

**TEACHER'S PERCEPTION OF AVAILABILITY AND
LABORATORY USE FOR CHEMISTRY TEACHING AND
LEARNING**

BY

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CERTIFICATION

We the undersigned hereby certify that this Research Report was conducted by Seraphina Mmachi Iheme with Mat. No. EDU1702601 of the Department of Curriculum and Instructional Technology, Faculty of Education, University of Benin, Edo State, Nigeria for the award of B.Sc. (Ed) degree in Chemistry Education.

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DEDICATION

This is dedicated to the Almighty God for his divine mercy, love wisdom, understanding, strength and provision.

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The researcher wishes to express her appreciation to God Almighty for his mercies that has made all things work out for her during the course of her study in the University of Benin. She also wishes to express her wholehearted gratitude to Him for His infinite mercy upon her life and for seeing her through her academic programme.

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ABSTRACT

This study aimed at the investigation of the roles of the laboratory in students' performance in Chemistry in private secondary schools in Egor Local Government area of Edo state Nigeria,

Five (5) research questions guided this study. The population of this study was sixty-four (64) schools and comprised of a sample of 36 Teachers selected through simple random sampling technique from 36 private secondary schools in Egor local Government area of Edo state was used in this study. A questionnaire instrument developed by the researcher was used for data collection. The instrument was validated by an expert of the Department of Curriculum Instructional Technology. The reliability of the instrument was carried out using the Cornbrash's Alpha formula. Data collected were analyzed using mean and standard deviation statistics.

The results showed that the use of the laboratory helps to: Develop scientific attitudes in the students towards the learning of chemistry especially practical. Develop scientific skills for problem solving in students among others. The results showed that the practical aspects of Chemistry should be taught in the Laboratory and also that laboratory experiment affects students academic performance. Based on the findings, the following recommendations were made: Chemistry should be taught in the laboratory, private schools should build and equip the science laboratories, employ more qualified chemistry teachers in the secondary school system.

Key words: Laboratory, chemistry, teaching, achievement, students.

CHAPTER ONE

INTRODUCTION

Background to the Study

Chemistry is a branch of science and the prerequisite subject for many fields of science. These fields include agriculture, pharmacy, medicine, nursing, biochemistry, and chemical engineering. It contributes immensely to the technological growth of the nation. Therefore, any nation that aspires to develop scientifically and technologically must pay attention to the quality of chemistry education that is being taught in schools. It is against this background that made the Federal Government of Nigeria to identify the specific objectives to be achieved in the teaching of chemistry at the senior secondary school level in the National Policy on Education (Federal Republic of Nigeria, 2004) as follows:

1. Facilitating a transition to the use of scientific concepts and techniques acquired in integrated science with chemistry.
2. Providing the students with basic knowledge in chemical concepts and principles through efficient selection of content and sequencing.
3. Showing chemistry in its inter-relationship with other subjects.
4. Showing chemistry and its link with industry, everyday life, benefits, and hazards;
5. Providing a course which is complete for students not proceeding to higher education, while at the same time, it is a reasonably adequate foundation for a post-secondary chemistry course. The policy recommends that science teaching and learning should be activity-oriented and student-centered such that

students acquire relevant laboratory experiences. The achievement of these objectives will depend on and be influenced by the teacher, the students, the materials, the laboratory, and how both students and teachers perceive them in relation to intended learning outcomes. Chemistry is a core science subject, and as such, a credit pass in it is required before a student can be admitted in any tertiary institution for most scientific based discipline. The study of chemistry entails the learning of concepts, established principles, laws and theories, and also substantial activity-oriented laboratory work. These laboratory experiments are to demonstrate practically some of the principles taught in theory, test the validity of certain empirical chemical laws, and illustrate properties of substances taught theoretically in the classroom. Learning chemistry means not only learning facts and concepts that describe the physical world at the atomic level, but also learning how to examine the physical evidences of chemical principles in a laboratory learning environment. Since chemistry is a science based on experimentation, therefore, performing experiments within a laboratory setting becomes very important in its' teaching and learning. Effective teaching and learning of chemistry can only take place when theoretical explanations are complemented with actual practices in the laboratory. The teaching laboratory is the standard method of training students in the skills and values central to scientific investigation and important in the development of positive attitude to chemistry. At the chemistry laboratory, students work cooperatively in small groups to investigate phenomena. This

mode of instruction has potentials to enhance constructive social interactions as well as positive attitudes and academic performance.

