AN ASSESSMENT ON THE IMPACT OF CHEMISTRY PRACTICALS ON ACADEMIC ACHIEVEMENT AMONG SENIOR SECONDARY SCHOOLS STUDENTS IN GUSAU METROPOLIS

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BEING A RESEARCH STUDY SUBMITTED TO THE DEPERTMENT OF EDUCATION CHEMISTRY, FEDERAL UNIVERSITY GUSAU.

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APPROVAL PAGE

This is to certify that this study, AN ASSESSMENT ON THE IMPACT OF CHEMISTRY PRACTICALS on ACADEMIC ACHIEVEMENT among SENIOR SECONDARY SCHOOLS STUDENTS IN GUSAU METROPOLIS, carried out by Mulikat Muhammed, with admission no.(1510111002), Anas Hamza, with admission no.(1510111019), Abdulkadir Mohammad, with admission no.(1510111003), Amina Usman with admission no.(1510111013) and Iliyasu Zainab with admission no.(1510111002) of the department of chemistry education, federal university Gusau in partial fulfillment of the requirement of Bachelor of education (B.Ed), Degree in chemistry education

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DEDICATION

This project work is dedicated to Almighty Allah for his everlasting guidance, infinite mercy, protection, strength, inspiration and favour, which made the achievement of the work possible. We equally dedicate this work to our lovely parents for their support.

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ABSTRACT

This study makes a comparative analysis on the assessment on the impact of chemistry practicals on academic achievement among senior secondary school students in Gusau metropolis. Survey research design was used and total sample of 972 student in four selected secondary schools where taken as the sample size for this study among the selected schools in Gusau metropolis. Data regarding students and staff were obtained from examination and record office from the selected schools in Gusau metropolis. Analysis of data using mean and standard deviation which revealed that chemistry has impact on the Students academic achievement while gender has no influence on the academic achievement among senior secondary schools students in chemistry practicals. Some of the recommendations were that. Government should as a matter of urgency make available chemistry equipment for senior secondary school students in-other for them to understand chemistry as a subject. Meanwhile, government should equally employed qualified chemistry teachers in schools so as to enhance the performance of students in chemistry.

Table Contents

CHAPTER ONE

INTRODUCTION

BACKGROUND OF THE STUDY

Chemistry is a branch of science concerned with the nature of substance and how they react to each other. Relatively, chemistry is a branch of science which is considered as a promoter of human development .It is also seen by many to be at the center of any society's development. Furthermore, chemistry is a science subject in all senior secondary school Nigeria even in the higher and tertiary institution. It is worth to note that the major advances made in medicine and industrial chemistry are based on research being conducted in many areas of science and technologies such as chemistry.

Chemistry is divided into four branches which includes; organic chemistry physical chemistry and in-organic chemistry.(Achor, Kurumeh,&Orokpo. 2012)

The importance of chemistry to the building of our nation includes; development of new practical tool and techniques to improve the quality of life and equally improve the academic performance (Achievement), among senior secondary school in Gusau metropolis.

In addition, another importance of chemistry to the building of our nation includes the techniques to improve the quality of life through the production of vaccine, new food storage system e.t.c . Meanwhile, chemistry equally introduced development of scientific weapon which serves as agent destroying crops pest and diseases.

Chemistry is the most influential science process established. Donim, (1999), stated that the prerequisite knowledge of its concept and principle can be obtained only if the students have certain underlying capability of the science processes, which are needed to practice and

understand science subject especially in chemistry among senior secondary school, Gusau metropolis.

Student's academic performance and achievement in chemistry practical in the United State of American (USA) have show a decline over the years. These result pushed the U.S.A. to focus on school reform especially science education. (Mupanduki,2009)

Hofstein (2004),reports that we are operating in a new era of reform in science education where both the content and pedagogy of science are being scrutinized and new standards intended to shape meaningful science education (chemistry) are emerging. In chemistry, one area that requires urgent reform is the chemistry practical, where it is important to rethink the role and place of chemistry practical in learning among secondary school student .

Over the years, many have argued that science cannot be meaning full to students without worthwhile practical experiences or practical in the school laboratory , (Hofstein and Hamloknaaman 2007).

Typically, practical means experiences in school setting where students interact with materials to observe and understand the natural world. Practical are designed and conducted to engage student individually or in small group, a method referred to as class experiment or in large group demonstration setting , which is known as teacher's demonstration method .

Since chemistry is a practical science, teaching and learning of chemistry should involve chemistry practical because practical are essential part of science education and science educators have suggested that there are rich benefit in learning from using laboratory activities.(Millar,2009). Anaso(2010) reports that researchers had observed that lack of chemistry practical by chemistry students result in poor communication as well as observational skills; this gives rise to students poor performance.

countries with a tradition of chemistry practical in school chemistry teaching,(such as UK),chemistry practical are often seen by teachers and others(particularly scientists) as central to the appeal and effectiveness of chemistry learning (Abrahams and Millar,2008).

Although many science teacher believe that students chemistry practical lead to better learning and indeed better performance because,we all understand and remember things better if we have done them ourselves, many educators have expressed concern about their effectiveness in promoting learning(Millar,2009).For instance, Abimbola(1994) research on appraisal of the role of laboratory chemistry practical concludes that, continuing to accord a central role to laboratory work in science teaching does not seen reasonable and feasible any more in the developing countries. Due to argument such as these and taking into consideration of the relatively high demand for resource and time, then the effectiveness and usefulness of chemistry practical as a teaching and learning strategy has to be addressed.

Although, chemistry courses at all levels have included chemistry practical where students follow procedures, directing them to mix chemicals, make measurements,analyze data and draw conclusion. Ssempala,F(2005) argues that the chemistry practical often consists of what is generally described as "cook book " exercise and engaging or inspiring. According to Abimbola (1994),science teacher do not usually find it convenient to make chemistry practical the center of their instruction .They usually complain of lack of materials and equipment to carry out chemistry practical and at the same time , it is possible that some of these materials and equipment may be locked up in the school laboratory store without teachers being aware of their existence..

