

IMPACT OF LANGUAGE LABORATORY ON ACHIEVEMENT AND RETENTION OF  
CHEMISTRY IN SENIOR SECONDARY SCHOOL STUDENTS IN BOSSO LOCAL  
GOVERNMENT AREA OF NIGER STATE

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2016/3/64473BE

A PROJECT SUMMITTED TO SCHOOL OF SCIENCE AND TECHNOLOGY OF  
EDUCATION, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD  
OF FIRST DEGREE OF TECHNOLOGY (B.TECH) IN CHEMISTRY EDUCATION OF  
FEDERAL UNIVERSITY OF TECHNOLOGY

NOVEMBER, 2019

## TABLE OF CONTENT

<b>Content</b>	<b>Pages</b>
Title Page	i
Declaration	ii
Certification	iii
Dedication	iv
Acknowledgement	v
Table of Content	vi
Abstract	vii

## CHAPTER ONE

<b>1.1 Background to the Study</b>	<b>1</b>
1.2 Statement of the Problem	8
1.3 Area and Objective	9

1.4 Research Question  
19

1.5 Hypothesis  
20

1.6 Significance of the Study  
21

1.7 Scope of the Study  
23

1.8 Operational Definition of Terms  
24

## **CHAPTER TWO**

**2.1 The Concept Of Technology**  
**26**

2.2 Concept of Language Laboratory  
27

2.3 The Concept of Academic Achievement 41

2.4 The Concept of Retention  
44

2.5 The Concept of Gender  
44

2.6 Theoretical Frame Work  
46

2.7 Empirical Studies  
49

2.8 Summary of Literature Review  
56

## **CHAPTER THREE**

### **3.0 Methodology**

**59**

#### 3.1 Research Design

59

#### 3.2 Area of Study

60

#### 3.3 Population of the Study

60

#### 3.4 Sample and Sampling Techniques

60

#### 3.5 Instrument for Data Collection

61

#### 3.6 Validation of the Instrument

61

#### 3.6 Reliability of the Instrument

62

#### 3.7 Administration of the Instrument

64

#### 3.8 Method of Data Collection

65

#### 3.9 Method of Data Analysis

65

### **CHAPTER FOUR**

#### **4.1 Data Analysis, Result, and Discussion Result**

**66**

#### 4.2 Presentation of Result

73

## **CHAPTER FIVE**

### **5.0 Discussion of Finding, Conclusion, Recommendation and Summary 74**

#### 5.1 Discussion of Findings

74

#### 5.2 Conclusion

75

#### 5.3 Educational Implication of Study

76

#### 5.4 Recommendation

77

#### 5.5 Limitation of the Study

77

#### 5.6 Suggestion for Further Study

77

#### 5.7 Summary of Study

77

## **APPENDIX**

80

## **REFERENCE**

## ABSTRACT

*The research investigated the impact of language laboratory on student's achievement and retention in some concepts in chemistry at senior secondary school in boss local government of Niger state. A quasi-experimental design of the pre- test post-test won equivalent research design was adopted. Four research questions and four hypotheses guided the study. A sample of 72 SSII students (32 males and 40 females) was selected from two schools. Test (test blue print and the test item (CAT) were face and content validated by experts in the field). Two instruments were used for data collection. They are chemistry achievement test (CAT) and Chemistry Retention Test (CRT) the reliability of the interment using kuder Richardson formula 21 (KR-21) and the reliability coefficient of 0.09 was obtained. It was formed that language laboratory is more superior to conventional lecture method in terms of student achievement and retention. It terms of gender male and female students taught with language laboratory achieved and retained almost equality. Finally it was recommended that language laboratory should be used in classrooms and should be regular workshops and in service training for teachers on the use of language laboratory and the need for adequate supervision to ensure effective implementation of chemistry curriculum.*

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Technology in all history of human existence ,there have been significant records that showed that some of the technology simplified the lives of humans in those generations, from the stones age to the iron age to the computer age. Technology has advanced and the use of technology has spread to all religions of the world .In Nigeria, we have embraced many technologies in the diverse sectors of our economy. However, some people still refuse to adopt technologies, preferring to stick to obsolete and more stannous ways of doing things suggesting that technology has done more harm than good, with the resources depletion and pollution among others. The fact still remain that there always two sides to issues but whenever the good overshadows the bad, it is best we should be adventurous about issues like this and effect it in our daily lives.

Some of the importance of technology in Nigeria and hopes to enlighten the minds in the use of technology in daily life process.

1. Technology enables production of high – quality products and services with less human resources
2. Technology simplified communication process that involve activities of sending and receiving messages with the advent of internet, email , Fax and

instant messaging platform

3. Learning is more fun and easily accessible with technology where learner can have access to learning materials and education from any part of the world. Through technology distance learning is possible, intensive and extensive research is possible knowledge sharing through various creative virtual platforms like YouTube , and Video is possible through e-database.
4. Technology has improved banking processes where online banking facilities ,banking mobile application, USSD code are available across all banks for easy and comfortable banking
5. Technology benefits businesses in Nigerian and the world through e-payment system which buying and selling are now done in a simplistic and comfortable ways using POS machine ,ATM cards among others.
6. Technology makes agricultural system more efficient and productive using tractors, ploughs, planters, ridges ,harvesters machineries and fertilizers have replace manure labour and farm implements like cutlasses and hoes, thus boosting the agriculture section and commercialized it to trade in international borders.
7. Technology facilitates collaboration and relationship with other nations. Also social media tools enable us foster our relationship with family and friends and also exposes us to make friends with foreigners without even leaving our country
8. Technology enhances the transportation of people, goods and services using



vehicle, ships , aeroplanes , bicycles , Motor bikes to delivered goods and services to their destination

9. Technology has created more employment opportunities like system analyst, database administrators, programmers, web developers and support engineers, application developer and software.
10. Technology has aid in better health care with modern health facilities like photo scan and x-ray technologies for diagnosis and treatment.

In conclusion technology has done more of good than bad because life become more easier and comfortable.

Technology is one of the greatest resources we have to help students to learn. While chemistry is a part of our everyday lives, students have found that chemistry can be difficult to understand. If a student is found to be weak in one area, additional support should be given to help that student strengthen their weak area so that they too can have an opportunity to realize their full potential. For teachers, finding time to provide additional support to help students overcome weak areas can be very difficult. Using technology as a way for students to build skills in weak subject areas will make it difficult in times of learning fun and enjoyable, but most importantly it will help students build the confidence they need to succeed. Technology is not only beneficial to struggling students; rather, it is beneficial to all students. By using technology, teachers can bring chemistry to life and students will be able to visualize abstract concepts and test newly learned concepts in chemistry. For 21st century learners, incorporating technology into the classroom is critical (Saba). Exposing students to technology while teaching

chemistry will increase their knowledge and help them build skills that will make them competitive in the STEM workforce (Strengthen Science Education and the Scientific Workforce - American Chemical Society). Active learning is facilitated through students' activities and by promoting student engagement. Redish et al, Demonstrated in a study with their students, that achieving significant gains is possible, using active learning as opposed to giving. During the application phase, students newly learned concepts are tested by applying the material learned to new situations. The application phase allows students to build confidence in what they have learned. Project-Based Learning (PjBL) is a method of teaching that facilitates learning through student engaged projects centered on concepts to be learned. During the process of working on a project; students are creating, questioning, and revising knowledge, while developing their skills in critical thinking, collaboration, communication, reasoning, synthesis, and describes a successful project-based learning lesson with 10th, 11th and 12th grade students that was carried out in three parts; 1) research an element and create a virtual poster 2) research the atomic structure of the element and demonstrate understanding to the teacher using an infographic and 3) research common uses of the element and tied this ideas to the prior knowledge of the properties and structures of their elements then created a video animation to teach the class. More efficient curriculum instruction, students learning skills outside of the required content, and relevance to students' life is a major reason why teachers choose PjBL as a method of teaching. As we are now in the 21st century, today's chemistry teachers are faced with two main objectives when preparing lessons; (1) students mastering chemistry concepts and (2) building 21st-century skills for STEM

jobs. Chemistry teachers should focus on helping students build 21st-century skills, such as critical thinking, creativity, meta-cognition or self-regulation, collaboration, information, and technological literacy in an effort to make students more competitive in the workforce. Online blogging is an excellent way for chemistry teachers to teach chemistry concepts, build 21st-century skills and keep students excited and focused about learning chemistry. While blogging can be done through discussion boards, using sites, such as a wiki, allows students to actually conduct group projects in class or at home while being able to monitor progress in real-time. Incorporating the use of student smartphones in the classroom has proven to be a useful instructional tool, especially for teachers who have limited technology resources. Web browsers, applications (apps), and 2D barcodes to create smart objects, can all serve as learning tools didactic lectures enhance student learning continuously after missing fundamental concepts. Science pedagogies discussed in this paper facilitate active learning and student engagement, through an inquiry-based problem approach. Pedagogical strategies reviewed in this article can be implemented independently of each other or in conjunction with an instructional setting. Problem-Based Learning is a science-based pedagogy that was first implemented in medical schools during the seventies to help students retain large amounts of information through open-ended questions. Students are broken into groups of 3-5 and presented with real-life, open-ended problems or questions given by their teacher. In order for students to achieve higher-order thinking, problems or questions should encompass several topics within the subject of chemistry. During the process of working through a problem, students identify problems, activate prior knowledge, and construct

new knowledge in a comprehensible framework that is linked to prior knowledge learned. Tarhan et al. described in great detail their PBL success with a group of 9th-grade chemistry students and 11th-grade students. In groups, the 9th-grade students worked on solving a chemistry problem centered on London dispersion forces. The teacher circulated around the room and asked guided questions as the groups worked on the problem. During group discussion, one group reasoned poly tetra fluoroethen's (Teflon) weak London dispersion forces made it difficult for food to stick to the pan. Other groups gave other real-life examples of London dispersion forces citing uses of graphite and oil. During the last 15 minutes of class, the teacher introduced new content that would be addressed in the next session. Chemistry students using PBL will develop 21st-century workforce skills such as problem-solving, critical-thinking, self-guided learning, communication, and teamwork ("Problem-Based Learning | CRLT", 2016). Process-Oriented Guided Inquiry Learning (POGIL) is the style of teaching that is designed to replace lectures in the facilitate independent learning. Video tutorials and quizzes can serve as differential methods of instruction for chemistry teachers inside and outside of the classroom. For example, Khan Academy is a popular site for chemistry teachers and teachers of other various content areas as well. Instructional methods for which Khan Academy can be utilized include blended learning, one-to-one classrooms, and online classes. Khan Academy provides data for teachers to see where they need to help their students who are struggling. Branded by older generations as the "gamer generation", chemistry teachers are now using online games as a way to actively engage students in learning chemistry concepts of all levels. A simple Google search of chemistry video

games will put students in a virtual world of molecules, molar masses, and complex equations. Virtual labs are one of the most effective ways for chemistry teachers to engage their students with active learning. Virtual labs allow students to experience what it is like to experience a chemistry job in a stem field. This is an excellent way for students to realize their own potential by getting to think like they are working in a field. Students become actively engaged when they are able to see concepts being studied, applied to real life. Going from teacher-centered learning to student-centered learning can be a little nerve-racking initially, for both the teacher and the student. Student-centered learning gives students the ability to actively learn and engage with their peers without depending on the teacher for answers. Of the three pedagogies discussed, problem-based learning is one of the easiest teaching methods to implement due to minimal preparation time. It is important for problem-based questions to be relevant to real-life so that students can identify with the problem, making it become personal. Case studies, vignettes, and open-ended task completion problems are the most commonly used. Problem-Based Learning can be incorporated into the POGIL method during the application phase to test the new knowledge learned. The Process-Oriented Guided Inquiry Learning (POGIL) method is the newest and most challenging methodology to implement the three methods. Teachers face a learning curve with the initial implementation of POGIL; however, student success with this method in general chemistry classes is well documented [1]. When needed, teachers can provide mini-lectures in-between phases, as tier [2] instruction for students struggling. Project-Based Learning (PjBL) is a very popular and effective method to teach chemistry. Its growing

popularity in recent years can be credited to the shift from teacher-centered learning, to student-centered learning. In the past, PjBL was an independent learning strategy, where students carried home and completed an assigned project, then returned back to school. Many students lack adequate support at home to complete these types of assignments, resulting in an overall negative impact on the students. Chemistry teachers, implementing project-based learning inside of the classroom, can design projects to specifically meet the learning needs of students in their classroom. An invaluable component that should be incorporated into each of these pedagogies is the use of 21st-century technology. For chemistry teachers who use lectures and textbooks as their primary instructional tool, incorporating technology into instruction is imperative to the success of struggling chemistry students. Pressure to strengthen writing skills has fallen on all content teachers. Chemistry teachers must look for creative ways to build their students' writing skills. Incorporating online blogging, discussion boards, or constructing wiki pages allows students to build online literacy skills, which is a critical asset in today's workforce. Smartphones are one of the simplest ways of implementing technology in the classroom, however, it should be noted that implementing smartphones into lessons, without adequate preparation by the teacher. Citation: Kristen KB, Malinda WG, Monica D, Kendra M (2017) Pedagogical Methods and Technology Used in Chemistry Secondary Education.

