COMPARATIVE STUDY OF CONTENT COVERAGE ON CHEMISTRY PRACTICAL BETWEEN PUBLIC AND PRIVATE SECONDARY SCHOOL IN BOSSO LOCAL GOVERNMENT AREA MINNA, NIGER STATE.

BY

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2014/1/51411BE

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A PROJECT REPORT PRESENTED TO THE DEPARTMENT OF SCIENCE EDUCATION, SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA NIGER STATE IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF TECHNOLOGY (B.TECH.) DEGREE IN CHEMISTRY EDUCATION.

NOVEMBER, 2019

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Abstract

In this study an attempt was made to compare content coverage of chemistry practical between public and private senior secondary school. The study adopted a survey research design which specifically, compared content coverage of chemistry practical in SS 1 and SS 2. Two research questions guided this study. A total of 11394 SS 1 and SS 2 students drawn from thirty-nine secondary schools within Bosso local government area were used. The students were drawn through simple random sampling technique. Eight public schools and eight private schools were used for the study. Simple frequency count, percentage, descriptive chart were used to answer the two research questions. The result showed that private schools have a high content coverage compare to public schools in Bosso local government area. Thus, it was concluded that public schools students do not cover their content on practical which relate to their poor achievement in external examinations in chemistry. Therefore it was recommended that Chemistry teachers should give more priority to content coverage of chemistry practical as part of instruction in order to improve students' understanding of practically related concepts.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Science has proven to be important to everybody in several ways such as personal life, education, civil life and economic empowerment. Its importance in national economic development cannot be downplayed. This gives a fundamental reason for much emphasis on the advancement of science as a wherewithal for achieving technological development. The concept of science as a subject is cosmic and has no limitations. Science which became part of the school curriculum got its achievement after many years of deedful efforts. The effective efforts put for the development of science and technology becomes essential as driving force for economic development of any nation. Specifically, in Nigeria, in order to achieve this economic objective, impetus have been given to the implementation of the ratio 60:40 admission policy in favour of science subjects in institutions of higher learning (Saleh, 2011). Effective science is a means to realised most of educational objectives in Nigeria. Therefore, for any country to strive for economic balance there is need to strengthen and improve science education even in secondary schools.

The primary aim of science is to collect facts while the ultimate purpose of science is to discern the order that exists between and amongst the various facts (Ebong, 2006). Science is all about acquiring knowledge through systematic process and then bringing this useful knowledge into reality in order to develop the human world. Of all the science subjects, Chemistry is important to the developing world.

Chemistry as a science branch deals with the study of the composition and characteristics of matter, changes in matter, laws and principles governing these changes (Mwangi, 2016).

Chemistry is a science based on observation and experimentation. It is an important part of what is called science and an active and ever-growing science that is crucial to our environment in both the realm of nature and society (Anaso, 2010). Doing chemistry involves attempting to provide answer to questions and explain observations in terms of the laws and theories of chemistry, using methods that are accepted by the scientific community. Amaefule (2010) asserted that "chemistry is a science subject from which all science and technology disciplines draw sustenance". Chemistry is used for the production of polymeric material such as rubber, slippers, wool, clothes, and nylon. Also it has helped in the production and preservation of food can and chemicals for growing, preserving, processing our farm produce which in return provide nourishment to our body. Anugwo and Asogwa (2015) stated that chemistry has contributed greatly towards providing our basic needs and improving the quality of life.

However despite the uniqueness of chemistry and it major importance to the development of a nation, the performance of students seems poor in this subject. According to Anaso, (2010) Nigeria's students' Chemistry performance has been poor and unremarkable. The continually poor performance of students in both internal and external examination has shown the existence of the problem in the way the subject is been taught. Njoku (2007) observed chemistry students' declining achievement in the three categories of quantitative analysis, qualitative analysis and theory to practical chemistry and attributed it to wrong ways of teaching chemistry, not only in the theoretical aspects of chemistry but also the practical activities involved in teaching chemistry.

The West Africa Examination Council Chief Examiner's Reports between 2010 – 2015 also showed a consistent decrease in the percentage of passes in Chemistry among Nigeria chemistry students. Particularly, this poor performance was observed to be in Chemistry paper 1 (practical). The WAEC Chief Examiner's reports, (2015) again showed a consistent degrading of students' performance in this area over the years result from students' poor knowledge of fundamental principles and procedures especially in qualitative analysis and lack of exposure to laboratory techniques. It was also indicated that the poor performance of the candidates was due to among others: - inability to adhere strictly to instructions; titer values are manipulated to conform with that of the supervisor; presentation of wrong tests, on solids instead of aqueous solutions, wrong observations and inferences; inability to align theoretical knowledge with actual practical work; According to Amaefule (2010) basic laboratory facilities in Nigerian schools are lacking. He believes that in an ideal situation, different science subjects such as Chemistry should have separate laboratories. It is so alarming in some science secondary schools where Chemistry is taught, not a single laboratory can be found. Chemistry students in such condition are only exposed to the theoretical aspect of chemistry rather than scientific skills.

Chemistry practical is being taught at senior secondary school in both private and public schools from SS 1 to SS 3 classes. Many have argued over the years that science cannot be applicable to students without useful theoretical and practical knowledge in the school laboratory. (Hofstein and Mamlok-Naaman, 2007). Science teaching, most especially chemistry involves students carrying out practical work. Students generally claim to enjoy practical activities and see it as an effective method in learning science courses. Such method of teaching can also be seen as demonstration method, where a student or group of students are allowed to carry out learning process on their own with the help of practical guide. This method leads to better performance

and learning because students tend to easily remember things done by themselves. Practical chemistry simply involve the systematic application of chemical concepts and theories, principles taught in the laboratory with the use of apparatus, chemicals and other laboratory materials. Students are require to solve practical problems by following some sets of scientific process skills which in return lead to the acquisition of such skills itself.

Content coverage simply means coverage of an intended subject matter. Nnachi (2011) had observed that crisis in education system results from teachers' inability to implement the curriculum. This observation was assumed an indication that teachers were 'not conversant with the recommended pedagogical approach of the curriculum' (Okorie and Akubilo, 2013). Adequate knowledge of Teachers' on the curriculum is necessary for an operative content coverage to students. If in teaching content coverage is not adequately, the students would be exposed to a fraction of areas in the subject. This negligence of content coverage by chemistry practcal teachers has led to poor achievement of chemistry practical and essay in both internal and external exams. Inability to conduct chemistry practical may include lack of teacher competence in handling the subject matter and lack of laboratory apparatus as the two major reasons why practical chemistry content are not covered.

1.2 Statement of the Problem

Chemistry as a branch of science is known with practical with topics like solubility, acid, base and salt, titration, quantitative analysis etc. the practical aspect of chemistry is very crucial. Chemistry been abstract and conceptual requires practical for easy understanding of concept and principles. Students complain of Chemistry not because it is difficult to learn but because it is bored and can only be made interesting when praticalized. The most interesting part of this is, chemistry practical can be effectively conducted using locally available materials around us as

simple as using charcoal to cover a content on carbon. However different secondary schools carry out their practical syllabus at different level which is a key determinate to students' achievement. It has been discovered that most schools often delay practical work until SS3 and others only introduced practical two to three days to chemistry practical. This research therefore tend to compare public and private on how they go in covering the practical content. Therefore this research is on comparative study of chemistry practical content coverage between public and private schools.

1.3 Purpose of the study

The purpose of this study seek to determine

i. The extent of content coverage of chemistry practical between public and private secondary schools in SS 1.
ii. The extent of content coverage of chemistry practical between public and private secondary schools in SS 2

1.4 Significance of the study

For students, teachers, and school administrators, the finding of this study will be important.

i. To the students the finding of this study may provide better understanding of chemistry practical and thus improving their performance.
ii. To the teachers the finding of this study may help to check and improve their responsibility on content coverage in chemistry practical since it directly affect students' performance. The finding of the study may also show the areas of the Chemistry practical content that are not or poorly covered by teachers.

iii. The result may help the school administrators and educational supervisors to identify the aspect of chemistry practical content where students are poorly taught or not taught at all with a view to take corrective actions.

1.5 Research Questions

To compare chemistry practical content coverage between public and private school the following research questions were raised.

i. Will there be difference in content coverage of chemistry practical between public and private secondary school in SS 1?
ii. Will there be difference in content coverage of chemistry practical between public and private secondary school in SS 2?

1.6 Scope and Delimitation of the study

This study is limited to the comparative study of content coverage chemistry practical among public and private secondary schools in the bosso municipality Minna Niger State. The study was restricted to senior secondary (I, and II). SS 1 and SS 2 students were chosen with the assumption that most SSCE examination questions comes from there and also with the expectation that they would have cover chemistry practical content and are ready for external examination. The target population is sampled from all of the local government area's public and private schools in Bosso.