According to Oxford , advanced learning (2001)"achievement is defined as a thing that somebody has done successfully especially using his or her own effort and skill. According Khuluse(2009), he defined academic achievement as something one does or achieve at

school, college or university in a laboratory class or field work. From the foregoing, we can understand that academic achievement of students in chemistry, depends on the impact of chemistry laboratory practical by providing students with practical laboratory lesson that are academically stimulating with task and subsequently may achieve higher in assessment grades. (Karen et al,2001)

STATEMENT OF THE PROBLEM

Chemistry has a crucial role in the rapid developments of science and technology. Since they emphasizes the role of science, technology and innovation.(STI) in a modern economy, then good performance of the subject and other science is crucial. The school of science curriculum in most countries has a distinct purpose of supplying new recruits to jobs requiring more detailed scientific knowledge and expertise than learning of school chemistry, a science, provides the foundation for more advanced study leading to such jobs. Poor performance of students in chemistry practicals is a major concern to teachers, policy makers and curriculum developers which chemistry practicals are given a central and distinctive place in the teaching and learning of chemistry at the secondary school level. Although, chemistry teaching and learning essentially involves chemistry practicals and has a long tradition of students experimental work in schools, question have been raised about the appropriate role and the reality of what is actually achieved by chemistry praticals especially, with continue decline in their academic achievement in the subjectDespite the widespread use of practicals as a teaching and learning strategy in school chemistry, and the view that increasing its amount would improve chemistry learning, some science educators have raised question about the impact of chemistry practicals on students academic achievement.

This study intends to asses the impact of chemistry practical on academic achievement among senior secondary school in Gusau metropolis. Meanwhile, question has been raised about the appropriate role and the reality of what is actually achieved by the chemistry especially with continued declined of performance in the subject.

OBEJECTIVES OF THE STIUDY

The main objectives of this research is to asses the impact chemistry practicals on academic achievement among senior secondary schools students in Gusau metropolis. The other specific objectives are;

i To determine the level of academic achievement among senior secondary school students in chemistry practicals

ii To determine the level of academic achievement of senior secondary schools students in chemistry praticals based on gender.

RESEARCH QUESTIONS

The study sought answer to the following research questions;

(1) What is the level of senior secondary school students academic academic achievement in chemistry praticals.

(2) Is there any difference between the academic achievements of male and female students in chemistry practicals.

1.5 SIGNIFICANCE OF THE STUDY

The study attempted to provide insight on the impact of chemistry practical on academic achievements among senior secondary school students in Gusau metropolis. By so doing, the finding of this study could benefit the following.

1.It could make the government through the ministry of education realize the need for provision of science equipment to senior secondary school

2.It could help the government in posting of qualified laboratory technologist to secondary schools.

3.It could help parents to provide basic requirements for practicals lesson for their children in secondary school.

4. It could boost the teaching of chemistry at the secondary school level, which may lead to higher performance in chemistry.

1.6 SCOPE AND DELIMITATION OF THE STUDY

This study concentrates on the impact of chemistry practicals on academic achievement among the senior secondary school in Gusau metropolis. Similarly, the number of students in a class may affect the quality of this study on chemistry practicals on academic achievement among students which might influence the outcome of this study on chemistry practicals and academic achievement among students. This research work will cover students from SS3 and SS2 and also teachers.

DEFINITION OF TERMS

Assessment: Is the systematic process of gathering and discussing information from multiple and diverse sources in order to develop a deep understanding of what students know, understand, and can do with their knowledge as a result of their educational experience

Impact: The force of impression or major effect.

Chemistry: Is the scientific disciple involved with element and compound composed of atoms molecules and irons; their composition, structure, properties, behaviour and the changes they undergo during a reaction with other substances.

Practical: Refers to the experiments carried out by the learner themselves or with the help of the teacher during the learning.

Academic achievement : Is used to describe things that relate to the work done in school, college, and universities, especially work which involve studying and reasoning rather than practical or technical skill.

Secondary school: Refers to an institution that offers educational experience to students for six years after primary school.

CHAPTER TWO

LITERATURE REVIEW

2.1: INTRODUCTION

This chapter is anattempt to review literature relevant to this topic under study. This will enable the researcher to establish close link with already concluded studies. The review of the related literature on the problems and prospects of an assessment on the impact of chemistry practicals on academic achievement among senior secondary school student in Gusau metropolis and theses will discuss under this following

2.2 The concept of chemistry

2.3 Chemistry laboratory

2.4 Chemistry practicals

2.5 Students academics achievements in chemistry practicals.

2.2THE CONCEPT OF CHEMISTRY

Chemistry is the scientific discipline involved with elements and compounds composed of atoms, molecules and ions: their composition, structure, properties, behavior and the changes they undergo during a reaction with other substances

There are many branches of chemistry or chemistry disciplines. The five main branches are considered to be organic chemistry, inorganic chemistry, analytical chemistry, physical chemistry, and biochemistry.

ORGANIC CHEMISTRY: The study of carbon and its compounds; the study of the chemistry of life

INORGANIC CHEMISTRY: The study of compounds not covered by organic chemistry; the study of inorganic compounds, or compounds that don't contain a C-H bond (many inorganic compounds contain metals)

ANALYTICAL CMEMISTRY:The study of the chemistry of matter and the development of tools to measure properties of matter

PHYSICAL CHEMISTRY: The branch of chemistry that applies physics to the study of chemistry, which commonly includes the applications of thermodynamics and quantum mechanics to chemistry

HISTORICAL VIEWS OF CHEMISTRY

Chemistry is presented in most modern textbooks from a ratherahistorical perspective. Although references to majorfigures inthe history of the discipline are often made, little discussion andanalysis is offered of the central questions, dilemmas, and concerns that have driven the development of chemical ideas andpractices. There is also no clear depiction of how the roles andperceptions of chemistry as a human endeavor have evolvedover time. Looking at chemistry from a historical perspective isbeneficial to chemical educators because it helps us recognizestruggles in the understanding of central concepts and big ideain the discipline, many of them similar to the challenges thatstudents face in our classrooms. It also opens our eyes to theunderlying themes, essential questions, scales of analysis, conceptual dimensions, contextual issues, and philosophical considerations that have emerged from the work of chemists throughout the ages. Consider, for example, the historical analysis of Jensen on themajor"revolutions"in the history of the discipline. In thiswork, Jensen builds a connection between critical historicalstages in the development of chemistry as a scientific disciplineand changes in the scale of analysis of chemical systems withinthe