Science education has been proved to be an indispensable factor in the economic and technological development of any nation; and for Nigeria, it has a more critical role to play. Chemistry is one of the core subjects in science education which deals with the scientific study of the composition, structure, properties, and reactions of matter in different forms. Its study involves exploration of relationship between theory and experiment. The importance of chemistry in national development cannot be over emphasized. According to Asiyai (20014), Chemistry has helped in the development of modern technology through the application of its principles in modern invention.

Despite the important of chemistry, the problem of students' poor achievement capacity in chemistry is undoubtedly worrisome and has been a major concern to the educationalist. Unfortunately, despite these idealistic objectives and importance of chemistry to nation development ,there is low performance of students in senior secondary schools (WAEC Chief Examiner's Reports ,2014 ,2015 ,2016 and 2017).According to these WAEC Chief Examiners reports these poor performance of students in chemistry may be as a result of lack of understanding of the chemistry concept ,lack o f knowledge of subject matter and poor communication skill. The 2018 WAEC Chief Examiner's Report attributes the students low achievement is due to poor teaching method adopted by the teacher which does not stimulate the learner and the availability of instructional materials that can aids learning. In this

regard, personal observation of the research of the researcher sees the need for teacher to use a language laboratory for senior secondary school in Bosso local Government.

Hindu (2006), defines Language Laboratory as a room or building in a school, college, training institute, resource center, university or academy that contains special equipment to aids students learn foreign languages by listening to tapes or CDs, watching videos, recording themselves, etc. The Language Laboratory is an audio or audio-visual installation used as an aid in modern language teaching. It was also called Speech and Writing Laboratory. All the four language learning skills (Listening, Speaking, Reading and Writing) are given importance and learners are provided with ample opportunities to practice by listening to the audio programmer and watching the video clips. In other words, a Language Laboratory is a room consisting of instructional technology tools source unit that can disseminate audio, audio-visual, and/or written materials to any number of students at individual seats or carrels, with a wide variety of potential feedback mechanisms to the student, teacher, or other students.

The modern language laboratory is one of the newest media that is making a lot of impact on our educational system. The language laboratory is an audio or audio-visual installation used as an aid in the laboratory each student can replay one track of tape and at the same time record his response on another track. He is then able to rewind the tape to listen to both the master track and the recording to his response comparing the two recordings. The language laboratory is an audio or audio-visual installation used as an aid



in the laboratory each student can replay one track of tape and at the same time his respond in another track and also be able to rewind the tape to listen to both recordings to his response comparing the two recordings. Kilickaya (2004), explains that language learners feel better with authentic materials helps them involve in the real language as long as the teacher provided with “pedagogical support”. Instructions may create a task from short academic lectures, radio programs, authentic conversations, audio-book, songs or short stories. Besides, audio or audio-visual equipment should be part of all language courses in which technology facilitates the effectiveness of the teaching-learning process. Regarding listening, learning, and retention, most language programs should include tape recording, digital data or even computer software in their curriculum. Mc Carthy(as cited in the gate, 2001) points out that “since the mid-1970s tape recording has been sufficiently cheap and practical to enable the widespread study of talk –whether native, speaker talk or learner talk and use of tape recorders in the classroom.

Academic achievement according to Jacobs (2008) depicts students’ performance on a measurement such as performance tests, skill tests, analytical thinking tests, etc. It is, therefore, not out of place to describe academic achievement as a gain in knowledge of students as a result of taking part in a learning activity or program. Academic achievement is a result-oriented construct that encapsulates the extent of performance in a desired task (Rix, 2010). Ogunsaju (2004), states that the academic standard in all Nigerian institutions has fallen considerably below societal expectations. The learning of chemistry in secondary schools has not fared well because of the end product resulting in the lack of understanding and consequently poor achievement and total nonchalance in

the scientific innovation that the subject has as its cornerstone objective (Ugwu, 2013). Most students graduate from school without being able to exhibit the expected behaviour. Unfortunately, evidence from the literature showed that most teachers in Nigerian secondary schools predominately use the conventional teaching method in teaching due to poor knowledge and none exposure to other learner-centered methods leading to poor achievement and retention (Anderson & Freedman, 2002; Omoniyi, 2006).

Teaching in Nigeria still follows the traditional pattern even when the traditional method is neither promoting students' interest nor achievement in the subject ( Iji, 2002). The whole process of education centers around two key concepts 'teaching and learning'. Therefore, any slit in the process of teaching is bound to affect learning and consequently students' achievement and retention.

### **Studies conducted on language lab and student achievement**

The project in 2014 united state speak up reports, are increasingly common

- Nearly 50% of the students in virtual schools reporting being interested in learning versus 32% in traditional schools
- 74% teachers believe language laboratory increase student achievement and engage them in the classroom.
- 46% of principals believe that digital content is having great impact on teaching and learning.

Because of this Johnston (2014) sated that in our digital world, the survey constantly shows that language laboratories increase student engagement and motivation to learn. In a secondary meta-analysis of existing studies over the past 40years comparing

student achievement in education settings. Taemin et al (2017) noted that language laboratory is more impactful when used to support instruction rather than provide direct instruction. In and of itself, Language laboratory is purely another medium for helping propel students along their learning path. In a study measuring the effectiveness of an 1:1 laptop environment based on constructivist principles, author Dawne Beck Hil and Yigal Rosen documented the impact on achievement may have been looking for significant math and reading gains on standardized tests, the Texas Assessment of Knowledge and Skills (TAKS). What's more, the study found that teachers in the experimental classroom adopted more student-centric instruction techniques. In the experimental language laboratory classroom teacher had twice the number of one – one student interactions with students and implemented independent learning activities more frequently. (www.clarityinovation)

### **Studies on retention and students achievement**

Research has consistently shown that retention does not improve student achievement and may in fact, have long term negative consequences for students because retained students are more likely to eventually drop out than their peers. In this regard to accountability, many school systems have begun taking a harder line concerning promotion policy, retaining students who do not make sufficient academic progress. Particularly in reading and math. In many cases, the decision to retain a student is based on student performance on high – stakes standardized tests. But despite these findings, many policymakers consider retention a good way to motivate students and to offer those who don't meet appropriate standards another opportunity to learn the material. This

solution is also relatively simple, as it does not require the creation and funding of new programs or services. Florida and Georgia (2017) have instituted their grade retention programs statewide and New York City, recently joined Chicago, students are tested in third, sixth and eighth grades. Student not achieving the minimum cut score (set at approximately the 20th percentile of national norms, or from one to almost two years below grade level, depending on the grades being tested) participate in summer bridge program designed to help them achieve passing score on the tests student who failed to achieve the cut off mark. Jenny and Roderick conducted the study as noted above three analyses were conducted and determine the effect of retention on student achievement. In the first comparison, the achievement of high score retains students (student just missing the cut off) was compared to the achievement of low – scoring promoted students. These comparison groups were created because the researchers felt that the students would be relatively close to each other in academic ability (the difference could be as little as one or two correctly answered questions on exam) and thus this comparison measure the effect of retention and not a different artifact of achievement. In conclusion, the study examines that short – term academic achievement of detained student; the long-term academic and social implications of the retention program were not estimated, Nagaoka, J, and Roderick, M. (2014).

### **Gender and students achievement**

Adigun, Eric, Adesina(2005) carried a research, studied the relation between student's gender and academic achievement in computer science in new Bussa, Borgu local government of Niger state. Question which consist of 30 multiple – choice items drawn

from senior school certificate examination past questions as set by the West African Examination council in 2014 multiple choice past question was used as the research instrument consist. The questionnaire was administered to the students from both private and public schools in the study area. The student's responses were marked and scored, afterward analyzed using independent t-test. The result of this study showed that even though the male students had slightly better performance compare to that of the female students.

Gender is one of such factors also mention in literature review to have considerable effect on student academic achievement especially in science subjects. Gender is the range of physical, biological, mental and behavior characteristics pertaining to and differentiating between feminine and masculine (female and Male) population. The importance of examination performance in relation together is based primarily on the socio-cultural differences between girls and boys. Some vocation and profession has been regarded as man's (engineering, art and crafts, agriculture among others) while others as women's (catering, typing, and nursing among other). Infact, in a nut shell what are regarded as complex and difficult task are allowed to boys and girls parents assigned task like washing cooking and many others. As a result of this thinking the larger society has tended to see girls as a weak sex" consequently, an average Nigerian girl goes to school with these fixed stereotypes.

In view of the belief that a student's gender may have an impact on the student's academic performance; this study will study the relationship between them if any gender difference in achievement has been examined for some time resulting in substantial

literature. Nanty(2010),Kyel et al,(2011);Rusillo and Ariase (2004); Awifala,Adeneye and Ariase and praise (2011);Amosu(2011);Dania (2014)Agbaje and Alake(2014); Atovigba et al , (2012) some of this researches point out that there is no significant gender difference in students achievement and retention in various subjects which other found significant difference with either the boys or the girls perform better. So many factors contribute to the varied conclusions arrived at by all researchers. Some of such factors include campaign for understanding and implementation of gender equality in the study area. Nigeria has been the site of numerous kingdoms and consist of several tribes with different socio-cultural backgrounds and believe system, therefore, understanding and implementation of gender equality in different parts of the country from one place to another. The reason for the varied conclusion is the subject on which gender equality is being measured. For example, there has been a global concern and researchers have found that there is no significant difference in male-female mathematics performance at any level, most have identified gender differences (Atovigba, 2012). It has been the general belief In most of the country that male students tend to perform better compared to the female students in mathematical related or technology base subject.