1.7 Definition of Terms

Comparative: An evaluation of the similarity and difference of one or more things

Chemistry practical: This is an experiments conducted by the students themselves or by the teacher during the chemistry learning process

Private Secondary School: School type owned by an individual but still under the governing of government

Public Secondary School: School type owned and controlled by the government

Content coverage: subject matter covered

CHAPTER TWO

2.0 LITERATURE REVIEW

This section contains the review of relevant related literature on the comparative study of content coverage chemistry practical between public and private secondary school. The review is done under the following sub-headings

- Nigeria Secondary School System
- Quality of Secondary School Chemistry Practical
- Nature and Important of School Chemistry Practical
- School Laboratory
- Chemistry Practical Content Coverage
- Content Coverage among Schools
- Student Performance in Chemistry Practical
- Empirical study
- Summary of the literature review

2.1 Nigeria Secondary School System

Education in Nigeria is overseen by the Ministry of education. The 6-3-3-4 education system in Nigeria include five-six years of compulsory primary education, three years of Junior secondary education (JSS), three years of senior secondary school (SSS) after which students are expected to sit for the senior secondary certificate examination (SSCE), which aid for the enrollment to the various tertiary education institutions in Nigeria for specific professions. The senior secondary science education demands all students to study five compulsory subjects such as: Mathematics,

English, Chemistry, Physic, Biology and a general subject like Civic Education. The Nigeria secondary education can be group into three sectors namely: public sector who is being run and managed by the government of the state, private sectors managed by an individuals but still under the rules and laws of the federal government of Nigeria, Federal Government colleges funded and managed by the federal government through the ministry of education.

The objectives of studying science in secondary school in the National Policy on Education (Federal Republic of Nigeria, 2004) amongst others include: Understanding basic scientific concepts, acquiring laboratory skills, understanding the connection between science and industry /environment and daily life in terms of benefits and hazards, and acquiring critical and logical thinking skills. Both aims include the learning of science through experiments through practices and detailed observations that give meaning and importance to the understanding of science. Based on these goals, the ability to think about learners needs to be developed to increase interest and curiosity in creative thinking. Knowing some of these goals, it is obvious that no concept should be learned in abstraction in science, but practically by subjecting such concepts experimentally to experiments, testing, observing and verifying problems. It is therefore necessary to interpret current phenomena effectively and gain useful insight into science as life through appropriate practical activities (Njelita, 2009)

2.2 Quality of Secondary School Chemistry Practical

Chemistry as a science subject cannot be effectively taught and learn without practical. Practical make chemistry more real, visual and simple especially when such theoretical aspect has been taught already in the classroom. In school settings, the term practical mean knowledge gathers learners interacting with materials to observe and understand the natural world. During practical, the students do the experiment by following some set of instructions as teachers do the

demonstration either in the laboratory or classroom but best done in the laboratory. (Twoli, 2009). Wellington (1998), describes practical chemistry as presentations by teachers or school experiments in which all learners are engaged in similar tasks, working in small groups or in a circus of experiments of small groups of learners participating in various activities, spinning in a carousel. In secondary schools, laboratory activities are structured and carried out to involve individual students, or in small groups (student experiments) and in large-group demonstration settings (teacher demonstrations) (Hofstein and Mamlok-Naaman, 2007). The effectiveness of practicing chemistry relay largely on adequate method of teaching.

Since chemistry is a subject that encourages "hands on" experiences, more practical oriented modes of instruction should be selected (Twoli, 2009). Practical work can also be seen as a process of learning which requires activity rather than receptivity or passivity which is characteristics of theoretical work. Sola and Ojo (2007) noted that science teachers have always recognized the importance of practical work as a means of exposing learners to the scientific discovery process, as well as the United Nations Educational Scientific and Cultural Organization (UNESCO) and the International Union of Pure and Applied Chemistry (IUPAC) participated in numerous international meetings aimed at promoting cheaper research experimental based teaching in chemistry. Practical work is always expected to play an important role as a teaching and learning tool and the challenge is to make it more effective (Millar & Abrahams, 2009). Students accept knowledge that they discover through their own efforts, and this approach helps them to better remember that knowledge and encourages them to be more independent (Millar, 2004).

The place of secondary school education in Nigeria cannot be overemphasize and replace. Its importance to parents, teachers, students and government cannot be down play.

They continued by saying that chemistry teaching should develop in the student manipulative and experimental skills so as to make them confident in conducting experiments and or researches. Student should be allowing to do practical activity of conducting experiments with the guided instructions, reporting their observation unbiased and drawing conclusions to their observation, thus, developing their scientific knowledge and practical skills and at the same time making chemistry interesting to the students. At the elementary, secondary and early levels of college, practical chemistry often consists of what is generally called "cook-book" exercises. (Shakhashiri, 2009). The guided instructions enable secondary school students to carry out the experiment accordingly which if well followed students tend to obtain accurate results. According to Eze (2010) the aim of practical is to inculcate into the students the habit of drawing conclusions based on observation and experimentation.

Practical work enhances problem solving ability in students through effective thinking and skills display and also develop scientific skills in students. Practical opportunities for students include: healthy and comfortable handling of chemicals, gaining practical experience in the use of instruments and equipment, improving scientific thinking and passion for chemistry, developing basic skills in engineering and problem-solving, developing research skills, detecting chemical hazards and learning how to determine and manage risks associated with chemicals (Lagoswki, 2009; Pickering, 1987; Carnduff and Reid, 2003; Ravishankar and Ladage, 2009). According to Agbi (2009) theses scientific skills include Identification and Definition of a Problem; Formulation of Appropriate Hypotheses; Collection of Data Necessary for Testing the Hypotheses; Testing the Hypotheses; Drawing Necessary Inferences or Conclusions. Practical access the students' ability to observe, identify and state problem, make some reasonable guess, conduct experiment to be sure of facts made, make inference and draw conclusion in clear terms.

Mainly the essence of practical in senior secondary school is to give a better understanding to theory lessons either before they are introduced or after. In practical classes, students get to have one to one experience with things that look abstract under the guidance of the chemistry teacher.

Practical activities in many countries are a relatively important feature of school science and they are given a high level of attention. Chemistry practical has similar characteristic to the school science curriculum. Since over a century, they have been part of the school science curriculum and their role in a chemistry lesson has often gone undisputed (Bennet, 2009). For example, the West African Examinations Council (WAEC) syllabus has encouraged the teaching of all science subjects as listed in the syllabus to be practically oriented or based, and after several decades of emphasizing the assumed importance of practical teaching and learning in science, the importance has been raised to the level of dogma (Mwangi, 2016). On the same note Hodson (1991, 176) argued that, "Teachers have been socialized by the powerful, mythical rhetoric of the teaching profession of science that sees practical work in small groups as a universal panacea-a path to all learning goals and an educational solution to all learning problems." Like other disciplines, laboratory experiments support the teaching and learning of chemistry (practical sessions) (Reid & Shah, 2007). Chemistry can be most effective taught through the aid of laboratory equipment. Practical chemistry courses (experiments) are supposed to help students understand complicated or abstract concepts and chemical principles (Lagoswki, 2009). With the help of those classes arranged, the subject been conceptual and microscopic becomes real, tangible and well understood by the students. According to SCORE (2007) the importance of practical work in science is widely accepted and it is acknowledged that good practical work promotes the engagement and interest of students as well as developing a range of skills, science knowledge, and conceptual understanding.

However, Hofstein (2008) he claims that research has failed to demonstrate a simplistic connection between the experiences provided to the laboratory students and studying chemistry. A lot of doubt on the effectiveness of practical on students in understanding sciences. The national scientific education framework and other scientific literature emphasize the importance of rethinking the role and practice of practical science in general in chemistry and science education (Hofstein, 2008). Also, The Singapore Ministry of Education analyzed the role of science in science education and reassessed how to make school science more relevant and efficient for students (Ling & Towndrow, 2010). But possibly this doubts of the effectiveness of practical might be due to the effect of content coverage of such practical to secondary school students. In Nigeria over the years they've been a progressive failure on the performance of chemistry practical. WAEC Chief Examiner's reports (2012) which indicated among other things, that students' major weaknesses in practical chemistry examination were in the areas of:

- Poor description of colors of solution, precipitation, gases or odor of gases.
- Poor mathematical competences in questions requiring calculations.
- Poor interpretation of scientific data or poor deductive reasoning.
- Inability to read or measure accurately e.g. burette reading.
- Inability to relate theoretical knowledge to practical observations.
- Inability to carry out confirmatory test in qualitative analysis etc.