composition–structure conceptual dimension, from themolar (macroscopic), to the molecular, to the electrical (subatomic)levels. From a different perspective, Knight's work follows theevolution of ideas in chemistry to reveal the different roles thediscipline has played over time, from an occult to a mechanicalscience, from an inductive to a deductive science, from adescriptive to a reduced science, from a useful to a servicescience.As afinal example, the writings of Bensaude-Vincentand Simon, at the boundary between history and philosophy,make us reflect on the ethical dimensions of chemistry.Suggestions about how to use historical and philosophicalperspectives in the teaching of general chemistry have beenmade by several authors. The 16th and 17th centuries saw the beginnings of what we now recognize as modern chemistry. During this period, great advances were made inmetallurgy, the extraction of metals from ores, and the first systematic quantitative experiments were carried out. In 1661, the Englishman Robert Boyle (1627–91) published The Sceptical Chemist, which described the relationship between the pressure and the volume of air. More important, Boyle defined an element as a substance that cannot be broken down into two or more simpler substances by chemical means. This led to the identification of a large number of elements, many of which were metals. Ironically, Boyle himself never thought that metals were elements.

In the 18th century, the English clergyman Joseph Priestley (1733–1804) discovered oxygen gas and found that many carbon-containing materials burn vigorously in an oxygen atmosphere, a process called combustion. Priestley also discovered that the gas produced by fermenting beer, which we now know to be carbon dioxide, is the same as one of the gaseous products of combustion. Priestley's studies of this gas did not continue as he would have liked, however. After he fell into a vat of fermenting beer, brewers prohibited him from working in their factories. Although Priestley did not understand its identity, he found that

carbon dioxide dissolved in water to produce seltzer water. In essence, he may be considered the founder of the multibillion-dollar carbonated soft drink industry.

2.1.2: The Role of Chemistry Education in National Development

Chemistry Education is therefore the systematic process of acquiring the fundamental knowledge about the universe. With these indispensable knowledge richly acquired, man can shape and reshape his world for his benefit. Hence, the development of the nation is usually measured by the degree and extent of growth brought to it through the enterprise of science education and a gate way to it is chemistry education. Chemistry education is the vehicle through which chemical knowledge and skill reach the people who are in need of capacities and potentials for development. In addition, chemical education addresses the social objective of substance development as education is now of the primary means for empowerment, participation, cultural preservation, social mobility and equity (Emmanuel, 2013) The impact of chemistry on technology involves the process of bringing manufacturing inventories and sculpturing, designing etc. Technology can be seen as the application of scientific knowledge, skills, work, attitudes, tools and equipment in evaluation of new processes and adoption of these processes to the production of goods and services for the benefit of mankind (Hornby, 2010). Chemistry education plays important role in enhancing the quality of teaching and research as well as ensuring that students are equipped with good knowledge to produce intensive goods and services to meet human needs for food, health care products and other materials aimed at improving the quality of life. Every single material thing in the universe is a chemical and the ability to understand and manipulate these chemicals is responsible for everything from modern food and drugs to plastics and computers. Conclusively, the ideas of chemistry are not getting the attention they desire in either formal or informal education provision. It is argued that an improvement in this position requires the further development

of the nature and quality of chemical education to chemical industries through intensive and extensive research.

Chemistry education is needed in the professional development of chemical industries required in the establishment of modern technology and operation of chemical industries. The process of chemical transformation involves intra-chemical reactions within the same substances examples, sublimation, radio-active decay like uranium, plutonium etc and other chemical reactions when the substances react with other things which includes the evaporation of volatile substances like fuel, Methylated spirit and even water when exposed to air. Really, chemistry can be used to find solution to problems of everyday activates in science, industry, technology, government, educational sector and economics. Some of the industries that obviously cannot do without chemistry include; cosmetics industry, brewery industry, chemical industry, textile industry, food processing and technology industry, forestry, Agricultural industry, petroleum, pharmaceutical industry etc. Man's success in the different realm of chemistry provides man unquenchable source of hope for success in technology. Whatever technology is, be it nursing, man is poised to face it challenges having gained courage, built in confidence in himself as he overcomes the seemingly impenetrable mysteries of chemistry. To be able to operate machinery involved in technology, good dosage of simple experimental concept like observation and recording, theory and principles and measurement to take record of events that are needed. Also market forces succumb to the supremacy of social chemistry which includes simple experiment formulation such as record and observation, profit and loss, minimum and maximum, to the more complex ones like optimization theory and also operation research such experimental expressions. Development is the gradual growth of something so that it becomes bigger, more advanced and stronger

Hornby(2010) in Mohammed & Bello (2013) sees development as growing or becoming industrialized. National development is the ability of a country or countries to improve the social welfare of the people. The question is whether this could be done through the knowledge of chemistry education? Educational institutions everywhere are established to carry out the role of teaching, research and community services, thereby contributing meaningfully to the social, economic, cultural, political, scientific and technological development of any nation (Iji, Abah&Uka, 2013).

2.3: CHEMISTRY LABORATORY

The place of chemistry laboratory practical in teaching Chemistry cannot be over emphasized, little wonder why Tairab (2014) Opined that chemistry practical work has helped students in knowledge acquisition, Daramola (2013), and Ogunniyi (2007), advocated earlier that science, which would be taught in secondary schools, should be technologically oriented, which means to teach science with its practical application which strengthens the fact that in recent times, science teaching has taken a new trend. Science belonged to the laboratory as cooking belongs to the kitchen and gardening to a garden. This is the state where chemistry practical teaching is best done in the laboratories. Ndu (1980), also emphasized the practical teaching of science by saying that meaningful learning of science cannot be achieved without practical aspect of science stressing that science disciplines are not only the acquisition of facts but also embrace the processes. Woolnough (1994) also found that majority of secondary school teachers indicated that about 40% to 80% of the class time was spent in practical activities. Hodson (2002) in his own work, classified the reasons given by teachers for engaging in practical work into five major categories like to motivate learners by stimulating interest and enjoyment, teaching laboratory skills, to enhance learning of scientific knowledge, give insight into scientific methods, develop certain scientific methods, these coincides with the classification of practical work reported by Gott, Welford,

and Foulds (1988) when they identified five types of practical works like, inquiry practical, investigative practical, skill practical, illustrative practical, and observational practical.