Retention according to Hornby (2001) is the ability to remember things. Iji (2010), states that retention is the continued capacity to behave in a particular way that has been learned. Iji (2010) asserts that retention is measured in collaboration with achievement. Retention according to Chauhan (1998) is a direct correlate of positive transfer. Gagne (1970) noted that the type of material included in the teaching program, structured in a carefully formed sequence is quite resistant to forgetting. This implies that any

instructional model which is effective in enhancing achievement can as well be effective in enhancing retention. Although much of the literature suggests that language helps students' to achieve and retain better there is no consensus among researchers as regards the effect on gender

Gender according to Ekeh (2000) implies the character of being male or female, man or woman, boy or girl. Offorma (2004) viewed gender as a learned socially constructed condition ascribed to males and females. Gender differences in achievement have been examined for some time resulting in a substantial body of literature (Jack and Johannes, 2001). As observed by Ogunkola (1997), girls tend to perform better than boys in reading and verbal skills, while the reverse is the case in manipulative and physical productive tasks. Fabunmi (2004) in a study discovered that gender composition has a significant relationship with students' academic performance and that gender composition has a significant survey on secondary school students' academic performance. While some other researchers have it that gender has no survey in students' academic achievement and retention Iloputaife, Eze(2001). In other words, there is no consensus among researchers as regards the survey of gender on students' academic achievement and retention. Hence additionally this study sorts to investigate the relevance and possible survey of gender on students' achievement and retention in chemistry at senior secondary school in Bosso local government.

However while much of the literature reviewed showed that language laboratory has been studied in other fields of study and area (Beta,2006; Beatty, 2003),there is dearth of

empirical evidence to support this assertion in chemistry at senior secondary schools in Bosso local government. This study therefore seeks to determine the impact of language laboratory on students' achievement and retention in chemistry at senior secondary school in Bosso local government.

## **1.2 Statement of the Problem**

It quiet worrisome that despite the importance of chemistry to national development, students' achievement in chemistry is still at a declining point. The achievement of students' in WAEC has been poor. This decline in students' academic achievement has been attributed to so many factors which include poor communication skills, poor knowledge of the subject matter, teaching method to mention a few. WAEC Chief Examiner's report 20017 attributed students' poor achievement in chemistry to the teaching method and poor communication skills adopted by teachers.

Research in education has shown that teaching and learning in Nigeria still follow predominately the traditional method of teaching especially the lecture method. The decline in academic achievement and retention of students could possibly be as a result of the ineffective teaching method and poor communication skills employed by the teacher. Hence the search for better methods and newer innovations. Research findings revealed that the language laboratory has been of tremendous impact on other subjects and areas. However, it is not known if the language laboratory will have the same impact on chemistry in Bosso local government. Though students poor academic achievement has been seriously blamed on teaching method employed by the teacher, the survey of gender on students' achievement with regards to teaching methods remain unresolved issue among researchers.



Consequently, the survey of gender on students' academic achievement as regards the language laboratory method will also make part of this study. It is against this backdrop that this study is necessitated to investigate the impact of language laboratory on senior secondary school students' achievement and retention in chemistry in Bosso Local Government.

### **1.3 Aim and Objective**

The aim of this research is to determine the impact of language laboratory on the achievement and retention of chemistry in senior secondary schools.

The following objectives will be achieved

1. To determine the impact of language laboratory on students achievement in Chemistry.
2. Impact of language laboratory on students retention in chemistry
3. Examine the Impact of language laboratory on students 'achievement
4. Does language laboratory exert survey on students' retention in Chemistry across gender.

### **1.4 Research Questions**

1. What are the mean achievement scores of SS II chemistry students taught

with language laboratory and those taught with the conventional lecture method?

2. What are the differences in the achievement mean scores of male and female SSII student in chemistry achievement taught using language laboratory?
3. What are the mean retention scores of SSII chemistry students taught with language laboratory and those taught with the conventional lecture method?
4. What are the differences in the mean retention scores of male and female SSII student in chemistry achievement test when taught using language laboratory?

### **1.5 Hypothesis**

The following hypothesis will be tested 0.05 level of significance.

H<sub>01</sub>: There is no significant difference between the mean achievement scores of SSII chemistry student taught using Language laboratory and those taught using conventional method

H<sub>02</sub>: There is no significant difference between the mean achievement scores of male and female students taught chemistry using language laboratory .

H<sub>03</sub>: There is no significant difference between the mean retention scores of SSII chemistry student taught using Language laboratory and those taught using conventional lecture method

H<sub>04</sub> : There is no significant different between the mean retention of male and female student's taught using Language laboratory and those taught using conventional lecture method

## **1.6 Significant of the Study**

The result of this study will have both theoretical and practical significance. The theoretical significance of this study is linked to the constructivist theory. Constructivist theory holds that humans generate knowledge and meaning from an interaction between their experiences and their ideas. The constructivist theory is a learning approach that argues that individuals learn best when they actively construct knowledge and understanding through interacting with others (Santrock, 2004). A strong proponent of the constructivist theory is Vygotsky. Vygotsky (2011) acknowledges the conceptual shift from individual to collaboration and social interaction which could be found in simulation (Rogoff, 2010 cited in Santrock, 2004). This theory is seen to be strongly linked to the present study on the grounds that students will learn best as they actively construct knowledge through their interactions with one another which simulation readily provides. During infancy, it is an interaction between their experiences and their reflexes or behavior-patterns. Piaget called this system of knowledge schemata. Language laboratory method that involves students' active participation through role play. Therefore the outcome of this study may help to strengthen the constructivist theory.

Apart from theoretical significance, the result of this study will also be of practical benefit. Practically the result of this study will hopefully be of

immense benefit to chemistry teachers and students, authors, curriculum planners, government and the society at large.

The findings of this study will be helpful to chemistry teachers. It will provide a sort of guide to them. It will reveal the efficacy of simulation to the teachers based on which they would see it as one of the more effective methods of teaching chemistry and begin to use it. In line with this, it is hoped that the teaching and learning of chemistry will become more interesting, effective, meaningful and less tedious on the part of the teacher. The study will also reveal to students the various interesting activities they would be involved in while studying chemistry. This would stimulate and retain their interest in chemistry and enable them to better understand chemistry concepts to be able to achieve and retain better in the subject.

The findings of this study would hopefully spur authors of chemistry textbook to begin to publish textbooks that will appeal to the interest, experiences, and ability of students. This study will inform authors of the need to include learner-centered activities in the textbooks to make it more beneficial to the students

Also if this research establishes the efficacy of language laboratory in enhancing students' achievement and retention in chemistry, the result could trigger off more researches and innovations in teaching chemistry.

Based on the findings, workshops and seminars on how to use the language laboratory method in teaching different topics in chemistry to enhance a better understanding of the subject could then be sponsored by the relevant science body.

Finally, the impact of language laboratory on teaching and learning in terms of student achievement and retention in any subject has superlative implications to the society at large. The application of the knowledge of the subject in solving and handling scientific problems and issues in the environment by the student. The students only apply knowledge when they learn the subject well through using a language laboratory.

### **1.7 Scope of the study**

This project work is, limited to finding the impact of language laboratory on the achievement and retention of chemistry in senior secondary school students in Bosso local government area ,Niger state. This study would have covered more schools in Bosso local government area of Niger state but due to constraints time and material resources, it was confined to SSII chemistry students in two public schools in Bosso local government area of Niger State. The topics of research are periodic table, periodic laws and different groups and families of elements.

## 1.8 Operational Definition of Terms

Language laboratory: - a language laboratory is a dedicated space for foreign language learning where students access audio or audio-visual materials.

Achievement: - achievement is the result of what an individual has learned from some educational experiences.

Retention: - means to Recall (memory), in learning, the ability to recall facts and figures in memory

Audio: - Audio is an electron device capable of producing an audible content in audio production and publishing.

Audio-visual: - it is designed to aid in learning or teaching by making use of both hearing and sight

*Pedagogy*: - taken as an academic discipline is the study of how knowledge and skills are imparted in an educational context, and it considers the interactions that take place during learning.

Student:- a student is primarily a person enrolled in a school or other educational institution who attends classes in a course to attain the appropriate level of mastery of a subject under the guidance of an instructor

and who devotes time outside class to do whatever activities the instructor assigns that are necessary either for class preparation or to submit evidence of progress towards that mastery..

*Learning Materials*: -is any collection of *materials* including animate and inanimate objects and human and non-human resources that a teacher may use in *teaching* and learning situations to help achieve desired learning objectives.

## **CHAPTER TWO: LITERATURE REVIEW**

The review of literature for the study will be done under the following sub-headings:

### **2.0 Conceptual Framework**

#### 2.1 The Concept of technology

#### 2.2 Concept of language laboratory

#### 2.3 The Concept of language laboratory and academic achievement

2.4 The Concept of Academic Achievement

2.5 The Concept of Retention

2.6 The Concept of Gender

## **2.7 Theoretical Framework**

Constructivist theory

## **2.8 Empirical Studies and summary**

Studies on Language Laboratory and Students' Achievement and Retention

Studies on Gender and Students' Academic Achievement and Retention

## **2.9 Summary of Literature Review**

### **2.1 The Concept of Technology**

Technology ("science of craft" ,from Greek ,art ,skill, cunning hands) is the sum of techniques ,skills methods, and processes used in the production of goods or services or in the accomplishment of objectives such as scientific investigation. Technology can be knowledge of techniques, processes and the like or it can be embedded in machines to allow for operation without detailed knowledge of their working .Technology is the developments in historic times including the printing press, the telephone and the internet, have lessened physical barriers to communication and allowed human to



interact freely on global scale. Some important of technology, in all history of human existence ,there have been significant records that showed that some of the technology simplified the lives of humans in those generations, from the stones age to the iron age to the computer age. Technology has advanced and the use of technology has spread to all religions of the world .In Nigeria, we have embraced many technologies in the diverse sectors of our economy. However, some people still refuse to adopt technologies, preferring to stick to obsolete and more stannous ways of doing things suggesting that technology has done more harm than good, with the resources depletion and pollution among others. The fact still remain that there always two sides to issues but whenever the good overshadows the bad, it is best we should be adventurous about issues like this and effect it in our daily lives. Some of the importance of technology in Nigeria and hopes to enlighten the minds in the use of technology in daily life process.

11. Technology enables production of high – quality products and services with less human resources
12. Technology simplified communication process that involve activities of sending and receiving messages with the advent of internet, email , Fax and instant messaging platform
13. Learning is more fun and easily accessible with technology where learner can have access to learning materials and education from any part of the world. Through technology distance learning is possible, intensive and extensive research is possible knowledge sharing through various creative virtual

platforms like YouTube , and Video is possible through e-database.

14. Technology has improved banking processes where online banking facilities ,banking mobile application, USSD code are available across all banks for easy and comfortable banking
15. Technology benefits businesses in Nigerian and the world through e-payment system which buying and selling are now done in a simplistic and comfortable ways using POS machine ,ATM cards among others.
16. Technology makes agricultural system more efficient and productive using tractors, ploughs, planters, ridges ,harvesters machineries and fertilizers have replace manure labour and farm implements like cutlasses and hoes, thus boosting the agriculture section and commercialized it to trade in international borders.
17. Technology facilitates collaboration and relationship with other nations. Also social media tools enable us foster our relationship with family and friends and also exposes us to make friends with foreigners without even leaving our country
18. Technology enhances the transportation of people, goods and services using vehicle, ships , aeroplanes , bicycles , Motor bikes to delivered goods and services to their destination
19. Technology has created more employment opportunities like system analyst, database administrators, programmers, web developers and support engineers, application developer and software.

20. Technology has aid in better health care with modern health facilities like photo scan and x-ray technologies for diagnosis and treatment.

In conclusion technology has done more of good than bad because life becomes easier and comfortable.