This consistent poor performance as earlier said may be due to low level of content coverage of chemistry practical in secondary school. It is due to this concern that this study tends to carry out a comparative study of content coverage among chemistry students

2.3 Nature and Importance of School Chemistry Practical

Numerous research on the importance of practical work when teaching science have been performed over time. Science educators and teachers recently agree that laboratory work is essential to the understanding of science (Cardak *et al.*, 2007; Ottander & Grelsson, 2006; Tan, 2008). Some researchers have paid attention to the role of practical activity in science education (Lazarowitz & Tamir, 1994; Lunetta, 2009). Practical activity in science education provide students with conceptual and theoretical knowledge so as to help them learn scientific principles, and through scientific methods, to understand the nature of science. Practical activity also improves students' knowledge and experience on science using scientific research methods. Students should experience meaningful learning, scientific facts and theories and how to apply them. Furthermore, laboratory work should encourage the development of analytical and critical thinking skills and encourage interest in science (Ottander & Grelsson, 2009).

Over the years, the purpose of science teaching and learning is to mimic what "true" scientists are doing. In the science curriculum for schools in many parts of the world, the principles of research, the scientific method, the investigative system, the substance of science and the behaviors of scientists are all re-contextualized (Ling & Towndrow, 2010). In trying to imitate the real scientist, the fundamental reason for utilizing chemistry practical as a form of instruction is sometimes lost.

Many teachers and students stress on the precision of the answers, leaving the mastery of process skills to chance. (Goh & Chia, 1988). Nevertheless, the major barrier to improving the quality of practical work in schools is the time constraints felt by teachers and the demands of the national evaluation frameworks.

This may pressurize teachers to use demonstration tests instead of student experiments, and teachers often end up using ' drill and practice ' to train students to pass exams (Lunetta, Hofstein and Clough, 2007).

Traditional practical is a kind of practical activity which involve students conducting experiments base on teacher-structured where each step of the practical procedure is ordered by the teacher and students are expected to follow the procedure proscribed correctly in order to obtain accurate expected results. This type of laboratory activity is often referred to as a "recipe laboratory" (Domin, 1999), which requires little involvement of the student with the content.. For such kind of activities, Johnstone, *et al.* (2010) he further claimed that students could excel in their laboratory class even if they have little understanding of what they actually do. Therefore, such kind of practical work gives little opportunity of activeness to students and more been passively involve. On that same ground, Johnstone (2009) commented that the laboratory is regarded as an information overload place, resulting in students with little “brain space“ to process information and consequently, they blindly and thoughtlessly follow the instructions. Furthermore, student interpreted their observation and results for conclusion. There are two extreme thoughts regarding the importance of Chemistry laboratory experiments/practical (Achor, Kurumeh & Orokpo, 2012). First is the traditional method of practical where student’s initiatives are being given little attention. The practical procedures are already in place on a practical manual, and the students carefully follow the instructions stated on the manual for practical report students lack the basis for understanding the process of doing Chemistry. The second is that a student has the opportunity to learn in depth (Gunstone & Champagne, 1990).

This would provide an opportunity to student in determining the main objectives of the project and in planning and executing it, of identifying the theoretical and practical challenges encountered, documenting and discussing the findings and observations and of proposing practical changes and improvements (Teixeira-Dias *et al*., 2010). The latter, thus, could result in a significant positive impact on a student's ability to learn both the desired practical skills and also the underlying theory (Akpa, 2009).

Teaching of chemistry should not just be based on developing student's cognitive ability but also enhance student ability to think and bring ideas in relation with the phenomena around them. It is necessary for teaching to focus upon scientific ways of talking and thinking about phenomena, rather than the phenomena themselves (Leach & Scott, 2003). Teachers can provide some teaching strategies that will engage students "mind" in learning chemistry. Reports emphasize that teaching science with the help of practical chemistry makes chemistry more enjoyable and stimulating for students than just lecturing on the same subject (Hofstein, 2004). Students have much to learn from practical chemistry, which can include growing students ' interest and expertise in the subject as well as their achievement in chemistry (Pavesic, 2008).

2.4 School Laboratory

Many researchers implied that learning science is augmented and the understanding level is enhanced when students are involving in science laboratory for practical experiments. (Lunetta V, N., Hofstein A., Clough M., (2007). The laboratory has been given a central and distinctive role in science education, and science educators have suggested that the use of laboratory activist ties brings rich benefits to learning science (Hofstein, A., Lunetta, V.N. (2009). The place of experimental laboratory work has always taken on a high profile at all levels of chemical education (Reid & Shah, 2007).

The laboratory class is an active place for learning. Science laboratories have long played a unique role in science education, enabling research-based learning (Hofstein & Lunetta, 2009). These classes offer an opportunity for practical experiences designed to help students understand the concepts they have learned in the classroom (Reid & Shah, 2007). The modern laboratory offers opportunities for students to learn specific procedures and to develop skills such as problem solving and communication (Carnduff & Reid, 2003) Nevertheless the facilities for teaching science are not up to the mark at secondary and higher secondary stages (Dahar, M.A. (2011). Secondary school lay the foundation for preparing students for science education. It is at this stage the students are introducing to laboratory equipment, practical activities and precaution or laboratory safety rules to adhere. Secondary school laboratory should have the apparatus and equipment necessary to carryout meaningful experiments. Hunde and Tegegne (2010) It stated that, despite the fact that laboratories have multiple advantages ranging from concrete learning to scientific education, students have been deprived of such opportunities.

The science laboratory is a setting in which students can work together in small groups to under seek scientific knowledge and phenomenon. Student's laboratory environment is supposed to be less formal, when compared to the typical classroom setting and provide opportunities for more interactions between students and with the teacher. The student's laboratory learning environment, where chemistry teaching and learning takes place is therefore likely to have a major control on the outcome of students and have an effective impact on improvement of chemistry teaching and learning

Provision of adequate facilities like well-equipped laboratory with relevant chemicals and apparatus will be effective in promoting content coverage of chemistry practical. The current state of most secondary school science laboratories is quite alarming. Most schools don't have

any laboratory existing and the ones that exist is either empty inside or partially filled with laboratory equipment. This situation is unconducive for teaching of chemistry and thus affect content coverage of chemistry practical. Ali (2010) emphasized that basic laboratory facilities in Nigerian schools are lacking. He is of the opinion that in a perfect condition, different science subjects such as Chemistry, Physics and Biology should have separate laboratories. Schools that lack laboratory end up producing students who only have ideas on the theoretical aspect of chemistry but lack scientific skills. It is not possible to raised students with scientific ability to solve problems. The essence of practical in schools is to develop problem solving ability among secondary school student so they can be able to deal with any arising issues in life. According to Okebukola and Ajewole (1990), in their opinion on science teaching facilities prove that, "the teaching of science and technology subjects requires the use of specialized laboratories, workshops, machines, tools and equipment. Unfortunately, this is not so in our schooling system, as a result of low funding, the Nigeria school laboratory is ill-equipped.

Ezeano (2010) stated that the noticeable poor performance in chemistry in external examination is caused by lack of laboratory materials which normally result to inadequate practical before the examination. On the same note Eze (2009) also claim when he reported that physical facilities like classrooms, laboratories are abysmally inadequate, unmaintained and lack requisite apparatus and equipment. Okebukola (2005) while studying the correlations between laboratory facilities and students' laboratory skills acquisition in secondary schools revealed that many biology, physics and chemistry students shows poor powers of observation, poor measurement, classification and experimental skills of inferring, predicting and formulating models due to lack of laboratory facilities in some schools. The negligence of chemistry practical in school has been blamed on such factors as unavailability of materials and equipments for practical activity and

teachers' inability to apprehend the importance of practical work in teaching chemistry which of course affect the coverage of practical content. However even when laboratory materials are available, some teachers still neglect the aspect of putting them into proper function due to their inability to handle such equipment.

Pwol (2010) stated that many Nigeria schools that offer chemistry as a course do not have equipment necessary for effective and efficient teaching of practical chemistry. According to her the few available ones are not properly utilized. In the same opinion, Ndana, (2000) also reported that one of the most striking problems of science teaching in Nigerian secondary schools today is that of inadequate science teaching materials, which arises as a result of the inability of the government to meet the cost of these materials.

Amaefule, (2010) students perceive science as a difficult subject because it involves imagination of object and concepts when laboratory materials are lacking. Still on inadequate facilities for science teaching which impede to a great extent the effective teaching and learning of science in secondary schools, Sola and Ojo (2007) said that lack of adequate science equipments makes the learning of science very uninteresting, difficult and even frustrating. When the available materials are insufficient chemistry students are offered less opportunity to make progress and receive satisfaction. Students are given what only is available and so they are not taught the aspect of syllabus where the necessary equipment is not present. From all indication, it is obvious that inadequacy in chemistry practical is as a result of insufficient or inappropriate materials and equipments which result to poor content coverage and thus affect students negatively in achieving excellent grade in both internal and external examinati on.