The importance of laboratories on students' performance can never be overemphasized, be it in primary, secondary schools or even in tertiary institutions. As such, the laboratories in schools need to be handled properly and be well equipped for a more effective learning. The availability of instructional facilities like laboratory is important in teaching the students various subjects at different levels of our educational system.

A laboratory is defined as a building or a part of a building, equipped with various scientific and experimental equipment for maximum knowledge benefits and results. There are different laboratories for different subjects but with one common aim, which is for researchers and practical transfer of knowledge from teacher to student.

According to Chan, (2009) 'a laboratory is a place for learning where students can observe and practice the things they are being taught theoretically and also experiment with different materials, objects or equipment either individually or in a group. Most times a laboratory is used for observations, performing hands on practical trainings and conducting experiments. The major aim of laboratory learning according to her is to enhance the students' performance and develop the practical competence of the student. Laboratory learning gives the Student the opportunity to learn visually and not by hearing

alone' in page (16). Theoretical teachings alone are sometimes not enough for students understanding but when coupled with the practical aspect, it gives the students a clearer and better picture of what they are being taught especially for a science student.

Famous scientific scholars believe that a laboratory is extremely important for instruction and learning in the science field since the late 19th century. According to Moyer, (2017) 'laboratory teaching was considered to be very important because it provided them with trainings in observation, supplying of detailed information and increased students interest in learning more and this same reason is still applied today in the 21st century', page (15).

Academic performance is the measurement of Students achievement across various academic subjects. Teachers and education officials typically measure achievement using class room performance, graduation rates and results from standardized tests.

The reference of chemistry to the building of our nation includes; (i) development of new tools and techniques to improve the quality of life through the production of vaccines, new drugs, new food storage system etc. (ii) development of scientific weapons which serves as agents destroying crop pests and diseases.

Academic performance of students is key feature in education, it is considered to be the Centre around which the whole education system revolves. The academic institutions. Singh, Malik and Singh (2016) also argued that

academic performance of students have a direct impact on the socio-economic development of a country. Similarly, academic performance serves as bedrock for knowledge acquisition and the development of skills. Farooq (2016) emphasized that the top most priority of all educators is academic performance of students. According to Narad and Abdullah (2016), academic performance is the knowledge gained which is assessed by marks by a teacher or educational goals set by students and teachers to be achieved over a specific period of time. They added that these goals are measured by using continuous assessment or examinations results.

Learners are constantly interacting with the physical environment of their schools during scheduled or unscheduled time, consciously or unconsciously. Physical environment of a school includes its physical surroundings and other facilities available in the school for learners. Students' performance may be affected by social, psychological, economic, environmental and personal factors. Laboratories are of great importance in schools and as such, this research work is to enable us understand the magnitude and effect of Chemistry laboratories on student's performances in private secondary schools in EgorLocal Government Area.

Statement of the Problem

The main aim for teaching is to pass across knowledge and for the students to understand what is being taught. Sometimes teaching theoretically is

not enough because some students learn better with practical things and not just by speaking alone. According to science we learn better visually and practically, that is why there is need for schools to have laboratories. For example, in Nigeria, it has been proven that 70% of students in schools fail their Chemistry exams or barely pass the cut off mark for the subject and it is a major problem due to lack of well-equipped laboratories.

Most of the topics taught in Chemistry needs to be practicalised because they deal with actual chemicals and that is why 85% of students after being taught in secondary schools forget all what they have been taught. This is because of lack of practical teachings and practical materials, thereby making students dislike the subject and loose interest in the subject. This has posed a serious problem for students intending to further in higher institutions.

Research Questions

The following research questions were raised to guide this study;

1. Are there Chemistry laboratories in public secondary schools in Egor Local Government area?
2. What are the available equipment in Chemistry laboratory in public secondary schools?
3. What is the level of knowledge of a Chemistry teacher on the use of Chemistry laboratory?
4. How often do students use chemistry laboratories in Egor Local Government public Secondary Schools?

5. How does Chemistry laboratory experiment affect secondary school students' academic performance in chemistry?

Purpose of the Study

The main purpose of this study is to find out the influence of Chemistry laboratory experiments on student academic performance.

The specific objectives are:

1. To find out if there are Chemistry laboratories in public secondary schools in Egor Local Government Area.
2. To ascertain the available equipment in Chemistry laboratories in private secondary schools.
3. To determine the level of knowledge of a Chemistry teacher on the use of Chemistry laboratory.
4. To find out how often students use Chemistry laboratories in Egor Local Government public secondary schools.
5. To determine how Chemistry laboratory experiment affect secondary school students' academic performance in Chemistry.