## **2.2 The Concept of the Language Laboratory**

The Language Laboratory is used for language tutorials, which are attended by the students and persons who voluntarily opt for remedial English classes. Lessons and exercises are recorded on a cassette or computer so that the students are exposed to a variety of listening and speaking drills; These especially benefit students who are deficient in English and also aim at confidence-building for interviews and competitive examinations. The Language Laboratory sessions include word games, quizzes, extemporary speaking, debates, skits, etc. These sessions can also be conducted online where many websites provide practice sessions.

According to Hindu (2006), Language Laboratory is defined as a room in a school, college, training institutions, university or academy that contains special equipment to help students learn foreign languages by listening to tapes or CDs, watching videos, recording themselves, etc. The Language Laboratory is an audio or audio-visual installation used as an aid in modern language teaching. It was also called Speech and Writing Laboratory. All the four language learning skills

(Listening, Speaking, Reading and Writing) are given importance and learners are provided with ample opportunities to practice by listening to the audio programmer and watching the video clips. In other words, a Language Laboratory is a room consisting of instructional technology tools source unit that can disseminate audio, audio-visual, and/or written materials to any number of students at individual seats or carrels, with a wide variety of potential feedback mechanisms to the student, teacher, or other students.

According to Deepika and Kalaiarasan (2012), Language Laboratory is an audio-visual installation used in modern teaching methods to learn foreign languages. Perhaps the first Language Laboratory was at the University of Grenoble. In the 1950s up until the 1990s, they were a tape-based systems using reel to reel or (latterly) cassette. But the current installations are generally multimedia computers. The Language Laboratory is a technological break for imparting skills in English Language. The Language Laboratory offers an exclusive result oriented and efficient to enrich the English Language learning process. The multimedia-based Language Laboratory help to learn and enhance language proficiency by sharing the course materials within a second where the teacher and the students involved effortlessly. The Language Laboratory is developed on the methodology of Listening, Speaking, Reading and Writing skills (LSRW).

Bygate (2001) pointed out that since the mid-1970s tape-recording has been sufficiently cheap and practical to enable the widespread study of talk whether native speaker talk or learner talk and use of tape recorders in language classrooms. Besides tape recorders, the audio-language laboratory has been highly used in language teaching to make students aware of the characteristics of spoken discourse. The audio-language laboratory has played an important role in language teaching for a long time. Its main objective was to help language students improve aural-oral skills. With the implementation of the Language Laboratory, many language teachers developed new techniques to derive all possible advantages of this tool in the field of applied linguistics.

Kilickaya (2004) explained that language learners feel better with authentic materials helping them involve in the real language as long as we, as teachers, provide them with pedagogical support. Instructors may create tasks from short academic lectures, radio programs, authentic conversations, audio-books, songs, or short stories. In addition, audio-visual equipment should be part of all language courses in which technology facilitates the teaching-learning process. In regard to listening comprehension, most language programs include tape recording, digital data or even computer software in their curriculum.

The language laboratory is a revolutionary device in the pedagogical sense. It is merely a more efficient way of making available to students to spoken

form of sounds of the language in a form which he or she can initiate in comparative privacy and which provides flexibility.

Stevens (2009) rightly pointed out that language is a learned activity. If we accept the theory that learning is over learning anything less is of no use, if we obey the dictum to get the forms by heart and practice them over and over again, day after day, until they become entirely natural and familiar, then drill work which is essentially done in the laboratory seem inevitable for effective language learning.

In 1958, in America, the National Education Act was passed providing for the establishment and strengthening of learning laboratories and the training of teachers in the use of laboratory techniques.

### **Classification of language laboratory**

There different types of language laboratory used in various institution all over the world. However development and innovations in modern technology bring about more facilities attached to the language laboratory, such as interactive boards\ which are very useful for student learning. The various types of language laboratories are:

- a. Conventional language laboratory: this laboratory consist of a tape recorder and few audio cassettes for the teaching of target language

- b. Computer Assisted Language laboratory (CAL): the language materials are already fed into the computer according to the features available. It helps teachers to give practice in particular aspects of language, such as sound , animation and videos. There are also web-based laboratories which are called Web Assisted language laboratory (WALL).
- c. Multimedia language laboratory: this type of laboratory uses different types of software available in the market like: Renet, Aristoclass , Hiclass , Globarian , console OCL-908W, Histudio MHi and tech Online software and according to contribution of multimedia in learning can be summarized as
  - a. Active participation
  - b. Induce learning
  - c. Recalling and applying
  - d. Control over the level and speed of information
  - e. Freedom to access information according to their needs.
  - f. Approach for support information

### **Kinds of Installation**

The various types of installation may be classified in different basis. There is the classroom with fixed machines used for foreign language classes. The true laboratory consists of a separate room specifically designed to contain the equipment and used only for language practice. In the case of the special laboratory there are essentially two varieties.

The first consists of centrally controlled recording and play back machines from which the sound is sent by wire to each student at his position. There may be several machines with different programmes given simultaneously.

The second type of installation consists of booths in each of which there is a record played controlled by the student himself. The two types may be combined of course.

**(a) The Classroom Installation**

A normal classroom is equipped with a certain number of audio-visual devices controlled by the teacher. Each student at his desk is provided with earphones. The phonograph, tape recorder and microphone will be in front of the room. There may also be a screen and a motion picture projection as well as a strip film projector.

**(b) The Middle Installation**

Because of its expensive nature, the lack of space and the school programme, it will be advisable to employ the mobile units. A certain number of “wagon” that is, tables on wheels will be used with a small sound proof partitions containing a play back machine, a microphone and a tape recorder. When needed these five or six wagons are wheeled into the front of the classroom.

**(c) The listening Laboratory**

One step closer to the real language laboratory is the listening room. It may be provided with sufficient listening posts for an entire class. If it is installed in the library,



the uses of earphones will prevent disturbing other students. For effective use of the listening laboratory a teacher or monitor should be in charge.

### **Advantages of the Language Laboratory**

Arguing for the advantages of the language laboratory Pimslear (2005), Lezson (2004) and Chabbert (2002) see it as a place where Texts can be played several times and with the teacher in collaboration, students learn better and faster. The language laboratory gives the student the opportunity to express simple ideas in his own words and this will enable him to gain confidence in his oral ability. The use of the laboratory aids language in the following ways:

1. Practically all the objectives of language course can be achieved in the laboratory.
2. The near ideal pronunciation of native speakers is always available. That is why Harding (2008) stated that the laboratory offers the possibilities for teaching pronunciation, intonations, reading as well as drilling in the use of grammatical forms and structures.
3. The students is accustomed to different kinds of voices-male and female, old and young, coarse and fine etc. In the conventional classroom he hears only his teacher's voices.
4. The students can listen over and over again.
5. Students practice individually during the whole period. In the class he generally recites or speaks but a few minutes at each session.

6. The device in the laboratory allows for immediate correction. The student can compare his performance at once with the master record. The teacher can identify habitual errors by listening to the student's recordings.
7. It relieves the teacher of many tasks such as dictation.
8. By constant repetition and oral drill the student acquires with use a new set of speech habits-real objective of learning of foreign language.

### **The Availability of the Language Laboratory**

One thing is always clear, that the availability of materials or resources for teaching and the readiness of the learner go hand-in-hand. Hence the availability of adequate teaching facilities helps to enhance and encourage students towards any task.

The use of the language laboratory by the teachers in teaching students depend on a large extent on the availability of useful and up-to-date resource materials including tape recorders and the related materials in the language laboratory. Good materials will produce good outcome. Therefore the availability of adequate facilities in the teaching and learning of English language will go a long way in fostering positive impact on the student's performance.

Ubakwe (2003) pointed out the necessity of using instructional materials to make the teaching and learning of oral English more meaningful. He said that the growth of technology, especially in the area of electronics, has provided more precise tools for

studying the sounds of a language laboratory is an essential if not indispensable requirement for effective teaching of modern language.

Ihenacho (2001) lamented that the non-existence of the language laboratory in Nigeria has impeded effective teaching and learning chemistry. It is a pity to say that a country like Nigeria and Enugu North Local Government to be precise has little or no language laboratory.

### **Limitations of the Laboratory**

Some scholars are of the view that some the language laboratory does not offer any miraculous solution to language training and cannot produce the finished product of near-native speaker of a second language, it should be eradicated. Ruley (2004) disagreed with Pimslear, Lezson and Chabbert in the notion that the language laboratory in collaboration with the teacher, the students learn faster and better when he said that the laboratory is no more efficient teaching method (aid) than any other teaching devices.

Every mechanical device has its advantages and its disadvantages.

1. It is costly
2. This chief danger is that the procedures may become monotonous. If the student's alertness is not maintained, he may become drowsy and half listen to the teacher or model. Monotony can be avoided by:
  - (a) Avoiding the use of lengthy recordings
  - (b) Introducing musical selections

(c) Providing opportunity for student's participation.

This can be done by pausing at intervals for students to repeat. It can also be done by letting the student record his own voice on the record or tape.

### **The Impact of the Language Laboratory on Student's Performance**

Like Fadiran (2007) and Echatabu (2004) called the language laboratory a kind of practice field, the use of the language laboratory is based on the notion that understanding and speaking are the prime essentials in acquiring foreign language. Since we learn what we do, extensive and systematic practice in learning and speaking is necessary.

The fundamental aim of the laboratory is to provide much and regular practice in listening to models, in imitating these models and in repetitive oral drills. Ubakwe (2003) pointed the necessity of using instructional materials to make the teaching and learning of chemistry more meaningful. He said that the growth of technology especially in the area of electronics has provided more precise tools for studying the sounds of language. Constant listening will build up the ability to understand the foreign language. Oral drills will strengthen the ability to speak fluently. Bowen (2009) said that there may be some teachers who language learning. The main advantages of the use of the language laboratory are the fact that it provides practice in the spoken language. The language laboratory, then, can accomplish what the ordinary classroom cannot. It increases the quality and the quantity of the student's performance.

## **The Student in the Laboratory**

Pimslear (2005) reviewed the functions of the language laboratory in a foreign language instruction with particular reference to spoken language in his article on “The foundation of the language laboratory” he says:

“The language laboratory could create good basic speech habits with collaboration of the teacher, bringing about an acceptable pronunciation”.

With the mechanical equipment every pupil is able to get active language practice throughout the period. No student is left out in the practice even the dullest among the student. As the model or the teacher pronounces the words the students follow suit.

In the traditional classroom each student advances at the same place. Each one must cover the same amount of material there is little possibility for differentiation in the language laboratory, however, it is possible to provide for different levels of learning and to adjust the rate of progress to the capacity of the learner. Sharp and dull students are recognized and they have a sense of identity for example, a set of students may understand the difference in the pronunciation of the sound.

/ pɪəri'ɒdɪk/ **as in periodic table**

/ pɪəriəd/ **as in period**

While another set of students may find it difficult. The equipment allows the students to study until they master it.

The teachers are human beings... At the end of the day they are tired hence, the student can get additional practice by making use of the laboratory in free period and regular school hours. The laboratory provides the additional practice by making use of the laboratory in free periods and after regular school hours. The laboratory provides the additional practice which is so necessary for efficient language learning.

The student is faced with something impersonal and loses the feeling of self-consciousness. Those qualities and acts of the teacher which may produce an unpleasant reaction on the part of the students such as impatience, sarcasm, critical comments and the giving of a grade is absent. Because of this privacy, the student is not embarrassed when he makes errors. Students have the tendency to laugh, insult or look down on students who make costly mistakes. A student who uses /r/ instead /l/ and /l/ Instead of /r/ is likely to be mocked by his fellow students. He is brought as close as possible to the speaker either his teacher or native voice on the tape or recorder.