If the practical nature and quality of chemistry are to be improved, there is an ongoing need to upgrade and renovate laboratories and to build new laboratories in schools. (Ofsted, 2005). Hence this study tries to compare and find the differences that exist between public and private school in content coverage of chemistry practical.

2.5 Chemistry Practical Content Coverage

According to Willis (1993), learning is content bound and effective instruction involves breaking topic into a series of small discrete (but hierarchically related) steps. This broken down topics can be referred to as concepts and this will help the teacher to handle (teach) each topic holistically and thoroughly to enhance maximum achievement by the students. Content coverage can be view as curriculum coverage, syllable coverage. One of the most long-lived and contentious conflicts in science education concerns the optimal degree of content coverage in science courses (Anderson, 1995; Katz & Rath, 1992). Content coverage has been seen in many ways, but generally researchers have simplified it such as the number of pages or subject matter completed or the number of objectives-stated mastered. Ugwu (2008) defined curriculum as the experience a school system provides for its students. Agusiobo (2009) defines it as an organised framework that sets out the content that children are to learn and the process through which children achieve goal which the curriculum sets for them. Therefore, curriculum can be view as all learning experiences students encounter in school under the supervision of the teacher in a school system. It is "a document, a syllabus, a process for developing a plan, the plan and the execution, a system and structure of an undefined discipline" (Moore, 2015). Adentwi (2009), defined it as the whole body of courses offered in an educational institution or by a department. Mereku (2008), briefly stated that today's curriculum is perceived as the experiences in which students are expected to engage in at a school and the general order of sequences in which these experiences are to come.

In Ghana, all basic schools are required to work to nationally prescribed teaching programs. The programs are contained in syllabuses which are also spread out in text books, teachers' hand out,

etc. They are intended to be carried out in schools throughout the country. That is, they include detailed prescriptions of what is required to be taught each year (Ghana News Agency 2011). The important of chemistry content and curriculum as seen by the Federal Ministry of Education (2007), took pleasure in revising the Senior Secondary education chemistry curriculum so as to reflect in-depth appropriateness and interrelatedness of curricula contents. The stated objectives of the revised edition of senior secondary education chemistry curriculum by the Federal Ministry of Education (2007) is expected to achieve a few are to enable students to

- To enhance students interest in the subject of chemistry both theoretical and practical;
- Acquire basic theoretical and practical knowledge and skills;
- Develop scientific, technological and mathematical interest
- Acquire basic STM knowledge and skills;
- Develop a reasonable level of ICT skills to generate entrepreneurial skills
- apply skills to meet societal needs of creating employment and wealth;
- Be positioned to take advantage of the numerous career opportunities offered by chemistry;
- Be adequately prepared for further studies in chemistry

To be able to achieve these objectives, schools and chemistry teachers have an important role to play. Teachers are usually responsible for the coverage of content and the quality of practical chemistry taught in schools to some extent. Chemistry teachers happens to be the path line or middleman between the curriculum or syllable and the students. In fact, chemistry teachers are a whole lot responsible for the effective content coverage of chemistry curriculum. Curriculum is

the ‘goal-setter’ which guides the teachers to what to teach and how to teach (Orpwood & Barnett, 2008:347). Getting the goals and carrying out an effective content coverage lead to good results.

Despite the importance of chemistry in countries pursuing technological progress and the roles that chemistry teachers have to play in their effective content coverage and implementation, the Senior Secondary Chemistry Curriculum has been ineffectively implemented (Ajeyalemi 1983, Nwosu 1993, Ezeliora 2003, Igbonugo 2013). Eze (2010) observed that in most senior secondary schools, Chemistry lessons are taught and completed without practical work. He further observed that some students of Chemistry never experienced any form of practical until second term of senior secondary year 3. Under this condition the students do not do well in their practical aspects of Chemistry examination.

Content coverage of chemistry practical can be seen as putting the intended chemistry practical syllabus into active practice. The volume and variety of chemistry practical in schools has lessened over time (Ofsted, 2005). In many ways the cause of this problem is teaching for examination, selected subject matter are narrowly brought out to be taught. Therefore, students in focus are taught not to be self-efficient in scientifically solving problems, but to pass examinations. Ofsted (2005), stated that teachers had to teach didactically to get through the content according to the examining body specifications. Teachers are under pressure to achieve good examination results, under this pressure the best way to meet to this demand is to focus on book learning rather than chemistry practical. Many teachers complain that, with pressure to get through the syllabus, they cannot find room for many chemistry practical (Dillon, 2008)

2.6 Content Coverage among Schools

A lot of factors could contribute to low content coverage in secondary school, these are a few; Pacing refers to the time (which include both when and how) at which the syllable is covered or mastered. Timely syllabus coverage is important to student's performance both in internal and external secondary school examinations. Generally, then, students who are paced more rapidly cover more content, though a faster pace will not necessarily ensure mastery of a greater amount of curriculum content (Barr, 2010). Yet, it has been displayed that differences in learning outcomes are related to the amount of content covered or the pace at which learners are moved through curricular materials and the types of learning tasks learners experience (Barr, 2010). There is strong positive relationship between timely syllabus coverage and better academic performance in schools (Amadalo, Shikuku and Wasike, 2012). The drastic reduction of teaching time is one of the most important causes of the non-completion of curriculum and it is linked to teachers' management abilities stated by (Crahay 2009). Kaner (2009) observed that the resource time, if well managed can lead to timely syllabus coverage. Early coverage of school syllabus allows time for working on the students' self-efficacy and mathematical self-concept which are very important in developing self-confidence and improving performance of individual students (Ferla Valcke & Cai, 2009). Poor time management practices and lack of control of time wastage leads to low achievement of set objectives (Kaner, 2009).

Reports showed that the behavior of entry was a contributing factor to the content coverage rate. This is in agreement with Shikuku (2012) and Manapure (2011). Students who already have a good foundation in the pre-required knowledge and master the fundamentals needed for the material in question should advance more quickly. Class-entry educational, cautious and socio-emotional skills as well as reading and mathematical achievements have been noted to contribute to the overall focus skills necessary for faster coverage of the work planned (Duncan, et al, 2007).

Students' attitude also affects content coverage. Syllabus coverage is also due to unqualified teachers in overcrowded, non-equipped classrooms (Mji and Makgato, 2009). Certain variables that also adversely affect the scope of the syllabus are: teachers ' duties and workload, poor school discipline, absenteeism (both teachers and students), group discussions, and insufficient school leadership supervisory activities. Absenteeism from their primary place of assignment by both the teacher and the students played a major role in content non-coverage. In many countries, during the rainy season and due to flooding in certain areas, student absenteeism led to low coverage of content and therefore poor performance. Kiveu and Mayio (2009) in the same manner affirm to the role of absenteeism on syllabus coverage. Many students also used lack of school fees to be absent from school. However, according to literature, (Bekalo SA and Welford AG, Hodson) in many countries of the world and particularly in the developing countries, the effective content coverage of practical work is a general problem with several limitations as listed.

Practical materials affect implementation and content coverage of chemistry practical curriculum. Gatana (2011) stated that inadequacy of chemical materials and apparatus for teaching chemistry contribute to low performance in the subject. Most at times the most common factors contributing to content coverage is lack or inappropriate chemicals, apparatus and lab safety kits. In addition, according to Makori and Onderi (2014) inadequacy of TLMFs influences implementation of the subject's curriculum as it may compel the teacher to depend on text books alone thereby resulting in poor syllabus coverage. Chemistry practical content coverage can be seen as watertight when students are adequately introduced to the listed knowledge gathered in their learning institutions. However it has also be observed that teachers make excuses for lack of reagents and apparatus present in order to suit their negligence. Mwangi (2016) noted that

science teachers generally do not find it convenient to make chemistry the center of their instruction in practice. Students typically complain about the lack of materials and equipment to practice practical chemistry, and at the same time, some of these materials and equipment may be locked up in the school laboratory store without teachers being aware of their existence.

In Nigeria, ineffective implementation of the subject's curriculum is as a result of inadequate funding, poor teacher motivation, partial curriculum coverage and lack of laboratories (Achimugu, 2016). In addition, Neji, Okwetang & Njaa (2014) reported that laboratory facilities in most Nigerian secondary schools were inadequate for effective teaching of chemistry.