Significance of the Study

Laboratory work is considered to be very significant in promoting students learning of science and of science related inquiries. The use of Chemistry laboratories gives the students the opportunity to practicalise what they have being taught theoretically. A good school will combine both classroom learning and laboratory learning/experiment. This would be beneficial to students, teacher and government agencies in charge of education.

The study is expected to be beneficial to the following: students, teachers, and Ministry of Education.

To the students, the finding would help kick start provision of suitable laboratory and essential laboratory apparatus that will help in teaching and learning of Chemistry.

To the teacher, the finding would provide information on the role of laboratory practical on students' academic performance, some as to plan lessons with practicals that strengthens knowledge.

To the government agency, this finding will provide information about the availability of laboratory and essential laboratory apparatus in Egor Local Government Area, and how to procure laboratory where they are not available.

Scope and Delimitation of the Study

This study investigates the Influence of Chemistry laboratory experiment on students' performance in Chemistry in private senior schools and this study focused on the importance of using these chemistry laboratories, from the availability of chemistry laboratory, to how often they are used to make teaching and learning of chemistry easier. This study is delimited to teachers of Egor Local Government Area of Edo state.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

In this chapter, the review of related literature is presented under the following subheadings:

- Concept of Chemistry
- The Concept of Laboratory
- Concept of Students' Academic Performance
- Knowledge of the Use of Laboratories as a Science Student
- The Effects of the Use of Laboratories in Schools
- Summary of Literature Review

Concept of Chemistry

Chemistry is a branch or part of science that deals with the structure, composition and properties of matter. Chemistry can also be called the science of atom and molecule because it can best be described and understood in terms of basic constituents of matters. 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. Marie (2020) states that Chemistry is the "scientific study of matter, its properties, and interactions with other matter and with energy", page (3). An important point to remember is that Chemistry is a science, which means its procedures are systematic and reproducible and its

hypotheses are tested using the scientific method. Chemists, scientists who study Chemistry, examine the properties and composition of matter and the interactions between substances. Chemistry is closely related to Physics and Biology, Chemistry and Physics are both physical sciences. Some texts define Chemistry and Physics in exactly the same way.

However, understanding basic chemical principle is important, even if you don't have to take a Chemistry class for a grade. Chemistry is at the heart of understanding everyday materials and processes. Here are some examples of Chemistry in daily life: Cooking food is applied Chemistry, as recipes are basically chemical reactions. Baking a cake and boiling an egg are examples of Chemistry in action. Once you cook the food, you eat it. Digestion is another set of chemical reactions, intended to break down complex molecules into a form the body can absorb and use. How the body uses food and how cells and organs function is more of chemistry. Biochemical processes of metabolism (catabolism and anabolism) and homeostasis govern health and illness. Chemistry is one of the science subjects taught in Senior Secondary Schools in Nigeria. It is an important subject taught in Senior Secondary Schools. It is a prerequisite for the five main branches of chemistry which include the following: organic, inorganic, analytical, physical, and biochemistry. But, there are many important sub-branches and types of chemistry shared with other disciplines. Here are the definitions and descriptions of the major branches.

Organic Chemistry

Organic chemistry is the study of life and organic carbon compounds. This discipline focuses on compounds that contain C-H bonds.

Inorganic Chemistry

Inorganic Chemistry studies inorganic compounds, including metals, Ceramics and minerals, don't contain C-H bonds.

Analytical Chemistry

Analytical Chemistry characterizes matter and develops tool to measure it. Analytical techniques include both qualitative and quantitative analysis.

Physical Chemistry

As its name implies, Physical Chemistry shares close ties with the science of Physics, particularly the discipline of thermodynamics. Physical science applies thermodynamics and mechanics to Chemistry.

Biochemistry

Biochemistry is the study of chemical reactions that occur in living organisms. The field focuses on nucleic acids, lipids, carbohydrates, and proteins. Some people consider the 4 branches of Chemistry to be Organic, Inorganic, Analytical, and Physical Chemistry. Under this classification system, Biochemistry is a sub-discipline of Organic Chemistry. Biochemistry is often considered the fifth branch of Chemistry.

The Concept of Laboratory

A laboratory is defined as a building or a part of a building equipped with various scientific and experimental equipment for the purpose of making researches and practical teachings and also for maximum knowledge benefits and results. There are different laboratories for different subjects but with one common aim which is for researches and practical transfer of knowledge from teacher to student. The laboratory has been given a central and distinctive role in science education.