Although Abimbol(2015) stated that some practical scientific experiences may be acquired in everyday life, the most important part of the experience is through practical work which gives the student the appreciation of the spirit of science. Therefore, there is no adequate substitute for retention of facts and which also makes learning more permanent because, chemistry practical work closely linked with theoretical work and help to maximize opportunity to practice those scientific methods.

Chemistry laboratory activities provides opportunities for students to actually do science as opposed to learning about science. Nzewi (2008) asserted that chemistry laboratory practical activities can be regarded as a strategy that could be adopted to make the task of a teacher (teaching) more real to the students as opposed to abstract or theoretical presentation of facts, principles and concepts of subject matters. Nzewi maintained that practical activities should engage the students in hands-on, mind-on activities, using varieties of instructional materials/equipment to drive the lesson home.

According to Nwagbo(2008) stated the use of practical activities (approach) to the teaching of chemistry concepts and should therefore be a rule rather than an option to Chemistry teachers, if we hope to produce students that would be able to acquire the necessary knowledge, skills and competence needed to meet the scientific and technological demands of the nation.the search for a more effective approach for the teaching and learning of Chemistry that will enhance the acquisition of process skills has persisted over the years. This is because, the acquisitions of science process skills are the bases for scientific inquiry and the development of intellectual skills and attitudes that are needed to learn concept

Acording to Nwagbo (2008), a number of factors have been identified as contributing to the non-acquisition of skills by secondary school students which invariably lead to poor performance and one of the factors is the teacher variable, that is, the teachers' method of teaching. Furthermore, Okoli (2006) indicated that many science teachers prefer the traditional expository/lecture method of teaching that is, a teaching technique in which one person, the teacher, presents a spoken discourse on a particular subject and shy away from activity-oriented teaching methods which are student centre (such as inquiry method, discovery method, investigative laboratory approach). Nwagbo (2008) observed that such teacher-centred approach which places the teacher as the sole possessor of knowledge and the students as passive recipients of knowledge may not enhance achievement or promote positive attitude to Chemistry . Apart from teaching methods, gender is also implicated in students' achievement in science.

2.4: CHEMISTRY PRACTICALS

Modern science teaching and learning emphasizes students' participation in the learning process through series of practical activities within the confine of the laboratory and available modern technologies. The fact modern concept of science emphasizes practical activities both teachers and learners should put more effort and time into the teaching and learning process.

The term science can be used to refer to a product (a body of knowledge) process (a way of conducting enquiry) and enterprise (the institutionalised pursuit of knowledge a process of material world). The distinctive characteristics of scientific knowledge is that, it provides material explanation for the behaviour of the material world that is explanation in terms of the entities that make world and their properties (Millar, 2004) given that the subject matter of science is the material world it seems natural and rather obvious that learning science will

involve and that manipulating real object and materials and that teaching science will involve act of shows as well as of "telling".

Ango (1986) who opines that, since chemistry practicals works in science means that learners and not only teachers are actively and productively involved in the learning process. To improved the performance of student and quality of science teachers and administrators who have an elevated level of authentic knowledge of both theoretical and practical sciences, learning style and prefer teaching methods and a genuine appreciation for the available repertoire of experience science students brings to school (Millar et al., 2002).

Oriafa (2003), described chemistry practical exercise as hands on activities for the acquisition of practical skills and attitudes. Practical, skills are science process skills and students needs to acquire and developed them for effective and sustainable development in science and technology of the day. The importance acquiring science process skills (scientific skills) cannot be over emphasized. Science process skills have been widely recognised as the foundation for scientific undertaking.

Chemistry practical as matter of fact is of crucial importance in the learning of natural sciences. Integrated sciences as an interdisciplinary subject is activities oriented need a lot of practical activities for its understanding development and application. Chemistry Practical work can provide students with valuable insight into scientific practice and can provide increase interest in science and motivation. Examples of the successful use of practical projects are however at the senior secondary school or above where students are to some extend independent where teachers have better subject knowledge and group sizes are smaller. Chemistry Practical work is necessary for developing students understanding of scientific concept and explanation.

Ango (1986) states that chemistry practical work is very essential for developing practical scientific skills and techniques problem-solving and in developing the character of a scientist. She further included the following fundamental aims of practical work as:

1 To involve the learners

2 To explain and make clear theoretical ideas

3 To try out experiments

4 To verify ideas

5 To test ideas and provide some

6 To validate hypothesis

7 To find answers to questions

8 To develop skills of science specifically referred to process skill

9 To facilitate concept understanding

10 To explain and symbolise concept of science.

The national policy on education stated that the aim of education is to educate on the child the spirit of inquiry and creativity through the exploration of nature. This could be active through practical activities in teaching and learning but most of the activities in teaching and learning of science in our schools are theoretical based leading to poor performance of students in sciences.

Award (1984), said that teachers cannot teach science effectively without employing the process of science in which practicals is essentially and student cannot learn science effectively without acquiring such process as well.

2.5: OVERVIEW OF THE RELATED STUDIES

The purpose of the study is to look at academic achievement in chemistry practicals. This study will also review literature work that are related to the studies. Quality of chemistry practical work refers to the degree of learner involvement in the practical. According to a related study conducted by Ifeakor (1999), the study describes and examines the effect of the quality of practical work implemented by secondary school chemistry teachers. The students' performance in chemistry was determined from scores obtained by students in Achievement Tests (SATs) done just before and immediately after exposure to different types and amounts of chemistry practical work in the topic under investigation. Descriptive and inferential statistics such as the mean and independent t-test were used to discuss the research findings. The study found that there is a positive relationship between the quality of practical work and learners' performance in chemistry. The results of the study indicate that the students had comparable performance in chemistry before treatment; that the quality of practical work had a significant contribution to the post test scores; and that there was a significant difference in performance in the post test between the experimental and control groups. The study recommends that the quality of chemistry practical work exposed to students be improved so as to improve performance in chemistry.