Also another factor that can contribute to partial Curriculum implementation, low content or syllable coverage is too much workload on teacher. Okono et al (2015) stated that the number of lessons which a teacher handles affects their preparedness for each class and between classes daily. Apart from teaching duties, teachers have other duties to perform in school which has to do with time also. Such as monitoring student's behaviour and learning outcome, preparing lesson plan, resource improvisation and guide to practical activities etc. Ndirangu, Nyagah and Kimani (2017) confirmed that, there was a partial level of implementation of learner-centred practical activities in teaching science subjects despite the teachers having attended to an in-service training programme about the same. Overload and high teaching activity can affect content coverage how that, schools where teachers are over border with more teaching workload may resort to conduct only a few practical work as compared to those with fewer teaching workload. It is possible for some school to lack laboratory attendance who conduct and guide learners towards practical work and so the teacher do the work of theoretical and practical chemistry. A full teaching activity is already quite bulky for a chemistry teacher to adequately prepare for all lessons including practical. Mudulia (2012) claimed that more high performing

schools had laboratory assistants compared to the low performing schools. The implication of this is that, highly performing schools have the chance to cover chemistry practical content, the frequency of conducting laboratory activities is higher than in low performing schools. This effect of content coverage in this case can be as a result of the support which the science teachers or chemistry teachers receive from the laboratory technicians. The examination system has immensely influenced curriculum implementation (Weerhe, 2007; Odongo, 2007). Many teachers have abandoned effective methods of teaching and instead concentrate on drilling and "coaching" students in order to pass the national examinations (Okonye, 2007). Clegg (2009) being conscious of this suggests in the Roadmap that "The new secondary curriculum will require a new kind of teacher with skills not previously commonly taught in teacher education programs."

2.7 Student Performance in Chemistry Practical

Chemistry play an important role in the world of science, it being a fundamental and doorway to courses like Engineering, Medicine, Agriculture, Pharmacy, Dentistry, Biochemistry and others. Chemistry as a major pillar of science imbibed physics, Chemistry, Biology and Mathematics. Its importance in the general education has achieved a global acknowledgement. But still, there have been records of poor academic performance of chemistry students in senior secondary school certificate examination. The continuous poor performance of chemistry among secondary school students has been of great concern to Science educators which effect is also be felt in high institution.

Performance is an excellent achievement of a given task judged against preset standards of accuracy, exactness and completeness. Education performance is seeming to be the completeness of an objective in a way that proves that the student has attained the stated objectives in the given

level of education. Performance in education is always accompanied by an academic certificate to show that the performer has successfully completed the grade or course and has attained the stated grades, (Butts, 1977). According to (Jerry, 2009) the performance in science subjects has been very poor in the secondary schools. The poor performance in chemistry subject over time and it rate of enrollment in university is a threat to Nigeria's development and economy. Among the factors that contributed to this poor performance in chemistry practical are inadequate learning facilities in the secondary schools which include science equipment and laboratories, lack of ability of the scholars to do well in practical and the teaching methodology used by the teachers (Akinola, 2006). Learning resources, practical equipment and apparatus play an important role in the teaching and learning of science subjects particularly chemistry practical and undoubtly the students' academic achievement in other subjects as well (Bologun, 2010). In as much there is need for significant practical activities, a lot of barriers still prevail over the effective teaching of such science subject. Efforts to improve performance in education are pulled back by woes such as inadequate coverage of syllabus, mismanagement and wastage of quality teaching time by teachers, perception that education no longer guarantees employment and lack of efforts by parents, teachers, leaders and community to create an enabling learning environment (Njoroge, 2012). No meaningful teaching and learning can take place without laboratory facilities. Practical facilities are requisite to good practical and science teaching and learning. Poor capital investment in terms of provision of science learning resources contribute to student's low level of academic achievement, (Agusiobo, 2009).

Poor performance in chemistry practical is not just relative to Nigeria secondary school students only. A review of Caribbean School Examination Council (CSEC) results in biology, chemistry, physics and integrated science for ten years indicated that pass rates had fallen below 50% in

these science subjects (Ogunkola & Fayombo, 2009). In like manner, the international studies of educational performance revealed that USA students consistently rank near the bottom in science and mathematics (Rutherford, & Ahlgren, 1991) showing the level of poor performance in these subjects. For some time now, there have been a continuous poor performance of chemistry practical, The WAEC (2012) Extermination report shows that the candidates‟ overall performance in chemistry was very poor when compared to the performance in the other subjects.

2.8 Empirical Study

Eze (2010) carried out a study on the constraints to effective teaching of chemistry practical in senior secondary school. The aim of the study was to find out the major problems chemistry teachers encounter when teaching chemistry practical. In accordance to the research questions that explains the study the researcher found that there exist some constraints to effective teaching of chemistry practical. Some of the reported factors that hinders effective conduction of chemistry practical in secondary schools include non-availability of essential chemicals and equipment, as well as lack of interest by chemistry teachers in organizing practical for their students, non or partial content coverage. Also in another study Akale and Usman (2009) examine the effect of practical activities on achievement in integrated science among junior secondary school students in Kaduna state. According to the three research questions and four hypotheses that explains or support the study, the report of the study by the researcher state that there is significant difference in achievement between students exposed to more practical activities and those taught in the conventional way.

Another study conducted by Bolorunduro (2009), also examined the relationship between laboratory facilities, teachers' qualifications, practical periods, interest in chemistry, laboratory as a venue for chemistry lesson for experiments and students' achievement in chemistry. The aim

of the study was to determine the extent to which students use the laboratory facilities, the attitude of students to practical work and also to examine the laboratory facilities available in the chosen schools. The result of his study revealed that students in schools with adequate facilities achieved better than those in schools with less or without laboratory facilities. Bolorunduro also discovered that students in schools with more qualified teachers achieved better than those with less qualified teachers. Akinyele (1997) reported that students' poor performance in the practical aspect of chemistry examination contributes significantly to the high failure rate in the subject. The continuous poor performance of students in chemistry practical is a pointer that all is not well with our chemistry education. Chemistry teaching in Nigerian secondary schools is dominated by teachers' lecture/expository method (Ajewole and Okebukola 1990). One of the major problem chemistry education in Nigeria is currently facing is poor or no content coverage of the subject matter. It is on this basis that this research study is designed to compare content coverage of chemistry practical between public and private secondary school with the aim of finding solution because early and high content coverage affect student's performance greatly.

2.9 Summary of the Literature Reviewed

Practical work help to induce into the students the practice of drawing conclusions based on observation and experimentations. The literature review emphasizes the need to compare the content coverage of chemistry practical between public and private secondary school in order to establish the effectiveness of chemistry practical as a teaching and learning strategy in secondary school chemistry. Practical are a characteristic feature of science teaching at all levels of education (Adane & Adams, 2011). Nevertheless, Abrahams and Millar (2008), report that, questions have been raised by some science educators about the effectiveness of chemistry practical as a teaching and learning strategy. This probably might be as a result of late content

coverage as established that some schools tend to delay practical activities till SS 3 in order to be able to pass external examinations. The literature also review that most schools lack quality practical and no effective science teaching can take place outside practical. Also timely syllable coverage has a direct advantage on the performance of students, it is obvious that chemistry students perform poorly in SSCE Chemistry practical due to a major reason, incomplete or low content coverage which may occur as a result of lack of quality practical offered, availability of facilities, student interest and entry behaviour and so on. It is however not clear in which of the two sectors of secondary school education (public or private) do experience low content coverage. This brought out a need for a study to compare content coverage of chemistry practical among schools and to establish whether low and high content coverage affect the performance of chemistry at secondary school level.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with the technique the researcher use in carrying out the study relevant to the research. The chapter enable the researcher have answer to the research questions and test the hypotheses formulated. The chapter is categorise into the following sections, research design, target population, area of the study, sample size and sampling techniques, research instruments, data collection procedures, data analysis and ethical considerations. The study is a survey research and questionnaire method was used to collect information from Secondary school Chemistry students SS 1 – SS 2 both from public and private schools on how much of chemistry practical has been covered.

3.2 Research Design

Kumar (2005) defines a research design as a plan, structure, and strategy of investigation to obtain answers to research questions or problems. This study used both primary and secondary data. Primary data was obtained through the questionnaires while secondary data was obtained from the educational resource centre. This study used a survey research design where questionnaire was used to elicit important information from the respondents on content coverage on chemistry practical.

3.3 Population of the Study

The population of this study consists of all public and private Senior Secondary School Chemistry students in Bosso area Minna, Niger State. Bosso have a total of thirteen (13) public secondary schools and 26 private secondary schools. Making a total of thirty-nine (39) public

and private secondary schools. The study population was eleven thousand three hundred and ninety-four (11,394) students from all the public and private Senior Secondary School SS 1 and SS 2 only.

The list of all public and private secondary school in Bosso Local government area was acquired from the Niger State Ministry of Education.