Hearing is stressed. Since language is basically sound, the sense of hearing must be appealed to more than any other.

## **Problems in Connection with the Use of the Language Laboratory**

Despite its advantages, the laboratory does not solve all the problems in the teaching of foreign languages. Since it is after all, a collection of machines, it cannot replace the teacher. It can be a very effective aid but it is and must remain an auxiliary device.

*“Just as the language laboratory is costly to install so also is the cost of maintenance. Secondly, the lack of trained teachers to handle the language laboratory is one of the problems encountered. Finally, extreme care is needed in choosing the tapes and recorders. If materials are not good it affects the laboratory.”*

There are problems that actually led to the inception of the language laboratory. It did not just evolve. The learning laboratory was built to help alleviate the problems second language learners encounter. One of these problems is the interference of the mother tongue. The interference of the mother tongue has hampered the learning of the foreign language a great deal.

### **2.3 Concept of academic achievement**

The definition of academic achievement varies among scholars policymakers and other educational stakeholders. Academic achievement is the outcome of [education](#) — the extent to which a student, teacher or institution has achieved their educational goals (Ezeudu, 2006). Achievement may be defined as the act of achieving or successful performance. Achievement is the level of performance attained by a learner in a task

(Karma, 2009). According to Akinteye (2008) achievement is a task that somebody has carried out successfully, especially using his effort and skills. Achievement is excellence in all academic disciplines, in class as well as co-curricular activities

Academic achievement means how a student performs in school (Madu, 2004). Some schools define this as a certain G.P.A, or ranking in class. According to Nwagbo (2013) academic achievement can be defined as anything a person excelled in with their education. Academic achievement could be getting high grades and a high GPA level. In the context of this study, academic achievement means learning outcome which has to do with the knowledge attain from teaching process, it is also known as achievement.

Academic achievement is commonly measured by [examinations](#) or [continuous assessment](#) but there is no general agreement on how it is best tested or which aspects are most important — [procedural knowledge](#) such as [skills](#) or [declarative knowledge](#) such as [facts](#) (Eze, 2010). An academic achievement is something you do or realize at school, university or college in class, in a laboratory, library or fieldwork and it does not include sport or music. Academic achievement generally refers to how well a student is accomplishing his or her tasks and studies. The most well-known indicator of academic achievement is the grades the student's 'score' for their classes and overall tenure.

Academic achievement of students has become an educational touchstone since the late 20<sup>th</sup> century. According to Ikeagwu (2001), the concerted effort of the education authorities towards improving the academic achievement of students anchored on the fact that the chief examiners reports in different school subjects since early 1990s showed a



downward trend in students' performance. Most research evidence such as Yearwood (2005), Nwosu (2007), Yusuf (2009), and Arisa (2011) linked the students' poor academic achievement to the ineffective teaching methods adopted by classroom teachers.

Students' academic achievement in chemistry becomes more worrisome considering the importance of senior secondary Government curriculum. The senior secondary school curriculum is value laden, societal focus, directed towards inculcating to the learners societal desirable values, skills, attitudes and knowledge that will help cope with the advancement of technology. The above importance of Chemistry presupposes the need for students constant increase achievement in the subject.

However, literature evidence such as Oloyede (2010), Eze (2012) and Ugwu (2013) appear to support the view that in recent time, the students' academic achievement in Chemistry has been decreasing. Some researchers such as Oloyede (2010) and Eze (2012) attributed students' decreasing academic achievement in chemistry to the teachers over reliance on traditional teaching methods such as lecture method and demonstration method which are considered teacher centred teaching methods. The current trend in teaching and learning emphasized a shift from teacher centred teaching method to students' centred teaching method such as Language laboratory method. This is expected to enhance achievement and retention in chemistry.

## **2.4 The Concept of Retention**

According to Rix (2010) defined retention as the act of retaining, maybe defined as the act of “absorbing and holding” or “or continue having or holding”. The highlight of this work, retention refers to the act of absorbing, holding, or continuing to hold or have facts or things learned. On the problems of retention Ezeamenyi (2004) find out

That failure to provide enough applications to real life activity and social usage, poor teaching techniques are strong limiting factors to students’ retention. Furthermore, Ezeamenyi (2004) contended that for improvement of retention of learned materials in mathematics, in other words students’ achievement, activity-based learning is indispensable. Retention, thus, depends mainly on teaching strategy adopted by the teacher. Thus, the thrust of this study is to determine the effect of language laboratory on senior secondary school students’ achievement and retention in chemistry in Bosso local government in Niger State.

## **2.5 The Concept of Gender**

Gender comes from the Latin word ‘genus’ and conveys the meaning of kind or race. Gender is related term that stresses the role and responsibilities of males and females (Okeke, 2002). According to Lee (2001) gender is an ascribed attribute that differentiates feminine from masculine socially. Gender is seen as the categorization in the world of matter into sex. According to Kalusi (2000), gender is a cultural construction that assigns roles, attitude and values considered appropriate for each sex. Ekeh (2000)

noted that gender implies the character of being male or female, man or women, boy or girl. Robert (2007) defined gender as a social construct which is not biologically determined but a concept equivalent to race or class. Offorma (2004) viewed gender as a learned socially constructed condition ascribed to male and female. Offorma noted further that gender is enforced through cultural practices as gender identity is the outcome of cultural learning thus, the expectations from male and female are depended on their cultural milieus.

Some authors like Kalusi (2000) used gender and sex as synonyms while others like Robert (2007) differentiate between the two. Sex is an inborn physiological condition that makes individuals to be either male or female. Oraifo (2000) expressed that sex is based on biological and physical differences between male and female while gender refers to cultural understanding about what constitutes masculinity and femininity in a society. Thus, while sex is biologically defined, gender is socially defined. Furthermore, Akubuokwu (2004) stated that being a male or female is a matter of sex, but to be masculine or feminine is a matter of gender. It is important to note that masculinity refers to attributes considered appropriate for male such as being aggressive, athletic, physically, active, logical and dominant in social relations with female. On the other hand, femininity refers to attributes traditionally with appropriate behaviour for female such as docility, fragility, emotionality and subordination for man. The above gender differences according to Udegbe (2003) are created and sustained by society through its traditions, customs, conventions, mores and regulations. The above assertion supports the

argument of Western feminists, as reported by Thompson and Hickney (2004), which the differences between women and men lay in culture and not in nature.

It is nurtured and therefore, subject to cultural survey and interpretation as well as limitations. Gender refers to one's subjective feeling to 'maleness' and 'femaleness' irrespective of one's sex. It is generally classified into masculine or feminine and concerned with the attitude that describes males and females in the social and cultural context. It has to do with the peculiar responsibilities and roles of men and women that are established in the families, societies and cultures. Gender describes the personality traits, attitudes, behaviours, values, relative power, survey, roles and expectation (femininity and masculinity) that society ascribes to the two sexes on a differential basis.

The present study intends to determine if the above diverse roles and expectations of males and females in the society have any survey on students' achievement and retention in senior secondary school chemistry.

## 2.6 Theoretical frame work

Considering the nature of the topic of the impact of language laboratory on students' achievement and retention in some concepts in chemistry, the theory that study can be heraldry to be constructivist theory of learning.

### **Social constructivism theory (Vygotsky,1978)**

This study is underpinned by the social constructivism theory (Vygotsky, 1978). As a theory of knowledge and learning, social constructivism views the teaching and learning context, students' prior knowledge and the interaction between student and the context as vital in informing teacher practice (Luera & Otto, 2005). Social constructivists believe that knowledge is a human product, and is socially and culturally constructed (Gredler, 2008).Members of a society create meaning through their interactions with each other and with the environment they live in. The emphasis is on the collaborative nature of learning. In school, students interact with teachers, peers, technology and the environment. Students in a social constructivist classroom are considered active agents, responsible for their own learning, enhanced by their interactions with peers, family, and their environment. Classrooms and have less teacher autonomy and are more student centred (Christensen, 2003). Students are also encouraged to use their prior knowledge and experiences, answer questions formulated by them or posed to them for learning to occur. A student, therefore, requires deliberate effort to relate new knowledge to relevant

concepts he/she already possess (Luera & Otto, 2005). To achieve this, students work collaboratively to ask questions, explore and assess what they already know. On the side of the teacher, Leach and Scott (2003) posit that teachers' role is "to introduce and support the use of new knowledge on the social plane" . Within social constructivism theory, I adopted a Pedagogical Content Knowledge (PCK) model that would enable me focus on specific classroom practice aspects of participants Within social constructivism theory, I adopted a Pedagogical Content Knowledge (PCK) model that would enable me focus on specific classroom practice aspects of participants especially content knowledge (CK) and Pedagogical knowledge (PK) they use while teaching the PTE. Shulman (1987) defined PCK as the knowledge that includes "an understanding of what makes the learning of a specific topic easy or difficult" (p.9). This is the knowledge that encompasses teachers' knowledge of representations and instructional strategies in relation to knowledge of student learning, with respect to a specified content area. Various scholars (e.g. Grossman, 1990; Magnusson, Krajcik, & Borko, 1999; Mulholland & Wallace, 2005; Park & Oliver, 2008; Rollnick et al., 2008) have proposed different conceptualizations of PCK, in terms of the features they include or integrate. So far, two elements are central in any conceptualization of PCK, i.e. knowledge of representations of subject matter and instructional strategies incorporating these representations; and understanding of specific student conceptions and learning difficulties with respect to a specified content area. Other scholars (e.g. Mudau, 2013; Roohan, Taconis & Jochems, 2011) contends that PCK is not only about the knowledge of various domains which amalgamate to result in the PCK, but the teacher's craft is the ultimate variable in the

classroom practice for students' learning. There seems to be consensus amongst researchers regarding the nature of PCK. Firstly, since PCK is topic based, in general sense it is to be distinguished from knowledge of pedagogy, of educational purposes, and of student characteristics. Secondly, since PCK has a focus on the teaching of a particular topic, it is likely to differ considerably from subject matter knowledge as such. The above theory is relevant as an anchorage theory to this study. The constructivist holds that learners make meaning of what is taught in the classroom when they are given the opportunity to participate actively in the learning process.

Language laboratory is a teaching method that gives learners the opportunity to be involved actively in the learning process. It allows students to take part in both the preparation and presentation of their lessons. Through the roles students play in the simulation process they construct new knowledge through what the constructivist call the process of accommodation and assimilation. Thus, the outcome of this study may help to strengthen the view of the constructivist theory.

## **2.7 Empirical Studies review**

Review of empirical study is based on the following;

### **Studies on language laboratory and Students' Academic Achievement and Retention**

Eke (2004), carried out a study on the impact of language laboratory on students achievement and retention in French. The study was conducted in Oredo education zone of Edo State. A total numbers one hundred and twenty (120) students sample from an

intact class was used for the study. Students' achievement test in French and students' retention test in French was used for data collection. Mean and standard deviation were used to answer the research questions while t-test was used to analyze the research hypothesis. The findings of the study among other things showed that the language laboratory significantly improve students' achievement and retention in biology. The study recommended efficient and effective use of language laboratory in teaching French and the replication of this study in other areas. The relevance of the reviewed work to the present study is that the reviewed study helped the researcher to identify Language laboratory as one of the methods that could possibly have a better impact on students' achievement and retention in chemistry. Also the former study was not carried out in Bosso education zone of Niger state. This difference creates a gap that the present study intends to fill.