The laboratory has been given a central and distinctive role in science education, and science educators have suggested that there are benefits in learning within laboratories with laboratory Apparatus. Laboratories used for scientific research take many forms because of the differing requirements of specialists in the various fields of science and engineering. Laboratory experiences have been purported to promote central science education goals including the enhancement of students' understanding of concepts in science and its applications; scientific practical skills and problem solving abilities; scientific 'habits of mind'; understanding of how science and scientists work; interest and motivation. At the beginning of the 21st century, it looks as if the issue regarding learning in and from the science laboratory and the laboratory in the context of teaching and learning chemistry is still relevant regarding research issues, as well as, developmental and implementation issues.

Concept of Student Academic Performance

Academic achievement or academic performance is the extent to which a student, teacher or institution has attained their short or long-term educational goals. Completion of educational benchmarks such as secondary school diplomas and bachelor's degrees represent academic achievement. Academic achievement is commonly measured through examinations or continuous assessments but there is no general agreement on how it is best evaluated or which aspects are most important procedural knowledge such as skills or declarative knowledge such as facts. Furthermore, there are inconclusive results over which individual factors successfully predict academic performance, elements such as test anxiety, environment, motivation, and emotions require consideration when developing models of school achievement. Now, schools are receiving money based on its students' academic achievements. A school with more academic achievements would receive more money than a school with less achievement. Academic performance of students is a key feature in education, it is considered to be the Centre around which the whole education system revolves. The academic performance of students determines the success or failure of any academic institution. Academic performance of students may have direct impact the socio-economic. Similarly, academic performance serves as a bedrock for knowledge acquisition and the development of skills. Farooq (2016) emphasized that the top most priority of all educators is academic performance of students.

Knowledge of the Use of Laboratories

One of the main objectives of science teaching is to train individuals who will be able to adapt to rapidly changing and developing age and benefit from the latest technological innovations. Teachers have great responsibilities to reach this goal. In short, in this process, teacher should be in the role of a guide that shares the importance of science teaching and the responsibility and enthusiasm of reaching scientific knowledge and at the same time guides the research process in its class. Students will play a more active role in such learning environments. It is known that science laboratories play an extremely important role in students' active participation in the learning process. Laboratory practices play a central role to fill the gap between theory and practice. Laboratory applications have been stated to help students define the concepts of science in a more comprehensive and meaningful manner. Laboratories have long been regarded as an important component in science education. In this context, teachers should give more weight to laboratory work so that students can correctly acquire the science concepts and do not have misconceptions. The reason is that laboratory practices have an important effect on students to learn science concepts. As a result, it can be said that science laboratories have a central role in science education. Science educators have often stressed that more learning takes place thanks to laboratory activities. Students gain direct experience by conducting experiments in laboratories. Moreover, students'

attitudes and achievements to science education evolve through laboratory teaching. Furthermore, laboratory instruction improves students' ability in science. It has long been a belief in science education that the laboratory has the potential to be a place where theory and practice can coalesce for students. This belief has contributed to the ongoing discussion of the purpose and function of the laboratory within science classes (Byers, 2012; Hofstein & Lunetta, 2015; Lagowski, 2010). The research literature on the laboratory describes the varied purposes that educators have for the laboratory, which echo, nearly verbatim, the purposes for the lecture and science learning in general. These articulated goals include understanding of scientific concepts, interest and motivation, practical skills and problem solving abilities. Within the discussion of these goals, however, there exists very little evaluation of student perception of these goals or of student ideation of laboratory goals in general. The dialogue on the purpose of the laboratory has created an ever-changing landscape of laboratory learning goals. Hodson (1993) and Trumper (2003) contend that the laboratory should focus on teaching students practical skills and abilities, and not the nature of science, scientific concepts, nor affecting student attitudes about science (Hodson, 1993; Trumper, 2003). There is little agreement on an underlying reason for the important status of the laboratory in science education, with only speculations available as to why the practice has reached its current stature (Hodson, 1996). Further, while the laboratory is wildly popular in some countries, it is excluded from the science curriculum in others (Abd- El-Khalick,

2004). It is therefore difficult to determine which goals are intrinsically most appropriate for the laboratory.