For a school to be part of the study, the school must;

i. have an adequate and standard chemistry laboratory
ii. not be a special school
iii. not be an art, social science or vocational

Based on these standard, the schools selected and the corresponding chemistry students' population is summarized in Table 3.2

Table 3.1: Names of sampled schools and numbers of Chemistry Students

S/No.	LGA	Name of School	No. of Chemistry Students
1.	Bosso	Bosso secondary school Minna	24
2.	Bosso	Sheikh Muhammad Sanbo College of Arts and Islamic Studies, Tudun-Fulani, Minna	24
3.	Bosso	Abu-Turub Islamic School, Minna	24
4.	Bosso	Day secondary school Pyata Bosso	24
5.	Bosso	Challenge International School	24
6.	Bosso	Government Army Day Secondary School	24
7.	Bosso	centre for excellent return iqu Islamic minna	24
8.	Bosso	Government Technical College Minna	24

9.	Bosso	Maryam Babangida Girls Science College	24
10.	Bosso	Model science college Tudun Fulani	24
11.	Bosso	Sir Ahmadu Bello Model Secondary School	24
12.	Bosso	FEMA School	24
13.	Bosso	Niger Baptist School	24
14.	Bosso	ST. Clement's Secondary School Gbaiko	24
15.	Bosso	Upper Niger River Basin Staff School	24
16.	Bosso	Mypa Nursery School	24

Total = 384

3.4 Sample and Sampling Technique

According to Borg and Gall (2003) sampling is the process by which a quarter of the total population for study is selected with the intention that the finding from the sample selected will represents the population accurately. The sample for this study was selected from sixteen (schools) eight each from public and private schools in Minna which include Bosso Government Secondary School Bosso, Maryam Babangida Girl's Science Secondary School, FEMA International School and Mypa Nursery School etc. Therefore, a sum of 384 chemistry students, 24 from each schools were randomly selected using simple random sampling technique for the study.

3.5 Research Instrument

A research designed questionnaire titled “Questionnaire on content coverage on Chemistry Practical" (**QOCCOCP**) was used for collecting data. Section A include personal data and is designed to collect information of the student’s profile such as name of (school), while section B include the questions structure for the students to answer. Items in the questionnaires are mainly concerned with content coverage and records of subject matter covered.

3.6 Validation of Research Instrument

According to Casley and Lury (2007) validation of an instrument is one of the most important things to do as a researcher when constructing an instrument. Validity of the research instrument is the capacity of an instrument to measure actuality or what it is fashion to measure. Kumar (2005) stated that, the judgement that an instrument is measuring what it is supposed to is primarily based upon the logical link between the questions and the objectives of the study. In this study, the instrument was evaluated for face and content validity. After drafting the instrument, it was taken to two lecturers in the Department of Science Education of Federal University of Technology Minna, Niger State and also to the supervisor of this study to determine its content and contrast validity and their comments were used to improve the instrument which is Questionnaire on content coverage on Chemistry Practical.

3.7 Reliability of the Instrument

Reliability is the extent to which an assessment tool yield a stable results. The idea behind reliability is; other researchers must be able to perform exactly the same experiment under the same conditions and generate the same results (Moskal 2000). The reliability of the instruments was determined by selecting two schools including male and female and the same questionnaires

were administered to the four schools to determine the reliability of the instrument. The four schools were randomly chosen from the areas which were not part of the sampled area for the study but were part of the population. The two schools were chosen because they are of the same characteristics as those sampled for the study which are Supreme Comprehensive School, Christ the King Academy, Government Technical College, Minna, Government Army Day Secondary School. A total number of twenty (12) chemistry students were used for this purpose.

3.8 Method of Data Collection

Firstly, permission was taken from the university administrator in the department. After which data (syllable or curriculum of chemistry) was collected from the educational resource centre, then copies questionnaires were personally and directly administered to the respondents to be filled and the information was collected. All copies of the instrument administered were taken back after been filled with the aid of class representatives in various classes or level. The responses of the students were used for this analysis to arrive at a generalization that compare content coverage chemistry practical between public and private secondary school, Minna.

3.9 Method of Data Analysis

Data analysis is the procedure by which raw data is transformed to figures by the application of statistical tools and targets to describe, compare and summarize data so also to discover knowledge (Sarantakos, 2007). The data collected were analysed using simple frequency count, and percentage. Descriptive charts were used also to further explain the analyzed data.

CHAPTER FOUR

4.0 DATA ANALYSIS AND DISCUSSION OF RESULTS

This chapter presents the result of this study in line with the research questions.

4.1 Presentation of Results

Research Question 1: Would there be difference in content coverage of chemistry practical between public and private secondary school in SS 1?

Table 4.1: Content coverage difference of chemistry practical between public and private secondary school in SS 1

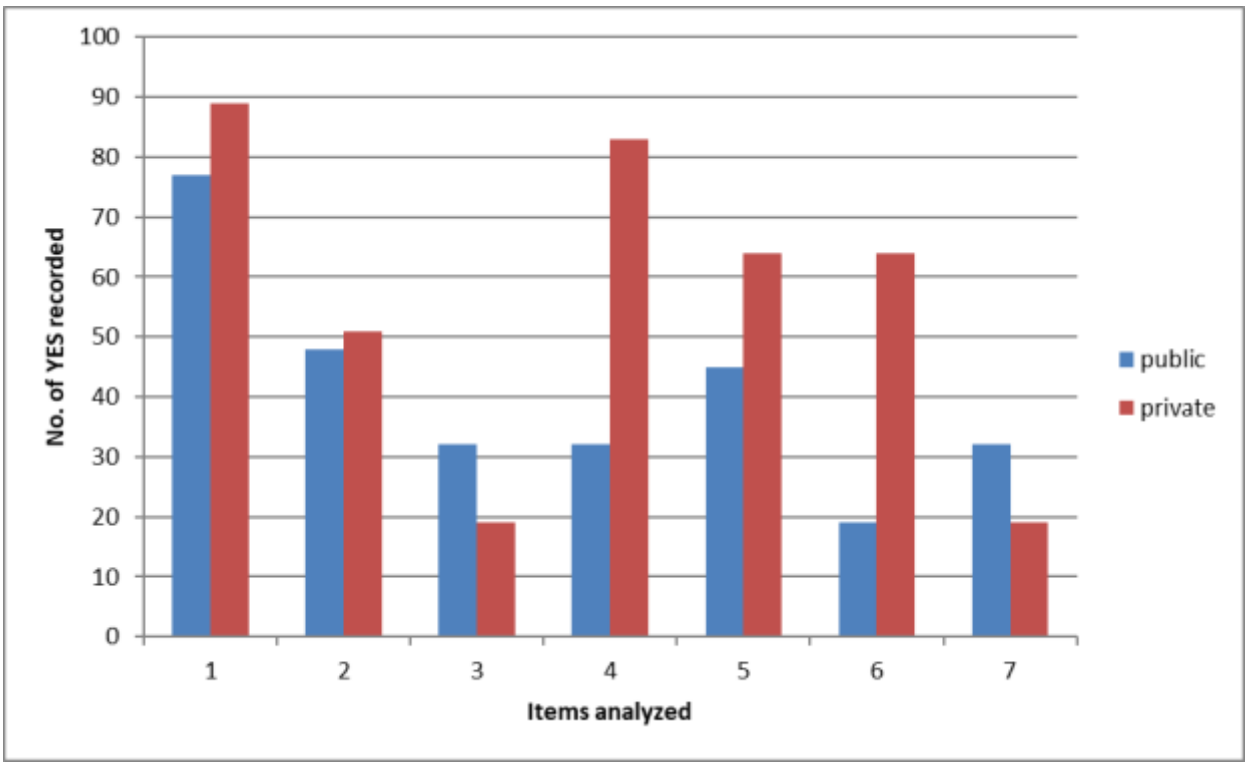
S/No.	Statement	N	Public		Private	
			Yes	No	Yes	No
1.	We were shown various apparatus used in the laboratory	192	77 (80.2%)	19 (19.8%)	89 (92.7%)	7 (7.3%)
2.	We performed an experiment on diffusion such as cotton wool soaked in Ammoniacal solution on Gas Law	192	48 (50%)	48 (50%)	51 (53.1%)	45 (46.9%)
3.	We prepared different indicators from flower extract to show Acid and Base	192	32 (33.6%)	64 (66.7%)	19 (19.8%)	77 (80.2%)
4.	We prepared a neutralization of Acid and base	192	32 (33.3%)	64 (66.7%)	83 (86.5%)	13 (13.5%)
5.	We were shown how to identify solubility of salt using NaCl and H_2O	192	45 (46.9%)	51 (53.1%)	64 (66.7%)	32 (33.3%)
6.	We performed experiment to determine the properties of carbon (C)	192	19 (19.8%)	77 (80.2%)	64 (66.7%)	32 (33.3%)

7.	We performed an experiment to show that carbon absorbed gases such as Carbon monoxide (CO) and Carbon dioxide (CO_2)	192	32 (33.3%)	64 (66.7%)	19 (19.2%)	77 (80.2%)

The data collected and analysed provided a clear understanding into the key objectives of this study which was to carry out a comparative study of content coverage on chemistry practical between public and private secondary school, Bosso.