Similarly, Mercy (2016) conducted a study on the effectiveness of using language laboratory in teaching of English language. The study was carried in VII school students in Coinbator District India. The study used sixty four students as the population of the study. The instrument used for data collection was English Pre-test and post- test. The instrument was developed by the researcher and validated by experts. Data collected were analyzed using mean and standard deviation while the research hypotheses were analyzed using t-test. The major finding of the study was that language laboratory survey positive and is most effective approach method of teaching. The study among other things recommended the use of innovative teaching methods of language laboratory in teaching



English language. The relevance of the reviewed work to the present study is that it helped the researcher to identify language laboratory as an effective teaching method in English language. While the reviewed work was carried out in English language, the present study will be carried out in chemistry. This difference creates a gap that the present work intends to fill.

Furthermore, Abdullahi (2010) carried out a study on the effect of simu method on students' achievement in civic education. The study was conducted in junior secondary schools in Kafanchan area of Kaduna State. The study made use of one hundred and fifty (150) students. Achievement test in civic education developed by the researcher and validated by experts was used for data collection. Mean and standard deviation was used for data analyzed in order to answer the research questions while t-test was used to analyze the research hypotheses. The findings of the study among other things showed that the use of Language laboratory increase students' achievement in civic education. The study recommended the use of Language Laboratory in teaching civic education in schools. The relevance of the reviewed work to the present study is that the reviewed work helped the researcher to identify simulation as one of the teaching methods that enhance students' achievement in civic. Civic is related to Government therefore the idea borrowed from the reviewed work can help enhance the present study.

The above empirical studies appear to show that students' academic achievement improved when innovative teaching method such a language laboratory is used in teaching. Most of the studies reviewed were carried out in other subject areas. Thus, to

further establish the efficacy of language laboratory as regards achievement and retention, therefore there is need to conduct such a study in chemistry and in different parts of the country like Bosso local government of Niger state.

### **Studies on Gender and Students' Achievement and Retention**

Godpower(2017) carried out a study on the survey of gender on interest and academy achievements in integrated science on Junior Secondary students' academic achievement in integrated science using cooperative learning teaching strategy. Total number of six hundred (600) students obtained from the intact classes of the 10 selected Junior Secondary Schools in the three selected Local Government Areas of River State, participated in the study. This study employed a quasi-experimental design. Lesson note based on the jigsaw II cooperative learning strategy and Achievement Test for integrated Science Students (ATBSS) were the instruments used to collect the relevant data. The data collected were analyzed using descriptive and independent samples t-test statistical methods. Findings of this study revealed that there was no significant difference in academic achievement of male and female students at the pre-test and post-test levels respectively. The study recommended that in order to encourage more women into pure sciences, and science-oriented courses, interventions need to be designed that focus not only on the academic achievement of girls but also in how to make science-related occupations more interesting for young, high achieving girls. The importance of the reviewed work to the present study is that the reviewed work considered the impact of language laboratory on gender and the present work is also considering the impact of

language laboratory on gender. Therefore the findings of the letter might be a confirmation of the former. More so the reviewed work was done in integrated science while the present study will be carried out in chemistry. This creates a gap that the present study intends to fill.

Joseph (2015) conducted a study on the effect of gender on students' academic performance in computer science in new Bossa. The study was carried out in Borgo local government of Niger State. The study involved a total population of two hundred and seventy five (200) students from private and public schools in ss3. Computer science test instrument developed by the researcher and validated by experts was used for data collection. The data collected were analyzed using mean and standard deviation while the research hypotheses were tested using t-test. The study found out among other things that there is no significant difference in male and female students' achievement in computer science when exposed to the same teaching method. The study recommended the use of collaborative teaching method in teaching computer science. The relevance of the highlighted work to the present study is that it helped the researcher to identify the interaction impact of language laboratory on gender as it regards achievement in computer science. The reviewed work was in Bosso local government area of Niger state was in computer science. This difference creates a gap that the present study intends to fill.

Gilbert (2009) conducted a study on the effect of simulation teaching method on the academic achievement of chemistry students in Etche Local Government Area of

Rivers State. The study involved one hundred and fifty (150) senior secondary two (SS2) students. Chemistry achievement test instrument developed by the researcher and validated by experts was used for data collection. The data collected were analyzed using mean and standard deviation while t-test was use to test the research hypotheses. The study found out that there is no significant difference in male and female students' achievement when exposed to the same teaching method. The importance of the reviewed work to the present study is that it showed among others that simulation method is gender insensitive as it regards students' achievement in Chemistry. Nevertheless, the reviewed work was in Chemistry while the present study is in chemistry. The difference creates a gap that the present study intends to fill.

Ekwe (2013) carried out a study on the effect of simulation teaching method on students' achievement in Biology. The study was conducted in Nsukka education zone of Enugu State. Three hundred (300) senior secondary two (SS2) students were involved in the study. Biology achievement test instrument developed by the researcher and validated by experts was used for data collection. The data collected were analyzed using mean and standard deviation to answer the research questions while t-test was used to test the hypotheses. The findings of the study showed that there is no significant difference in male and female students' achievement in biology when exposed to the same teaching method. The relevance of the highlighted work to the present study is that it helped the researcher to identify the interaction effect of simulation method on gender as it regards achievement in Biology. Nevertheless, the reviewed work did not take cognizance of

effect of simulation on students' retention while the present studies do. This difference creates gap that the present study wish to fill.

However, Madu (2004) conducted a study on the effect of simulation method on students' achievement in physics, the study showed that there is a significant difference in male and female students' achievement in physics when exposed to the same teaching method. Similarly, Ezeudu (2006) carried out a study on the effect of simulation teaching method on students' achievement in chemistry. The study was conducted in Nsukka education zone of Enugu State. The findings of the study among other things showed that there is significant differences in the achievement mean score of male and female Chemistry students.

Furthermore, a study conducted by Eze (2010) on the effect of collaborative teaching method on students' achievement in English Language in Umuahia education zone of Abia State showed that there is a significant difference in male and female students' achievement in English language. Nwagbo (2013) in a study on the effect of concept mapping strategy on students' achievement in integrated science found out that there is a significant difference in male and female students' achievement in integrated science.

The above studies showed that while there is no significant difference in male and female students' academic achievement when exposed to the same teaching method on the other hand some studies showed that there is a significant difference in the male and

female students' academic achievement. This shows that there is lack of consensus among scholars as it concerns students' achievement and retention based on gender. Thus, the issue of survey of gender on students' academic achievement has not been settled. Therefore, this study amongst other things intends to find out the survey of gender on students' academic achievement and retention in Government when taught using simulation

### **Summary of Literature Review**

The literature reviewed shows that Chemistry is one of the core subjects in science education which deals with the scientific study of the composition, structure, properties, and reactions of matter in different forms. Its study involves exploration of relationship between theory and experiment. The importance of chemistry in national development cannot be over emphasized. According to Asiyai (20014), Chemistry has helped in the development of modern technology through the application of its principles in modern invention.

Despite the important of chemistry, the problem of students' poor achievement capacity in chemistry is undoubtedly worrisome and has been a major concern to the educationalist. Unfortunately, despite these idealistic objectives and importance of chemistry to nation development ,there is low performance of students in senior secondary schools (WAEC Chief Examiner's Reports ,2014 ,2015 ,2016 and 2017).According to these WAEC Chief Examiners reports these poor performance of students in chemistry may be as a result of lack of

understanding of the chemistry concept ,lack o f knowledge of subject matter and poor communication skill. The 2018 WAEC Chief Examiner’s Report attributes the students low achievement is due to poor teaching method adopted by the teacher which does not stimulate the learner and the availability of instructional materials that can aids learning. In this regard, personal observation of the research of the researcher sees the need for teacher to use a language laboratory for senior secondary school in Bosso local Government.

Meanwhile, reviewed literature shows that the teaching of chemistry predominately followed the traditional method and this could possibly be the reason behind the poor achievement of students. However different methods can be used to teach chemistry. Nevertheless the concern of this study is Language laboratory.

Literature review under theoretical framework considered constructivist theory of learning developed by Vygostky. The theory of constructivism suggests that learners construct knowledge out of their experiences. The theory holds that the learners make meaning of what is taught in the classroom when they are given the opportunity to participate actively in the learning process. This theory is relevant to the present study because language laboratory gives students the opportunity to participate actively in class. Therefore the outcome of this research work may help to strengthen the view of the constructivist theorist.

Review of empirical studies was organized under studies on teaching methods and students’ achievement and retention in chemistry and studies on gender and students’

achievement and retention. The reviewed literature shows that language laboratory yielded a positive result as students' achievement and retention in other subjects and areas. Some empirical literature reviewed on gender shows that gender is a contributory factor to students' achievement while some maintained that gender is not a significant factor to students' achievement and retention when students' are exposed to some teaching method. However the empirical studies did not show the impact of language laboratory on students' achievement and retention in chemistry in Bosso local government of Niger state. Hence, the need for this study that seeks to determine the effect of language laboratory on students' achievement and retention in chemistry at senior secondary school in Bosso local government in Niger state.



## CHAPTER THREE

### 3.0 METHODOLOGY

This chapter presents the general plan for carrying out the study specifically, it describes the design of the study, area of the study, population of the study, sample and sampling techniques, instrument for data collection, validation of instrument, item analysis, reliability of instrument, control of extraneous variable, experimental procedure method of data collection and method of data analysis.

#### 3.1 Research design

The design of the study is quasi-experimental design of the pre-test Post-test non-equivalent research design. According to Ali, (2006) this design is often used in classroom experiment, when experiment and control groups are assembled as intact classes and no possibility of randomization. Hence, intact classes was used and there was no random assignment of research subjects. The design is represented in the table below.

<b>Group</b>	<b>Pre-test</b>	<b>Treatment</b>	<b>Post-test</b>	<b>Retention</b>
EG	O <sub>1</sub>	X	O <sub>2</sub>	O <sub>3</sub>
CG	O <sub>1</sub>	-X	O <sub>2</sub>	O <sub>3</sub>

Where EG =Experimental Group, CG=Control Group

O<sub>1</sub>= Pre-Test

O<sub>2</sub>= Post-Test

O<sub>3</sub>= Retention Test Scores

X= Treatment

-X= No Treatment

### **3.2 Area of the Study**

The study was conducted in Bosso local Government area of Niger State; it is made up of 25 local government areas. The researcher use Bosso Local government area of Niger state because this particular studies has not been carried out in this area

### **3.3 Population of the Study**

The population of the study comprised all the public, Senior Secondary School class two (SS 11) student offering chemistry in Bosso government areas in Niger state. The choice of SS 11 students is based on the fact that most topics that are considered difficult topics are mostly found in SS11 scheme of work. The choice of co-educational secondary school is based on the fact that gender is a variable in the study.

### **3.4 Sample and Sampling Technique**

The samples that will be used for the study consist of a total of 72 SS11 chemistry students (32 males and 40 females). Multi stage sampling technique was used. Two schools were simple randomly selected from co-educational schools in the population. One intact SS11 class was assigned to language laboratory instruction while the other one intact class was assigned to conventional lecture method of instruction. The selection of school for either of the instruction method was done through simple random sampling (balloting) technique.

### **3.5 Instrument for Data Collection**

The instrument that was used for data collection was the chemistry Achievement Test (CAT) developed by the researcher. Each of the CAT contains twenty item instrument made up of multiple choice questions/items with four responses option A-D. The multiple choice test was developed from the unit of the senior secondary chemistry for SS II. In the construction of the instrument, a well constructed table of specification was used.