According to a study conducted by Emmanuel (2013),The study deals with student attitude towards laboratory work and its impact on academic performance in chemistry in Oredo Local Government Area of Edo State. Eight schools were involved in the study. Attention was paid to a close examination of three selected factors which are assumed, affected students attitude towards chemistry laboratory work.

i. Chemistry student quality and availability of the chemistry laboratory equipment.

ii. The teachers quality, qualification and experience and personality.

iii. The amount of time or period spent on laboratory work.

The main instrument used for the research was mainly students questionnaire the questionnaire were administered by the investigator. The main statistical method used were simple percentage and the analyses of the data collected revealed the following:

1. Like and dislike of chemistry laboratory work in majority of the cases is due to the influence of the teacher (laboratory equipments)
2. In some cases, students like laboratory work due to the influences of their teacher.
3. Most of the student show positive attitude towards chemistry laboratory work.

Also from the study, student attitude towards laboratory work has influence on their academic programme. Teachers and parents are advised by the investigator to make it a matter of duty to encourage and direct their children towards development of positive attitude in laboratory work in particular and chemistry in general.

According to a study conducted by Okeke (2016), the study determined the influence of Chemistry practical on students' interest and academic achievement in senior secondary school chemistry. The general purpose of the study was how to find out how practical chemistry exercises triggered interest and hence promoted more academic achievement in senior secondary schools in chemistry. In order to give this study a sense of direction, two research questions were raised and answered while two hypotheses were formulated and tested at 0.051evel of significance. Literature related to the study was reviewed under conceptual and empirical frameworks. The design ofthe study is survey. The area of the study is Awgu Education zone. The population of the study was three thousand and five hundred (3,500) SS2 students. The sample and sampling technique were one hundred and fifty (150) SS2 students and stratified random sampling technique. The instruments used are chemistry practical achievement test (CPAT) and chemistry interest inventory (CII). Two instruments were used to collect data. The Data collected were analyzed using Mean and SO. T-test

analysis was also used to obtain t-calculated and hence t-critical. Results show that the mean and SO obtained are mean = 112.34 and SO = 13.34. The t-calculated value = 25.56 at OF of 49 and t-critical (P) value = 1.68. The t-calculated for the two hypotheses is greater than the t-critical. Therefore the null hypotheses were rejected. That is to say they are significant at OF of 49 at 0.051evel of significance. 5 Keywords: Chemistry, Practical, Students, Achievement and Interest

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter explains the procedure and method that was applied in conducting this study and issues discussed include research design, population of the study, sampling technique/sampling size, description of research instrument, validity and reliability of the instrument, procedure for data collection and procedure for data analysis.

3.2 RESEARCH DESIGN

The research design is the structure and strategy for obtaining a reliable and valid result of a research problem. According to Natalie & Stephen, (2017) research design means thof data to enable the investigator test or answer research questions by providing procedural outline for conducting research.

This research employed survey design, since the purpose of the study is to ascertain the impact of chemistry practicals on academic achievement among senior secondary school students in Gusau metropolis. Okoro (2001), gives a definition of survey as a process of gathering data from target population through questionnaire or interview and subjecting such statistical analysis for the purpose of reaching conclusion on the subject matter on the study and providing solution for identified purpose.

3.3 POPULATION OF THE STUDY

According to Nurfika (2014), population mean all cases or individual that fit a certain specification.

Table 3.2.1 Population of the study

S/N	NAMES OF SCHOOL	SS2	SS3
1	GGDSS GALADIMA	188	90
2	GGDSS.S/ KUDU	144	80
3	GDSS GUSAU	198	70
4	GDSS.S GARI	142	80
5	GGDSS BYE PASS	177	60
6	GGASS T/WADA	151	70
7	GGDSS G/BIYU	180	100
8	GDSS JANYAU	199	100
9	GDSS DANTURAI	189	70
10	GDSS MIL QTRS	187	80
11	GDSS U/GWAZA	153	70
12	GTC GUSAU	165	50
13	SAMBO SEC SCH	183	70
14	GDSS B/RUWA	172	80
15	GGSSS SAMARU	163	70
16	GSSS	182	80
17	CENTER FOR CON.EDU	121	80
18	GSSU/ DAN BABA	175	90
19	GSS SABON GARI	170	70
	Total	3,339	1,490

3.4 SAMPLE AND SIMPLE TECHNIQUE

According to Obas (2013), sample is a portion of a population selected for the study. Therefore,4 schools where selected as sample which includes, GGDSS By pass, GDSS Gadabiyu, GDSS Samaru and GSS Sabon-Gari where taken with 972 students as sample size among the selected schools in Gusau local government area.

This research made use of purposive sampling technique. This technique provided each member of the population the chance of being selected. This sampling was used because the researcher found out that staff of the selected schools are the one who teaches the students chemistry practicals in the laboratory as the students who equally knows wither the available equipment in the laboratory have a positive role to play their academic achievement

Names of school	SSS2	SSS3
GDSSS By pass	177	60
GDSS Gadabiyu	180	100
GDSS Samaru	163	70
GDSS Sabon Gari	142	80
Total	662	310

3.5 RESERCH INSTRUMENT

The instrument employed for data collection in survey is the questionnaire. The questionnaire will be used to elicit response from subjects in sample population. Questionnaire uses straight forward questions to obtain information and distribution to a group of population in relation to factors such as qualification, sex age etc.

A questionnaire on the impact of chemistry practicals on academic achievement was design with a total of (12) items and administered to the respondents. The questionnaire was

divided into two parts: section A is on the Bio data of respondents and section B contained questions related to the research problem.

3.6VALIDITY AND RELIABILITY OF THE INSTRUMENT

Validity is the extent to which an instrument measure what it is designed to masure. It is rare,if nearly impossible, that an instrument be 100% valid, so validity is generally measured in degrees. As a process, validation involve collecting and analysis data to access the accuracy of an instrument.

Reliability can be thought of as consistency. Does the instrument consistently measure what it is intended to measure? It is not possible to calculate reliability; however, there are four generation estimator that the researcher may encounter in reading research work.

3.7 PROCEDURE FOR DATA COLLECTION

This research use survey method in collecting data for the investigation since a survey is an empirical study that uses questionnaire or interview to discover the descriptive characteristics of a phenomenon.. Data was be collected using the questionnaire which the researcher administered 100 questionnaire to the respondents.