Table 4.1 reveal that there is a wide range of content coverage of 77 (80.2%) and 89 (92.7%) respectively in item one both in public and private schools. Meaning there is no significant difference in content coverage in item one since both school type scores above average (50%). In item four, five, six there is a high content coverage of chemistry practical of 83 (86.5), 64 (66.7%) and 64 (66.7%) respectively in private school compare to public schools which implies that there is a significant difference of content coverage between public and private school. And in item three and seven 32 (33.3%) and 19 (19.8%) respectively there is poor content coverage of chemistry practical both in public and private secondary school. The table further reveals the percentage of the type of school with quantum content coverage. The result of the findings indicates that private secondary schools covers chemistry content in SS 1.

Fig. 1: Chart showing number of YES recorded in Public and Private school type (SS 1)



Research Question 2: Would there be difference in content coverage of chemistry practical between public and private secondary school in SS 2?

Table 4.2: Content coverage difference of chemistry practical between public and private secondary school in SS 2

S/No.	Statement	N	Public		Private	
			Yes	No	Yes	No
1.	We performed an experiment to illustrate the concept of time and reaction rate	192	70 (72.9%)	26 (28.1%)	96 (100%)	0 (0%)
2.	We performed an experiment to determine the effect of nature of substance, concentration, pressure, temperature, catalyst, endothermic and exothermic reaction on the rate of chemical reaction	192	26 (28.1%)	70 (72.9%)	96 (100%)	0 (0%)
3.	We prepare a standard solution	192	58 (60.4%)	38 (39.6%)	38 (39.6%)	58 (60.4%)
4.	We carried out an acid base titration using a given indicator and instructions	192	83 (86.5%)	13 (34.5%)	96 (100%)	0 (0%)
5.	We carried out practical on the removal of hardness of water by boiling and addition of washing soda.	192	45 (46.9%)	51 (54.1%)	38 (39.6%)	58 (60.4%)
6.	We performed an experiment to determine the solubility of substance using NaCl in H_2O	192	38 (39.6%)	58 (50.4%)	77 (802%)	19 (19.8%)
7.	We conducted an experiment to show the composition of air and properties of	192	32	64	45	51

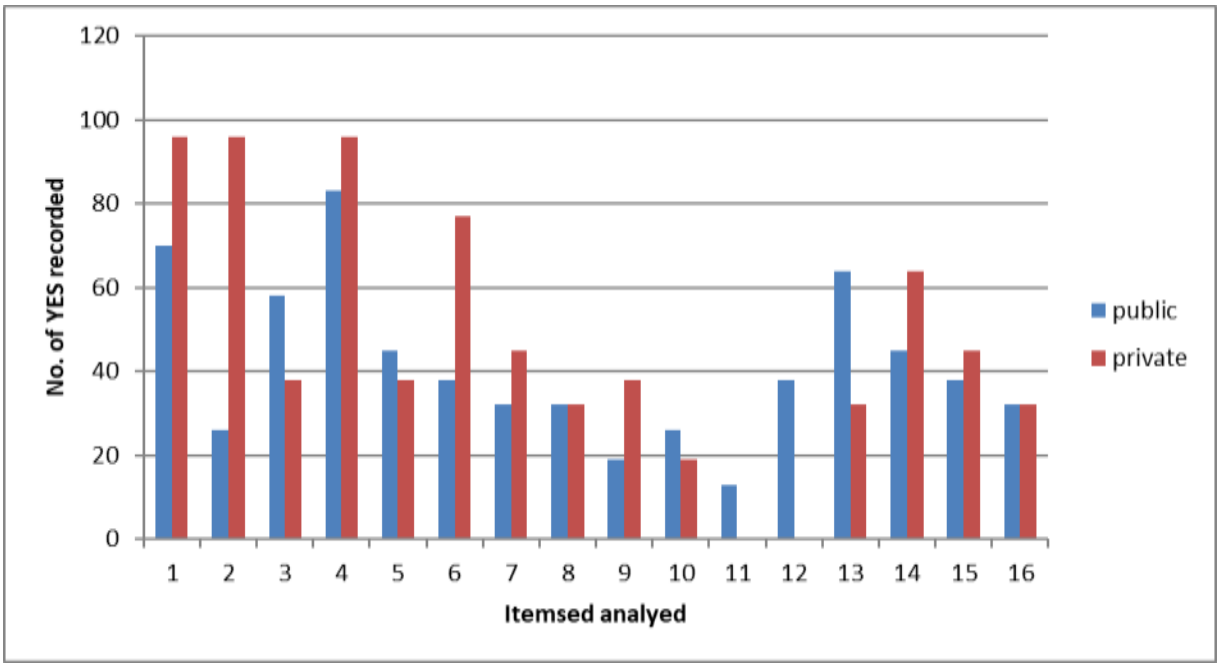
	air		(33.3%)	(66.7%)	(49.6%)	(54.1%)
8.	We set up an experiment for the laboratory preparation of hydrogen using zinc and acid	192	32 (33.3%)	64 (66.7%)	32 (33.3%)	64 (66.7%)
9.	We prepared an experiment to determine the physical and chemical properties of hydrogen	192	19 (19.8%)	77 (80.2%)	38 (39.6%)	58 (60.4%)
10.	We prepare an experiment to demonstrate the laboratory preparation of oxygen using H_2O_2 and MnO_2	192	26 (8.1%)	70 (72.1%)	19 (19.8%)	77 (80.2%)
11.	We performed an experiment to demonstrate the laboratory preparation of chlorine	192	13 (13.5%)	83 (86.5%)	0 (0%)	96 (100%)
12.	We performed an experiment to identify the physical and chemical property of chlorine	192	38 (39.6%)	58 (60.4%)	0 (0%)	96 (100%)
13.	We performed an experiment on the movement of ions in solution	192	64 (66.7%)	32 (33.3%)	32 (33.3%)	64 (66.7%)
14.	We performed an experiment to determine weak and strong electrolytes	192	45 (46.9%)	51 (54.1%)	64 (66.7%)	32 (33.3%)
15.	We performed an experiment to differentiate between alkanes, alkenes and alkynes	192	38 (39.6%)	58 (60.4%)	45 (46.9%)	51 (54.1%)
16.	We performed an experiment to determine the oxidation of $KMnO_4$	192	32	64 (66.7%)	32	64

(33.3%) (33.3%) (66.7%)

The data collected and analysed provided a clear understanding into the key objectives of this study which was to examine "Would there be difference in content coverage of chemistry practical between public and private secondary school in SS 2?"

Table 4.2 shows the percentage of the type of school with the highest content coverage of chemistry practical in senior secondary school form two (SS 2). The result of the findings for item 1, 2, 4, 6, and item 14 in table 4.2 shows that there is a high content coverage of chemistry practical in private school type compare to public school type. With private school covering 96 (100%) of content in item 1, 2 and 4 and 77 (80.2%) in item 6 and 64 (66.7%) in item 14. Whereas in those corresponding items (1, 2, 4, 6 and 14) there was poor content coverage in public 70 (72.9%), 26 (28.1%), 83 (86.5%), 38 (39.6%) and 45 (46.9%) schools. In item 3 and 13 public 58 (60.4%), 64 (66.7%) school type shows a high percentage of content coverage than private 38 (39.6%), 32 (33.3%) school type. But in item 5, 7, 8, 9, 10, 11 and 12 there was a poor content coverage of chemistry practical from both public and private secondary schools. The result of the findings indicates that private secondary schools covers chemistry content in SS 2.

Fig. 2: Chart showing number of YES recorded in Public and Private school type (SS 2)


120
100
80
60
40
20
0
No. of YES recorded
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Itemsed analyed
public
private

4.2 Discussion of Results

The data collected and analysed provided a clear understanding into the key objectives of this study which is to carry out a comparative study of content coverage on practical chemistry between public and private secondary school in Bosso local government area, Minna. A total of 384 respondents from sixteen different schools in Bosso area were used for this study where equal number of students from both public and private schools was selected in each school to determine content coverage from each school type in Bosso local government area, Minna. From the result of the study showed that private school covered 5 items or content compare to public school two which cover 2 items or content out of seven items in SS 1. This means that private school type In general has a high content coverage than public school type. Similarly Private school type has a high content coverage of eight items out of sixteen items compare to public school type covering six items or content out of sixteen in SS 2.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

In this chapter the data presented in chapter four are interpreted and discussed based on the two research questions that guided the study. The discussions are done based on the following headings:

- Summary of the study
- Conclusion reached from the findings of the study
- Recommendations
- Suggestions for further research

5.1 Summary

This study carry out a comparative study of content coverage on chemistry practical between public and private secondary school Bosso, Minna Niger state. Five chapters made up this research work.