### **3.6 Validation of the Instrument**

The instrument undergoes both face and content validation. For face validation, the instrument was given to two specialists in chemistry education. This instrument was validated in terms of clarity of questions asked, proper wording of the items, appropriateness and adequacy of the questions/items to the students level of understanding and experience and agreement of items with the test blue print consequently, they made some comments which formed the basis for either modifying or rejecting some items. After the validation, the instrument was overhauled completely to reflect the specialist's contributions.

To ensure the content validity of the research instrument, test blue print was used to determine the number of item to be generated from a particular subunit. To do this, the researcher took into consideration the relative scope of the units and subunits. Thus units and subunits that are large in scope attracted more questions than those that are relatively

small in scope. In all, a total of 20 multiple choice question were generated from the subunits.

### **3.7 Reliability for the Instrument**

The reliability of the instrument was determined by administering the instrument to 20 students in Bosso local government secondary school who were not part of the sampled school. The student's responses were subjected to Kudar-Richardson (KR-21) formula to determine the internal consistency. The reliability coefficient of 0.91 was obtained. The internal stability was established using test retest method.

#### **Control of Extraneous Variables**

The following measures were adopted by the researcher to ensure that extraneous variables which might affect the result of the study were controlled.

##### **i. Teacher Variable**

To control the error which may arise as a result of teacher difference, the researcher organized one week pre-experimental conference for the regular chemistry teachers of the class selected from the sampled school for the study. The conference helped to establish a common instructional standard among the chemistry teachers.

##### **ii. Instructional Situational Variable**

To ensure that instructional situation is the same for all the classes in all the selected schools for the study, teaching and testing were conducted in the SS11 classes in each

school. However the data for the study was restricted only to the intact classes selected. This was to avoid Hawthorne Effect: a situation in which the research subjects' behaviours are affected not by treatment parse, but by their knowledge of participating in the study Novelty effect: a situation where there is increased interest, motivation or participation on the part of the research subject because they are doing something different.

### iii. **Inter-Group Variable**

To eliminate the error of non- equivalence due to non-randomization of the research subjects, analysis of covariance (ANCOVA) was employed for data analysis to correct the error of initial differences in ability levels among the research subjects.

### **Subject Interactions**

To control the error that which may arise as a result of subject interaction, the researcher minimized subject interaction by:

Ensuring that there were teachers in all the SS11 classes before the teacher commences the teaching. This helps to reduce wandering of the students.

Using only one teaching method in each school that is selected for the study. Either language laboratory or conventional lecture method for the experimental group or the control group respectively.

### **Experimental procedure/ Administration**

Before the treatment, the subjects were given a pre-test. The test was administered by the research in the sample schools. The scripts were marked by the researcher. The pre-test was used to-

- (a) Determine the students' initial knowledge of the materials they would learn later;
- (b) Determine the comparability of the two groups (experimental and control) with respect to their achievement in the pre-test scores.

After the pre-test, the experiment commenced. The main treatment for the study was the teaching of the Periodic table to senior secondary II chemistry students, using the two teaching methods (Language laboratory and conventional Lecture Method), The experimental group was taught using Language laboratory with the lesson plane prepared for the method while the control group was taught using the conventional lecture Method After the treatment, the post-CAT was administered to the subjects (both the control and experimental group). The scripts (both pre-test and post-tests) was marked by the researcher and the students' scores was recorded.

Two weeks after the post-CAT, the retention test was administered and as indicated earlier the pre-CAT was used as the retention test.

### **3.8 Method of Data Collection**

The pre-CAT was administered to the subjects before the treatment which lasted for two weeks. At the end of the treatment, a parallel test (post-CAT) was administered. The scores for both the experimental and control group was recorded accordingly. The test items in both the pre-test, post-test and retention test was scored one mark each. The maximum mark is 20 while the lowest mark is zero (0).

### **3.9 Method of Data analysis**

The researcher used use mean and standard deviation to analyze the data obtained and provide answers to the research questions. Student t-test was used to test the hypotheses formulated for the study at 0.05 level of significance. T-test was used in other to take care of the errors of initial difference in ability levels among the research subjects.

## CHAPTER FOUR

### 4.0 RESULTS AND DISCUSSION

This chapter discusses the result of the study in line with the research questions and hypothesis that guide the study.

**4.1 Research Question One:** What are the mean achievement scores of SS II chemistry students taught with language laboratory and those taught with the conventional lecture method?

**Table 4.1: Mean and Standard Deviation of Pretest and Posttest Scores of Experimental and Control Group**

GROUP	N	Pretest		Posttest		Mean Gain
		X	SD	X	SD	
Experimental	72	5.29	1.70	14.61	3.23	9.32
Control	72	4.80	2.03	13.05	2.80	8.30

Table 4.1 shows the mean and standard deviation of the mean achievement scores of experimental group and control group in pretest and posttest. The result revealed that mean and standard deviation scores of the pretest and posttest experimental group are  $\bar{X} = 5.29$ ,  $SD = 1.70$  and  $\bar{X} = 14.61$ ,  $SD = 3.23$  respectively. This gives a mean gain of 9.32 in favour of the posttest. On the other hand, the mean and standard deviation of the pretest and posttest of the control group are  $\bar{X} = 4.80$ ,  $SD = 2.03$  and  $\bar{X} = 13.05$ ,  $SD = 2.80$  respectively and gives a mean score of 8.30 in favour of the posttest. The result also revealed that experimental group and control group had mean gain of 9.32 and 8.30 respectively, and with the experimental group having the highest mean gain of 9.32



**4.2 Research Question Two:** What are the differences in the achievement mean scores of male and female SSII student in chemistry achievement taught using language laboratory?

**Table 4.2: Mean and Standard Deviation of male and female Scores of Experimental**

GROUP	N	Pretest		Posttest		Mean Gain
		X	SD	X	SD	
Male	32	5.03	1.98	14.59	2.27	9.56
Female	40	5.00	1.85	13.03	3.46	8.03

Table 4.2 shows the mean and standard deviation of the mean achievement scores of experimental group in pretest and posttest for both male and female. The result revealed that mean and standard deviation scores of the pretest and posttest for male are  $\bar{X} = 5.03$ ,  $SD = 1.98$  and  $\bar{X} = 14.59$ ,  $SD = 2.27$  respectively. This gives a mean gain of 9.56 in favour of the posttest. On the other hand, the mean and standard deviation of the pretest and posttest for Female are  $\bar{X} = 5.00$ ,  $SD = 1.85$  and  $\bar{X} = 13.03$ ,  $SD = 3.46$  respectively and gives a mean score of 8.31 in favour of the posttest. The result also revealed that male and female in the experimental group had mean gain of 9.56 and 8.03 respectively, and with the female having the highest mean gain of 9.56.

**4.3 Research Question Three:** What is the mean retention scores of SSII chemistry students taught with language laboratory and those taught with the conventional lecture method?

**Table 4.3: The Mean and Standard Deviation of Posttest and Retention Scores**

Group	N	Posttest		Retention test		Mean Gain
		$\bar{X}$	SD	$\bar{X}$	SD	
Male	58	14.59	2.27	17.06	1.73	2.47
Female	121	13.03	3.46	13.73	1.50	0.70

Table 4.3 shows the mean and standard deviation of the posttest and retention scores of male and female experimental group. From the result, it can be seen that mean score of the posttest and retention test score of the male are  $\bar{X} = 14.59$ ,  $SD = 2.27$  and  $\bar{X} = 17.06$ ,  $SD = 1.73$ . The mean gain is 2.47 in favour of the male retention test score. Similarly, the mean and standard deviation of posttest and retention test score of female are  $\bar{X} = 13.03$ ,  $SD = 3.46$  and  $\bar{X} = 13.73$ ,  $SD = 1.50$ , the mean gain is 0.70 in favour of the female retention test score. Also the result reveals the difference of 2.47 between the retention test mean gains score of male and female in favour of the female.

**4.4 Research Question Four** What are the differences in the mean retention scores of male and female SSII student in chemistry achievement test when taught using language laboratory?

**Table 4.4: The Mean and Standard Deviation of Posttest and Retention Scores in chemistry**

Group	N	Posttest		Retention test		Mean Gain
		$\bar{X}$	SD	$\bar{X}$	SD	
Male	58	14.59	2.27	17.06	1.73	2.47
Female	121	13.03	3.46	13.73	1.50	0.70

Table 4.4 shows the mean and standard deviation of the posttest and retention scores of male and female experimental group. From the result, it can be seen that mean score of the posttest and retention test score of the male are  $\bar{X} = 14.59$ ,  $SD = 2.27$  and  $\bar{X} = 17.06$ ,  $SD = 1.73$ . The mean gain is 2.47 in favour of the male retention test score. Similarly, the mean and standard deviation of posttest and retention test score of female are  $\bar{X} = 13.03$ ,  $SD = 3.46$  and  $\bar{X} = 13.73$ ,  $SD = 1.50$ , the mean gain is 0.70 in favour of the female retention test score. Also the result reveals the difference of 2.47 between the retention test mean gains score of male and female in favour of the female.

**4.5 Hypothesis One:** There is no significant difference between the mean achievement scores of SSII chemistry student taught using Language laboratory and those taught using conventional method.

**Table 4.5: Summary of descriptive statistics of achievement mean and standard deviation scores of students taught chemistry using language laboratory and conventional lecture method.**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	390.715	1	350.725	3.00	0.04
Within Groups	40902.302	208	110.890		
Total	41293.017	209			

Table 4.5 shows the results of the analysis of variance on achievement of students taught chemistry concepts using Language laboratory and those taught using conventional lecture method as a medium of instruction. As shown in (Table 4.5) revealed  $F(1, 208) = 3.00$   $p=0.04$  with  $P < 0.05$ , the null hypothesis ( $H_{01}$ ) was rejected. Therefore, students taught chemistry concepts using language laboratory and those taught in using conventional lecture method as a medium of instruction have significant difference.

**4.6 Hypothesis Two:** There is no significant difference between the mean achievement scores of male and female students taught chemistry using language laboratory.

**Table 5: Analyses of Covariance (ANCOVA) of students' achievement mean and standard deviation scores of students taught chemistry by instructional methods**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	10.831	1	12.811	0.10	0.64
Within Groups	16022.556	103	87.103		
Total	16033.387	104			

Table 4.6 shows the results of the analysis of variance on achievement of Male and Female Students Taught Chemistry Using Language laboratory as shown in (Table 4.6) revealed  $F(1, 103) = 0.10$   $P = 0.64$  With  $P > 0.05$  the null hypothesis was accepted. Therefore, there was no significant difference between the post-test academic achievement of male and female students taught chemistry concepts using language laboratory.

**4.7 Hypothesis Three: Analyses of Covariance (ANCOVA) of students' retention mean and standard deviation scores of students taught Chemistry by instructional methods**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	763.717	1	663.717	7.98	0.00
Within Groups	41310.005	208	83.016		
Total	42073.715	209			

Table 4.7 shows the results of the analysis of variance on achievement of students taught chemistry concepts using laboratory language and those taught using conventional lecture method as a medium of instruction. As shown in (Table 4.7) revealed  $F(1, 208) = 7.98$   $p = 0.00$  with  $P < 0.05$ , the null hypothesis ( $H_{03}$ ) was rejected. Therefore, there was significant difference in retention scores of students taught chemistry concepts using laboratory language and those taught using convention as a medium of instruction.

**4.8 Hypothesis Four:** there is no significant different between the mean retention of male and female student's taught using Language laboratory and those taught using conventional lecture method.