3.8 PROCEDURE FOR DATA ANALYSIS

Mean and standard deviation was adopted in analyzing data for this study.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 INTRODUCTION

As its depicts, this chapter seeks to analyze in details the data obtained from the questionnaire administered for this researchwork. The chapter is presented under the following sub-heading; analysis of data, discussion of result and summary of findings.

4.2 ANALYSIS OF DATA

Analysis of demography data.

Demographic Data of Respondents

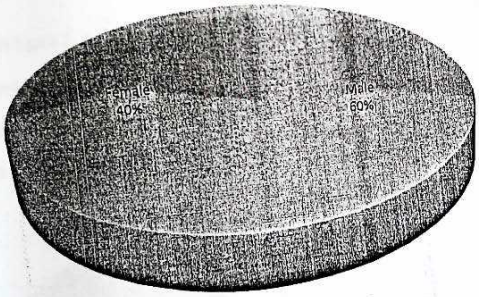

Fig. 1: Percentage of the Respondents based on Gender

The demographic representation of the respondents based on gender was presented in the figure 1. It was observed that out of 100 respondents, 60% were male and 40% were female. This shows that the number of male who participated in this study was more than that of female.

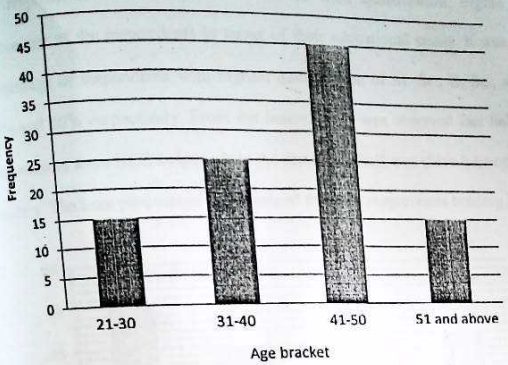

Fig. 2: Frequency of the Respondents based on Age bracket

From the figure 2, it was observed that the number of the respondents who participated in this study and falls within age bracket of (21-30), (31-40), (41-50) and (51 and above) are 15, 25, 45, and 15 respectively. This indicates that the highest number of respondents was obtained within the age bracket of 41-50 and the least were from 21-30 and 51 and above.

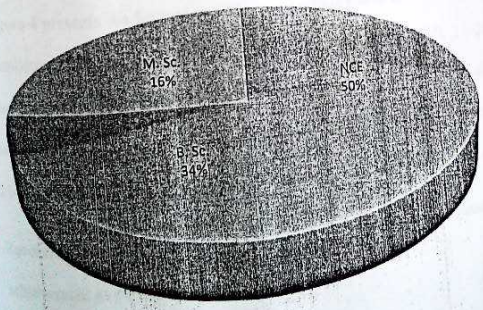

Fig. 3: Percentage of Respondents based on Qualification

The respondents were categorized based on their qualification. Figure 3 represents the percentage of the respondents in terms of their educational status. It was observed that the percentage of respondents with highest qualification of M. Sc., B. Sc., and NCE are 16%, 34% and 50% respectively. From the indication, it was observed that half of the number of respondents were NCE holder while the remaining half was share between M. Sc. and B. Sc. holders. The least percentage was obtained from the respondents holding M. Sc.

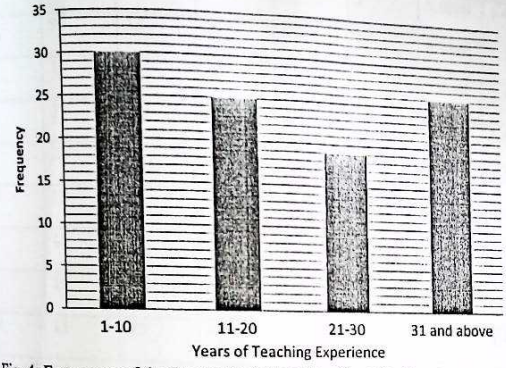

Fig. 4: Frequency of the Respondents based on Experience

Figure 4 presents the frequency of the respondents based on their experience in teaching. The numbers of the respondents with teaching experience of 1-10, 11-20, 21-30, and 31 and above were 30, 25, 19 and 26 respectively. The highest number was obtained from those that have teaching experience between 1-10 years while the least was obtained from those within 21-30 years.

Research Question 1: What is the impact of Chemistry practical on students' academic achievement as perceived by Chemistry Teachers?

Table 1: Mean score and standard deviation of Chemistry teacher perceived impact of Chemistry practical on students' academic achievement

Items	Responses					Mean	Std. Dev.	Remark
	SD	D	SA	A	U			
1	12	14	40	30	4	3.7200	1.42191	Agree
2	15	34	25	23	3	3.0900	1.47775	Agree
3	9	12	37	41	1	3.7500	1.23399	Agree
4	16	11	40	32	1	3.6900	1.48864	Agree
5	33	32	15	16	4	2.4800	1.46667	Disagree
6	28	32	16	18	6	2.6200	1.46184	Disagree
7	13	17	41	25	4	3.6400	1.48065	Agree
8	15	14	42	28	1	3.6800	1.50340	Agree
9	19	17	41	23	0	3.5000	1.60492	Agree
10	11	13	49	26	1	3.8900	1.42059	Agree
Grand Total						3.4060	1.52758	Agree

Decision level: Mean = 3.00

Table 1 presents the mean response and standard deviation of Chemistry teachers' perceived impact of Chemistry practical on students' academic achievement. It shows that out of 10 items, the response of Chemistry teachers showed that they agreed that Chemistry practical has impact on students' academic achievement. Only in 2 items that is 5 and 6, with mean and standard deviation of (2.4800 ± 1.46667) and (2.6200 ± 1.46184) respectively, their response disagreed that Chemistry practical has impact on students' academic achievement. The grand mean and standard deviation of (3.4060 ± 1.52758) indicate that all Chemistry

teachers participated in this study agreed that Chemistry practical has impact on students' academic achievement.

Research Question 2: What is the impact of Chemistry practical on students' academic achievement as perceived by Chemistry Teachers based on gender?