In Chapter One, Background to the study, Statement of the problem, Aims and Objectives, Significance, Scope and Limitations of the Study were discussed.

Chapter Two reviewed related literatures which provided clue on how the researches that have been conducted in respect to the topic and also channel down to areas to really focus on.

Chapter Three consist of the methodology which was used in conducting this research work. A survey research design was adopted and the population target consists of all the science public and private senior secondary school in Bosso local government area, Minna. A total of three hundred and eighty-four students (384) were randomly selected from the sixteen public and

private secondary schools in Bosso local government area and the instrument used in collecting data was a structured questionnaire titled “Questionnaire on Content Coverage on Chemistry Practical” (QOCCOCP).

In Chapter Four, the data collected was analysed using simple frequency count and percentage Descriptive charts such as bar chart was also used to describe the analysed data.

Lastly, Chapter Five is a concise of the entire research work, where conclusions were gotten from the survey research conducted and necessary recommendations for further studies.

5.2 Conclusions

The Study revealed that Private secondary schools in both SS 1 and SS 2 to some extend cover their content in chemistry practical and this might be a reason why there is high performance of chemistry from that school type. Therefore teachers should be encourage to cover chemistry practical content since it directly affect students’ performance. During the research work some students reported that would have and will do better if practical is used to compliment the theoretical expect of chemistry, they should be taught side by side. Further conclusions were drawn that content coverage of chemistry practical can be achieve if locally available material are used to improvised for the unavailable and unrealistic materials.

5.3 Recommendations

In view of the results of these findings and conclusions reached in this study, the following recommendations are hereby offered:

1. It is recommended that chemistry teachers should be sensitized on content coverage and how it affect students’ performance.

2. Thus, public schools should be provided with practical equipment so as to make content coverage effective. Teachers should be encourage to make use of local available material in carryout teaching.
3. Same attention and time given to theoretical expect of chemistry should be equally applied to practical chemistry too as both respectively will be written in external examinations and both contribute to excellent result in examinations.

5.4 Suggestion for Further Studies

This work is limited to students of Senior Secondary School 1 and 2 only, thus a comparative research could be carried out on other levels like SS 3.

This work is limited to schools and students of Bosso local government area only, hence a similar research should be carried out in Minna metropolis or the entire Niger State.

A research should be carried out on the effect of content coverage of chemistry practical on the performance of students.

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APPENDIX 1

QUESTIONNAIRE ON CONTENT COVERAGE ON CHEMISTRY PRACTICAL (QOCCOCP).

Dear Respondent,

This questionnaire is designed to assess your opinion on the quantum of content coverage in chemistry practical undertaken in your school.

Please tick the option (Yes/No) that best describe your opinion.

Section A: Biodata Information

School Type: Public School ( ) Private School ( )

Gender: Male ( ) Female ( )

Name of your School: _____

CLASS: _____

Section B: Questionnaire Statements

S/N	ITEMS	YES	NO
1.	We were shown various apparatus and reagent used in the laboratory		
2.	We performed an experiment on diffusion such as cotton wool soaked in Ammonical solution on Gas Law		
3.	We prepared different indicators from flower extract to show Acid and Base		
4.	We prepared a neutralization reaction of acid and base		
5.	We were shown how to identify Solubility of salt using NaCl and H_2O		
6.	We performed experiment to determine the properties of carbon (C)		
7.	We performed an experiment to show that carbon absorbed gases such as Carbon monoxide (CO) and Carbon dioxide (CO_2)		

Section C: Questionnaire Statements

S/N	ITEMS	YES	NO
1.	We performed an experiment to illustrate the concept of time and reaction rate		
2.	We performed an experiment to determine effect of nature of substance, concentration, pressure, temperature, catalyst, endothermic and exothermic reaction on rate of chemical reaction		
3.	We prepared a standard solution		
4.	We carried out an acid-base titration using given indicator and instructions		
5.	We carried out practical on the removal of hardness of water by boiling and addition of washing soda		

6.	To determine the solubility of substance using sodium chloride in water		
7.	We conducted an experiment to show the composition of Air and property of Air		
8.	We set up an experiment for the laboratory preparation of hydrogen using zinc and acid		
9.	To determine the physical and chemical properties of hydrogen		
10.	We performed an experiment to demonstrate the laboratory preparation of oxygen using hydrogen peroxide and manganese(iv)oxide		
11.	We performed an experiment to demonstrate the laboratory preparation of chlorine		
12.	We performed an experiment to identify the physical and chemical properties of chlorine		
13.	We performed an experiment on the movement of ions in solution		
14.	We performed an experiment to determined weak and strong electrolytes		
15.	We performed an experiment to differentiate between alkanes, alkenes and alkynes		
16.	We performed an experiment to determine the oxidation of $KMnO_4$		

APPENDIX 2

Table 1: Names of Secondary Schools in Bosso Local government area and the number of Chemistry Students

S/N	LGA	Name of School	Nature of School	Level	SS 1 – SS 2
1.	Bosso	Bosso secondary school Minna	Public	SS 1 SS 2	462 445
2.	Bosso	Abu-Turab Islamic School, Minna	Private	SS 1 SS 2	138 128
3.	Bosso	Abu-Hannaf International School, Tudun Fulani	Private	SS 1 SS 2	4 0
4.	Bosso	Day secondary school Pyata Bosso	Public	SS 1 SS 2	87 177
5.	Bosso	Aliman Academy Maitumbi	Private	SS 1 SS 2	38 15
6.	Bosso	Government Army Day Secondary School	Public	SS 1 SS 2	780 711
7.	Bosso	Government Science college Chanchaga	Public	SS 1 SS 2	326 475
8.	Bosso	Government Technical College Minna	Public	SS 1 SS 2	526 513
9.	Bosso	Maryam Babangida Girls Science College	Public	SS 1 SS 2	251 576
10.	Bosso	Model science college Tudun Fulani	Public	SS 1 SS 2	182 172
11.	Bosso	Niger State School for Special Education Minna	Public	SS 1 SS 2	37 37
12.	Bosso	Sheikh Muhammad Sanbo College of art and Islamic studies Tudun Fulani Minna	Public	SS 1 SS 2	465 372

13.	Bosso	Sir Ahmadu Bello Model Secondary School	Public	SS 1 SS 2	648 548
14.	Bosso	Amale Royalty Model School	Private	SS 1 SS 2	4 6
15.	Bosso	Ar-Rayyan Academy, Bosso Estate, Minna	Private	SS 1 SS 2	11 7
16.	Bosso	Best Model School	Private	SS 1 SS 2	3 0
17.	Bosso	Centre for Excellence Return Iqe Islamic Minna	Private	SS 1 SS 2	25 32
18.	Bosso	Challenge International School	Private	SS 1 SS 2	56 39
19.	Bosso	Christ The King Academy	Private	SS 1 SS 2	15 4
20.	Bosso	Diamond International School	Private	SS 1 SS 2	10 9
21.	Bosso	Divine Excellence International School	Private	SS 1 SS 2	34 12
22.	Bosso	FEMA School	Private	SS 1 SS 2	60 68
23.	Bosso	First Oxford School	Private	SS 1 SS 2	36 37
24.	Bosso	Garima Standard Academy	Private	SS 1 SS 2	4 0
25.	Bosso	Hasha International School	Private	SS 1 SS 2	39 36
26.	Bosso	Ibrahim Memorial Academy	Private	SS 1 SS 2	9 3
27.	Bosso	Mamre Veritable School Sabon Anguwan Gudugudu	Private	SS 1 SS 2	6 4

28.	Bosso	Mypa Nursery School, Bosso Town	Private	SS 1 SS 2	29 32
29.	Bosso	Niger Baptist School	Private	SS 1 SS 2	30 26
30.	Bosso	Oliver International School	Private	SS 1 SS 2	17 16
31.	Bosso	Paradigm School	Private	SS 1 SS 2	17 6
32.	Bosso	Sammy Talent Intl. School	Private	SS 1 SS 2	13 12
33.	Bosso	Special Tropy International School	Private	SS 1 SS 2	4 0
34.	Bosso	ST.Clement Secondary School Gbaiko	Private	SS 1 SS 2	101 89
35.	Bosso	Supreme Comprehensive School	Private	SS 1 SS 2	15 19
36.	Bosso	Upper Niger River Basin Staff School	Private	SS 1 SS 2	42 46
37.	Bosso	Federal Government College, Minna	Public	SS 1 SS 2	308 341
38.	Bosso	Government Science college Chanchanga B	Public	SS 1 SS 2	326 475
39.	Bosso	Day Secondary school Maitubi Minna	Public	SS 1 SS 2	364 384

Source: Niger State Ministry of Education, 2018-2019 ACS Report.