**Table 4.8: Analyses of Covariance (ANCOVA) of students' retention mean and standard deviation scores of students taught Chemistry by instructional method and gender**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	343.770	1	343.770	2.72	0.06
Within Groups	10632.325	103	59.749		
Total	10976.095	104			

Table 4.8 shows the results of the analysis of variance on retention scores of Male and Female Students Taught chemistry Using Language Laboratory shown in (Table 4.8) revealed  $F(1, 103) = 2.72$   $P = 0.06$  With  $P > 0.05$  the null hypothesis was accepted. Therefore, there was no significant difference between the retention scores of male and female students taught chemistry concepts using Language Laboratory.

### **Summary of the Findings**

Below are the summary of the findings of this study

1. Students taught Chemistry using language laboratory scored higher in achievement test than the group taught using conventional lecture method.
2. Significant difference exist in the achievement mean score between students taught Chemistry using language laboratory and those taught using conventional lecture method in favour of language laboratory group with high mean score
3. Students taught Chemistry using language laboratory method score higher in retention test than the group taught using conventional lecture method
4. Significant difference exist in the retention mean scores between students taught Chemistry using language laboratory method and those taught using conventional lecture method in favour of language laboratory group with high mean score
5. Gender is not significant in the achievement mean scores of students taught Chemistry using language laboratory method
6. Gender is not significant in the retention mean scores of students taught Chemistry using language laboratory method

## CHAPTER 5

### 5.0 DISCUSSION OF FINDINGS, CONCLUSION, RECOMMENDATION AND SUMMARY

This presents the discussion of the findings, conclusion, educational implications, and recommendations for further studies and finally, the summary of the study

#### 5.1 Discussion of findings

The findings of the study were discussed base on the research questions and hypothesis of the study.

##### **Impact of language laboratory on students' achievement and retention in chemistry**

This finding of this study revealed that there is a significant difference between mean achievement score of SSII student taught chemistry using Language laboratory and those taught with the instructional conventional lecture method. The mean achievement scores of students' taught with Language laboratory was higher than achievement scores of students taught with conventional lecture method. In view of this John Stone(2014) state that in our digital world, survey constantly show that language laboratory increase student achievement and motivation to learn. This finding therefore implies that through Language laboratory is rarely used in our schools, which could be used to enhance student achievement in chemistry.

##### **Impact of language laboratory on students' retention in chemistry**

The finding of the study indicates that the students' taught in chemistry using language laboratory, which is experimental group had higher retained more than those taught using conventional lecture method. This find is in line with Eke (2004), who reported that students' retain more when they are taught with language laboratory than when they are taught with lecture method this difference in students retention could be as a result of students' active engagement in learning process and interaction with one another. The finding of this study has proved language laboratory to have more impact on students than conventional lecture method. It could therefore help significantly to improve students' academic achievement as well as retention in chemistry.



### **Gender achievement when taught with language laboratory**

This finding of the study shows that the retention means scores of male and female students in the experimental group is almost the same this indicate that language laboratory is gender friendly. Ekwe (2013) is in line with the findings that there is no significant difference in male and female achievement scores in biology when exposed to the same teaching method. On the finding of this study disagrees with the finding of Eze(2010) and Nwago (2013) who reported that there is significant difference in male and female students; achievement in the their study.

### **Effect of gender on student's retention when taught using Language laboratory**

This finding of the study show that the retention mean scores of male and female in the experimental group is almost the same ,this indicate that language laboratory method of teaching is gender friendly. This finding is in line with the findings of Eke(2004) who reported there is no significant differences in the retention of male and female taught biology with stimulation method.

## **5.2 Conclusion**

The finding of the study can be concluding as follows:

- Student taught chemistry with language laboratory approach of teaching achieve higher than those taught using conventional lecture method. This was suggested that language laboratory stimulate students' academic achievement more than the conventional lecture method.
- Students that were instructed in language laboratory approach retain more than those with conventional lecture method. This proved that language laboratory method of teaching is effective and has more impact.
- Male and female taught chemistry using language laboratory method achieve almost equally. This implies that is gender friendly and is un-bias.
- Male and female students instructed with language laboratory method retain almost equally in chemistry. There is no significant difference in the mean retention scores of male and female students taught chemistry using language laboratory method. This

suggest that language laboratory method has more impact and when properly implemented could help to enhance not just retention but also retention in chemistry.

### **5.3 Educational implication of the study**

The findings of this study have some implications

1. The finding shows that Language laboratory method of teaching is more impactive and effective than conventional lecture method. This implies that students' achievement in chemistry will improve more when they are taught with language laboratory method than taught with conventional lecture method.
2. The study also shows that students' taught chemistry concept with language laboratory method of teaching retain more than those students that were taught with lecture method. This implies that students will better retain what they have been taught in chemistry when they are exposed to language laboratory method of teaching.
3. Another implication of this study is that both male and female students' achievement can be improved.
4. The findings also indicate that language laboratory has the ability to improve both male and female students' achievement and retention in chemistry. This study there will help to reduce gender sentiment in the teaching and learning of chemistry

### **5.4 RECOMMENDATION**

The following recommendation where made base on the study

1. Language laboratory method of teaching should be adopted by curriculum designers and teacher as one of the participatory method of teaching and learning of chemistry in Nigeria.
2. The government should assist in installation of language laboratory in all government schools and profiting facilities that can aids students achievement and retention.
3. Teachers should be trained and retrained by government on how to use Language laboratory method of teaching in other to improve students' retention.
4. The secondary school board should adequately supervise teachers for effective implementation of chemistry in the curriculum in Nigeria.

### **5.5 Limitations of the Study**

The researcher encountered some difficulties in the cause of this study. The researcher did not find it easy finding materials for this study as they are very few works on language laboratory method of teaching online.

### **5.6 Suggestion for Further Study**

The researcher suggests the following for further study:

1. That a study be carried out to compare the impact of two different types of language laboratory on students' achievement and retention in chemistry
2. That the study on the impact language laboratory on students' achievement and retention in chemistry should be replicated in other local government in Niger state.
3. That further researches be carried out on the impact of language laboratory on students' achievement and interest in chemistry.
4. That further researches be carried out on the impact of language laboratory on students' achievement and motivation in chemistry.

### **5.7 Summary of the Study**

The study investigated the impact of language laboratory on students' achievement and retention in some concept in chemistry at senior secondary school in Niger State. Students' academic achievement and their ability of retain what they have achieved is very important in education as that is the only way to ascertain the realization of the objectives of chemistry as a subject of study. The students' poor achievement in chemistry spurs the researcher to undertake this study on the impact of language laboratory on students' achievement and retention in some concepts in chemistry at

senior secondary schools. Based on this background the study also examined the influence of gender on students' achievement and retention when they are exposed to language laboratory. Four research questions guided the study and were answered using mean and standard deviation on the other hand four null hypotheses were formulated and tested at 0.05 level of significant using analysis of covariance (ANCOVA).

Review of related literature was done under the following subheadings; conceptual framework theoretical framework, review of empirical studies and the summary of review of literature the reviewed literature the retrieved among other things that some studies had been carried out in other subject areas to find out the impact of language laboratory on students achievement and retention in secondary schools. Nevertheless none of the reviewed studies focused on the impact of language laboratory on students' achievement and retention in chemistry at senior secondary school Bosso local government of Niger State.

Quasi –experimental design of pre- test post-test non-equivalent group design was adopted for the study. The target population of the study is two senior secondary II government students in Bosso local government. Sampling technique was used to select seventy two research subjects that were used for the study. Instrument called chemistry Achievement Test (CAT) and Chemistry Retention Test (CRT) with the reliability index of 0.91 was used for data collection in addition experimental and control lesson plane were used for teaching the experiment and control group respectively. Before teaching pretest was administered on the research subjects to find out the initial achievement level and posttest was administered after the treatment for analysis.

Data that were obtained were subjected for statistical analysis. Mean and standard derivation was used to answer the research questions while analysis of covariance was used to test the null hypothesis. The result of the analysis indicated among others that students taught chemistry with language laboratory achieved and retained more than their conventional lecture method counterparts.

Following the discussion of the findings the educational implication of the study were highlighted. Based on the findings of the study, it was recommended that teachers should adopt language laboratory approach to enhance students' achievement in chemistry. The limitations for the study were highlighted and suggestions for further studies were made. Based on the findings of the study it was concluded among others that teachers should adopt language laboratory approach and should be adequately supervised to ensure effective implementation of chemistry in curriculum and the realization of the objectives of chemistry as a subject of study.

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## CHEMISTRY ACIEVEMENT TEST (CAT) FOR SENIOR SECONDARY SCHOOL II

Name of School: \_\_\_\_\_

Gender: Male

Female

**INSTRUCTION:** TICK/ CIRCLE THE CORRECT OPTION FOR EACH OF THE FOLLOWING SENTENCE FROM QUESTIONS A - D

1. The period table is the tabular arrangement of chemical elements ordered by their increasing \_\_\_\_\_  
(A) Mass Number (B) Atomic number (C) Proton number (D) Atomic mass
2. \_\_\_\_\_ states that the properties of the elements in the periodic table are a periodic function of their atomic number.  
(A) Periodic table (B) Periodic cup (C) Periodic function (D) Periodic laws
3. Group 1 elements are known as \_\_\_\_\_  
(A) Alkaline earth metal (B) Oxygen family (C) Nitrogen Family (D) Alkali metal
4. Carbon family are known as \_\_\_\_\_  
(A) Group 1 (B) Group 2 (C) Group 4 (D) Group 10
5. How many electron is in group 1 valence shell?  
(A) 1 (B) 3 (C) 2 (D) 10
6. Valence electrons means \_\_\_\_\_  
(A) Innermost shell (B) outermost shell (C) uppermost (D) I don't know
7. \_\_\_\_\_ are placed on the left-hand side of the periodic table  
(A) Non-metal (B) Metal (C) Atom (D) Atom
8. The metal are placed on the \_\_\_\_\_ side of the periodic table.  
(A) Non- metal (b) Centre hand (C) right hand (D) Upper Hand
9. The horizontal column in the periodic table is called \_\_\_\_\_  
(A) Period (B) Group (C) tittle (D) Gapper
10. Hydrogen is an example of \_\_\_\_\_  
(A) Group 1 (B) Group 2 (c) Group 3 (D) Group 7



11. The vertical arrangement of elements in the periodic table is known as \_\_\_\_\_  
 (A) Group (B) Period (C) Gapper (D) tittle
12. There are \_\_\_\_\_ periods in the periodic table.  
 (A) 4 (B) 7 (C) 2 (D) 10
13. One of the following elements belong to halogen family.  
 (A) CA (B) CL (C) Cl (D) Na
14. The followings are group 2 elements except \_\_\_\_\_  
 (A) Be (B) Mg (c) Na (D) He
15. Carbon is in group 4 in the periodic table because it has four valence electrons?  
 (a) True (B) False (C) I don't know (D) all of the above
16. What is the electronic configuration?  
 (A) It is the distribution of electrons into various shells  
 (B) It is the act of sharing atom  
 (C) It is the act of selling and buying  
 (D) It is the act of distribution
17. The formula for the element Sodium is \_\_\_\_\_  
 (A) SO (B) So (C) NA (D) NA
18. What is the formula of Calcium  
 (A) CA (B) Ca (C) CL (D) CL
19. Chlorine is called halogen because it has \_\_\_\_\_ Valence electrons.  
 (A) Seven (B) Two (C) Three (D) Four
20. The group in the period table can be identify by number of shell represented?  
 True (B) False (C) I don't know (D) None of the above