Table 2: Mean score and standard deviation of male and female Chemistry teacher perceived impact of Chemistry practical on students' academic achievement

Gender	No	Grand mean	Std. Deviation	Remark
Male	60	3.3433	1.55117	Agree
Female	40	3.5000	1.48847	Agree

The data analysis in table 2 shows the responses of male and female Chemistry teachers participated in the study while their grand mean and standard deviation are male(3.3433 ± 1.55117) and female(3.5000 ± 1.48847). This implies that both male and female Chemistry teachers agreed that Chemistry practical has impact on students' academic achievement.

Research Question 3: What is the impact of Chemistry practical on students' academic achievement as perceived by Chemistry Teachers based on age bracket?

Table 3: Mean score and standard deviation of Chemistry teacher perceived impact of Chemistry practical on students' academic achievement based on age bracket

Age bracket	No	Grand mean	Std. Deviation	Remark
21-30	15	3.3267	1.59065	Agree
31-40	25	3.3400	1.63803	Agree

41-50	45	3.4244	1.60173	Agree
51 and above	15	3.2133	1.63677	Agree

The analysis of data in table 3 revealed the response of Chemistry teachers based on age bracket. The grand mean and standard deviation of respondents within the age of 21-30, 31-40, 41-50, and 51 and above are (3.3267 $\pm$ 1.59065), (3.3400 $\pm$ 1.63803), (3.4244 $\pm$ 1.60173) and (3.2133 $\pm$ 1.63677) respectively. This indicate that regardless the age of Chemistry teachers participated in this study, they agreed that Chemistry practical has impact students' academic achievement.

Research Question 4: What is the impact of Chemistry practical on students' academic achievement as perceived by Chemistry teachers based on qualification?

Table 4: Mean score and standard deviation of Chemistry teacher perceived impact of Chemistry practical on students' academic achievement based on qualification

Qualification	No	Grand mean	Std. Deviation	Remark
NCE	50	3.4160	1.59877	Agree
B. Sc.	34	3.3147	1.70487	Agree
M. Sc. and above	16	3.3188	1.68744	Agree

The analysis of the responses of Chemistry teachers perceived impact of Chemistry practical on students' academic achievement were presented in table 4. From the table, the grand mean and standard deviation of Chemistry teachers who have NCE, B. Sc., and M. Sc. and above are (3.4160 $\pm$ 1.59877), (3.3147 $\pm$ 1.70487), (3.3188 $\pm$ 1.68744) respectively. This shows

that their qualification has no influence on their response since in all qualifications they all agreed that Chemistry practical has impact on students' academic achievement.

Research Question 5: What is the impact of Chemistry practical on students' academic achievement as perceived by Chemistry teachers based on teaching experience?

Table 5: Mean score and standard deviation of Chemistry teacher perceived impact of Chemistry practical on students' academic achievement based on teaching experience

Years of teaching experience	No	Grand mean	Std. Deviation	Remark
1-10	30	3.5700	1.56416	Agree
11-20	25	3.2920	1.60281	Agree
21-30	19	3.5105	1.49333	Agree
31 and above	26	3.2538	1.53875	Agree

Table 5 presents grand mean and standard deviation of the response of Chemistry teachers as they perceived the impact of Chemistry practical on students' academic achievement based on their years of teaching experience. The analysis shows that the mean and standard deviation of the response of those who have been teaching between 1-10, 11-20, 21-30, and 31 and above are (3.5700 ± 1.56416), (3.2920 ± 1.60281), (3.5105 ± 1.49333), and 3.2538 ± 1.53875) respectively. This means regardless of the years of teaching experience of the respondents, they agreed that Chemistry practical has impact on students' academic achievement.

4.3 DISCUSSION

Foremost, the analysis and presentation of the data obtained for this study pervades the total number of (100) questions, upon the respondents answered via ticking.

RESEARCH QUETION 1What is the impact of Chemistry practical on students' academic achievement as perceived by Chemistry Teachers?Table 1 presented the mean response and standard deviation of Chemistry teachers' perceived impact of Chemistry practical on students' academic achievement. It shows that out of 10 items, the response of Chemistry teachers showed that they agreed that Chemistry practical has impact on students' academic achievement. Only in 2 items that is 5 and 6, with mean and standard deviation of (2.4800 ± 1.46667) and (2.6200 ± 1.46184) respectively, their response disagreed that Chemistry practical has impact on students' academic achievement. The grand mean and standard deviation of (3.4060 ± 1.52758) indicate that all Chemistry teachers participated in this study agreed that Chemistry practical has impact on students' academic achievement.

RESEARCH QUESTION 2 What is the impact of Chemistry practical on students' academic achievement as perceived by Chemistry Teachers based on gender? The data analysis in table 2 showed the responses of male and female Chemistry teachers participated in the study while their grand mean and standard deviation are male(3.3433 ± 1.55117) and female(3.5000 ± 1.48847). This implies that both male and female Chemistry teachers agreed that Chemistry practical has impact on students' academic achievement.

RESEARCH QUESTION 3 What is the impact of Chemistry practical on students' academic achievement as perceived by Chemistry Teachers based on age bracket? The analysis of data in table 3 revealed the response of Chemistry teachers based on age bracket. The grand mean and and standard deviation of respondents within the age of 21-30, 31-40, 41-50, and 51 and above are (3.3267 ± 1.59065), (3.3400 ± 1.63803), (3.4244 ± 1.60173) and (3.2133

± 1.63677) respectively. This indicate that regardless the age of Chemistry teachers participated in this study, they agreed that Chemistry practical has impact on students' academic achievement

RESEARCH QUESTION 4 What is the impact of Chemistry practical on students' academic achievement as perceived by Chemistry teachers based on qualification? The analysis of the responses of Chemistry teachers perceived impact of Chemistry practical on students' academic achievement were presented in table 4. From the table, the grand mean and standard deviation of Chemistry teachers who have NCE, B. Sc., and M. Sc. and above are (3.4160 ± 1.59877), (3.3147 ± 1.70487), (3.3188 ± 1.68744) respectively. This showed that their qualification has no influence on their response since in all qualifications they all agreed that Chemistry practical has impact on students' academic achievement.

