (man), Yaba college of technology, Lagos between 20th and 26th august, 2017.*

Özerem, A., & Akkoyunlu, B. (2015). Learning Environments Designed According to Learning Styles and Its Effects on Mathematics Achievement. *Eurasian Journal of Educational Research, Issue 61, 2015, 61-80*

Sakirudeen, A. O., & Sanni, K. B. (2017). Study habits and academic performance of secondary school students in mathematic: a case study of selected secondary schools in Uyo local education council. *Research in Pedagogy, Vol. 7, Issue 2 (2017), pp. 283-297*

Sang, C. J. (2013). Effect of classroom environment on academic performance in mathematics of preschool children in pioneer zone, Uasin Gishu county, Kenya.

Shahzadi, E., & Zahoor, A. (2011). A Study on Academic Performance of University Students. *Proc. 8th International Conference on Recent Advances in Statistics Lahore, Pakistan – February 8-9, 2011, 255-268*

Shamaki, T. A. (2015). Influence of Learning Environment on Students' Academic Achievement in Mathematics: A Case Study of Some Selected Secondary Schools in Yobe State – Nigeria. *Journal of Education and Practice. ISSN 2222-1735 (Paper) ISSN 2222 288X (Online). Vol.6, No.34, 2015.*

Shirley, M., & Capstone, M. (2017). The Effects of Overcrowding on Student Academic Performance in Kentucky High Schools. *Martin School Of Public Policy And Administration. (2017.)*

Sinay, E., & Nahornick, A. (2016). Teaching and learning mathematics research series l: Effective instructional strategies. (Research Report No. 16/17-08). Toronto, Ontario, Canada: Toronto District School Board.

Suleiman, Y., & Hammed, A. (2019). Perceived Causes of Students' Failure in Mathematics in Kwara State Junior Secondary Schools: Implication for Educational Managers. *International Journal of Educational Studies in Mathematics, 2019, 6(1), 19-33*

Travis, T. (2015). Defining and Measuring Academic Success. *Practical Assessment, Research & Evaluation, Vol 20, No 2015 234 21.*

Yandav, D. K. (2017). Exact definition of mathematics. *International Research Journal of Mathematics, Engineering and IT Vol. 4, Issue 1, January 2017. ISSN: (2349-0322).*

APPENDIX 1

LEARNING ENVIRONMENT QUESTIONNAIRE

(LEQ)

Instruction: Fill in your personal details in this section.

1. Name of School: _____
2. Type of School: _____
   (a) Mixed [ ] (b) Single [ ]
3. Age range: (a) 12 -13 [ ] (b) 14- 19 [ ] (c) 20 and above [ ]
4. Type of Student: (a) Day Student [ ] (b) Boarder [ ]
5. Sponsorship: (a) Private [ ] (b) Scholarship [ ]

SECTION B

Instruction: tick appropriate

Strongly Agree SA, Agree A, Disagree D, Strongly Disagree SD

S/N	QUESTION	SA	A	D	SD
1.	My classroom is well ventilated.				
2.	My classroom temperature is conducive.				

3.	High temperature makes the class uncomfortable.				
4.	The classroom ventilation affects my performance in mathematics.				
5.	At times, I preferred staying outside because of the classroom temperature.				
6.	There are enough seats in my classroom.				
7.	There are enough spaces to keep our belongings in the classroom.				
8.	The seats in my classroom are well arranged.				
9.	Good sitting arrangement can improve the understanding of mathematics.				
10.	No student obstructs another's view due to seat construct.				
11.	The population of the students does not affect learning of mathematics.				
12.	High population in my class makes the class uncomfortable.				
13.	I can perform better when the population is less.				
14.	I can see clearly what the teacher write from my sitting position.				
15.	Dull board painting affects my understanding of mathematics.				

APPENDIX 2

The form used to validate the instrument.

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF SCIENCE EDUCATION

Dear Sir/Madam,

Instrument Validation Form

The bearer is a student of the above named University and Department. He/She is conducting a research and you have been selected as one of those with requisite expertise to validate his/her instrument. Kindly grant him/her all necessary assistance to make the exercise a success.

Your competency and expertise was considered as factors that will serve to improve the quality of his/her research instrument. We therefore crave for your assistance in validating the instrument. The completion of the form serves as evidence that the student actually validated the instrument.

Thanks for your anticipated assistance.

Dr (Mrs) R. A. [illegible]
Head of Department (Signature, Date & Official Stamp

Head of Dept. Science Education
04 OCT 2019
Federal University of Tech. Minna

Student's Surname: ABUBAKAR Other Names: ALIYU BAKO

Registration Number: 2016/3/64491BE Programme: B. Tech (MATHS EDU)

Title of the Instrument: Learning Environment Questionnaire

ATTESTATION SECTION

Summary of the Remark on the Instrument:

Satisfactory

I hereby attest that the above named student brought his instrument for validation

Name of Attestor: DR. A. A. HASSAN

Designation: SENIOR LECTURER

Name and Address of Institution: SCIENCE EDUCATION DEPT. FUT, MINNA

Phone No: 08036276378 E-mail: hanan.ahmed@futminna.edu.ng

18/10/2019
Signature, Date and Stamp

Please Turn Over

Please comment on the following:

1. Appropriateness of the instrument for the purpose it's designed for: Appropriate
2. Clarity and simplicity of the language used: good
3. Suitability for the level of the targeted audience: Satisfactory
4. The extent in which the items cover the topic it meant to cover: Satisfactory
5. The structuring of the Questionnaire: Satisfactory
6. Others (grammatical errors, spelling errors and others): little editing required
7. General overview of the instrument: Satisfactory

Suggestions for improving the quality of the instrument

1. little editing on spelling
2. .....
3. .....
4. .....
5. .....

Name of Validator: Dr. A. A. Haron

Areas of Specialization: Mathematics Education

Name of Institution: FUT Minna Designation: Senior Lecturer

Signature: [signature] Date: 17/10/2016

Thank You

APPENDIX 3

This is the checklist in which the observed factors were recorded by the researcher.

Schools	Window Glasses or Panes	Fans	Type Of Seats	Type of Sitting Arrangements	Place to Keep Belongings	Type of Board used.	Clarity of the board	Class Population
A								
B								
C								

APPENDIX 4

Photographs of the SS1 classes in the schools