RESEARCH QUESTION 5 What is the impact of Chemistry practical on students' academic achievement as perceived by Chemistry teachers based on teaching experience? Table 5 presented the grand mean and standard deviation of the responses of Chemistry teachers as they perceived the impact of Chemistry practical on students' academic achievement based on their years of teaching experience. The analysis showed that the mean and standard deviation of the response of those who have been teaching between 1-10, 11-20, 21-30, and 31 and above are (3.5700 ± 1.56416), (3.2920 ± 1.60281), (3.5105 ± 1.49333), and 3.2538 ± 1.53875) respectively. This means regardless of the years of teaching experience of the respondents, they agreed that Chemistry practical has impact on students' academic achievement.

4.4 SUMMARY OF FINDINGS

Base on the results of this study, the following summaries were made:

1. Chemistry teachers perceived that Chemistry practical has impact on students' academic achievement.
2. Gender has no influence on the perception of Chemistry teachers on the impact ofChemistry practical on students' academic achievement.
3. Age bracket has no influence on the perception of Chemistry teachers on the impact of Chemistry practical on students' academic achievement.
4. Qualification has no influence on the perception of Chemistry teachers on the impact of Chemistry practical on students' academic achievement.
5. Years of teaching experience have no influence on the perception of Chemistry teachers on the impact of Chemistry practical on students' academic achievement.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter is presented under the following headings; summary, conclusion and recommendations.

5.2SUMMARY

The purpose of this study is to find out the assessment on the impact of chemistry practicals on academic achievement among senior secondary school in Gusau metropolis. This research design employed a survey design while the population of this study consisted 4,459 students. The sample size selected from the population of this study is 972 students.The instrument employed for data collection was a questionnaire filled and 100 copies of questionnaires was distributed to the respondents and 100 copies were retrieved. This was carried out the using the purposive sampling technique. This technique provided each element of the entire population the chance of being selected without a representative section of the population.Mean and standard deviation were used to present and analyzed data collected from the respondents for this study.

5.3CONCLUSIONS

The study provides meaningful information relating to assessment on the impact of chemistry practicals on academic achievement among senior secondary school students in Gusau metropolis. According to Nwagbo, (2008) the use of practical activities (approach) to the teaching of chemical concepts should therefore be a rule rather than an option to Chemistry teachers, if we hope to produce students that would be able to acquire the necessary knowledge, skills and competence needed to meet the scientific and technological

demands of the nation. the search for a more effective approach for the teaching and learning of Chemistry that will enhance the acquisition of process skills has persisted over the years. This is because, the acquisitions of science process skills are the bases for scientific inquiry and the development of intellectual skills and attitudes that are needed to learn concept

From the foregoing, it can be concluded that;

1. Chemistry practical has a great impact on the academic achievement among senior secondary school students in Gusau metropolis.
2. Furthermore, Chemistry teachers perceived that Chemistry practical has impact on students' academic achievement which means that students can learn better with chemistry practicals.
3. Gender has no influence based on the perception of Chemistry teachers on the impact of Chemistry practical on students' academic achievement.
4. Chemistry teachers perceived that age bracket has no negative influence on the impact of Chemistry practical on students' academic achievement.
5. Qualification has no influence on the perception of Chemistry teachers on the impact of Chemistry practical on students' academic achievement.
6. Years of teaching experience has no negative influence based on the perception of Chemistry teachers on the impact of Chemistry practical on students' academic achievement.

5.4 RECOMMENDATIONS

The following recommendations were made based on the findings of the study

1. Government should as a matter of urgency make available chemistry equipment for secondary school students in-other for them to understand chemistry as a subject.
2. Government should employ qualified chemistry teachers in senior secondary school so as to enhance performance of students.

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APPENDIX A

A Questionnaire on the Impact of chemistry Practicals on Academics Achievement among Senior Secondary Schools.

This section contains the demography of the responder.

1. Name of school
   GDSS By pass. [ ]
   GDSS Samaru [ ]
   GDSS Gadabiyu [ ]
   GDSS Sabon gari [ ]
2. Gender?
   Male [ ]
   Female [ ]
3. What is your age bracket?
   18 – 21 [ ]
   21 – 30 [ ]
   31– 40 [ ]
   41– 50 [ ]
   51 and above [ ]
4. What is your highest educational status?
   FLSC [ ]
   SSCE [ ]
   B. Sc [ ]
   M. Sc [ ]
5. Years of teaching experience
   10-15=[ ]
   15-20=[ ]
   20-25=[ ]
   25-30=[ ]

SECTON B

1. Secondary school students understand chemistry practicals more than theory?

   SA=Strongly agree [ ]

   A=Agree [ ]

   SD=Strongly disagree [ ]

   D=Disagree [ ]

   U=Undecided [ ]

2. Has chemistry practicals help in increasing the performance level of senior secondary school students

   Yes [ ]

   No [ ]

3. In what way do you see chemistry practicals effect senior secondary school students? Achievement?

   Positively [ ]

   Negatively [ ]

4. Lack of science equipment causes low level of achievement among senior secondary school students?

   SA=Strongly agree [ ]

   A=Agree [ ]

   SD=Strongly disagree [ ]

   D=Disagree [ ]

   U=Undecided [ ]

5. Do Government provides equipments for chemistry practicals in senior secondary schools?

   SA=Strongly agree [ ]

   A=Agree [ ]

   SD=Strongly disagree [ ]

   D=Disagree [ ]

   U=Undecided [ ]

6. Does Gender has a role to play in the level of achievement in chemistry practical among senior secondary schools students?

   SA=Strongly agree [ ]

   A=Agree [ ]

   SD=Strongly disagree

D=Disagree [ ]

U=Undecided [ ]

7. Lack of qualified chemistry teachers causes low performance among senior Secondary school students in chemistry practicals?

   Yes= [ ]

   No= [ ]

8. Chemistry practicals should be a focus point than theoretical aspect of chemistry among senior secondary school?

   SA= Strongly agree [ ]

   A=Agree [ ]

   SD= Strongly disagree [ ]

   D=Disagree [ ]

   U=Undecided [ ]

9. More research should be carried out on chemistry practicals in-other for senior secondary schools students to get more understanding

   SA=Strongly agree [ ]

   A=Agree [ ]

   SD=Strongly disagree [ ]

   D=Disagree [ ]

   U=Undecided [ ]

10. Conducting practicals makes students to be more interested in chemistry?

    SA=Strongly agree

    A=Agree [ ]

    SD=Strongly disagree [ ]

    D=Disagree [ ]

    U=Undecided [ ]