The laboratory as a learning forum is under constant scrutiny by educational researchers with the goal of improving its educational merit and solidifying its place in science education (Hofstein & Lunetta, 2004). Hodson (1993) asserted that [The laboratory] is over-used in the sense that teachers engage in practical work as a matter of course, expecting it to assist the attainment of all learning goals. Instead, much that we provide is ill-conceived, muddled and lacking in real educational value.

Hodson (1993) The dialogue regarding the content and position of the laboratory in science education has fuelled a significant amount of work by educators or educational researchers leading to a relatively large body of research on the laboratory and improvements thereof. Similarly, though these discussions have consistently failed to take into account the perspective of students in terms of their interpretations and internalizations of the laboratory goals.

The Effects of the Use of Laboratories in Schools

It is extremely important for schools to have the latest and great quality science laboratory supplies these days. Science differs quite a bit from other subjects and in order to understand its concepts, you will need to look beyond the books and the conventional classroom teaching. Effective learning and teaching of science involves handling, seeing and manipulating real materials and objects. In the classroom, this would be ineffectual unless they actually observe the process and also understand the relationship between action and reaction. When it comes to science, effective teaching and learning will involve a perpetual state of show and tell. Some of the top schools combine classroom teaching with laboratory experiments so that their students are grasping each and every concept thoroughly. It is also believed that laboratory teaching and experiments that are conducted there, will help encourage a deeper understanding in children. Children are able to retain knowledge for much longer when they can see the experiments being performed in front of them. Science laboratory equipment will allow students to interact directly with the data that is gathered. They will be getting a first-hand learning experience by performing different experiments on their own. Pupils make use of the models and then understand the different scientific concepts and theories. Generally, school science lab equipment and supplies make learning as well as teaching much easier. There are many scientific concepts and theories that are quite difficult to explain directly from text books, For example, physics kits, anatomy

models and chemistry science kits but can make it easier to understand the otherwise complex theories of science. By virtue of equipping themselves with the very best and most advanced materials and supplies, schools are able to contribute quite a bit in the scientific advances that are yet to come. The developments and advantages in the field of medical science and technology wouldn't take place if schools didn't prepare exceptional and dedicated scientists and researchers. It is in science labs that children develop an interest in scientific research. When they are observing various things and carrying out many different experiments, their reasoning skills are honed and they will start to think deeply on those concepts and theories.

Summary of the Reviewed Literature

This research work was proposed to find out the influence of chemistry laboratory Experiment on students' academic performance in public secondary schools in Egor Local Government area of Edo State.

Academic Achievement or Academic Performance is the extent to which a student, teacher or institution has attained their short or long-term educational goals.

It is known that Science Laboratories play an extremely important role in students' active participation in the learning process. Laboratory practices or Experiments play a central role to fill the gap between theory and practice.

Laboratory applications have been stated to help students define the concepts of science in a more comprehensive and meaningful manner. Laboratories have long been regarded as an important component in Science education.

Science laboratory equipment will allow students to interact directly with the data that is gathered. They will be getting a first-hand learning experience by performing different experiments on their own. Pupils make use of the models and then understand the different scientific concepts and theories. Generally, school science lab equipment and supplies make learning as well as teaching much easier.

CHAPTER THREE

METHODOLOGY

This chapter describes the research method and procedure used in gathering and analyzing data in this study under the following sub-headings:

- Design of the Study
- Population of the Study
- Sample and Sampling Techniques
- Instrument of the Study
- Validity of Instrument
- Reliability of the Instrument
- Method of Data Collection
- Method of Data Analysis

Design of the Study

The research design is the survey research design using descriptive method. This approach was considered appropriate because the study was directed at collecting data from a segment of the population which was generalized.

Population of the study

The target population for the study comprised of one hundred and fifty-seven (157) teachers of sixty-four (64) private secondary schools in Egor Local Government Area of Edo State.

Sample and sampling technique

The sample of this study is made up of thirty-six (36) teachers from thirty-six (36) schools which were selected from the sixty-four (64) private schools in Egor Local Government area as sample for the study, using simple random technique. One teacher was selected from each of the thirty-six (36) schools, which made the total number of respondents thirty-six (36).

Instrument of the study

The instrument employed is the structured questionnaire. This was divided into two sections. Section (A) addresses the demographic information of the respondents. Section (B) is made up of twenty-eight (28) structured questions based on the research question earlier stated to elicit information from the respondents. The questionnaire will consist of 4-point likert scale response of strong Disagree (SD).response of strongly agree (SA). Agreed (A), Disagree (D), Strongly Disagree (SD)

Validity of the instrument

The validity of the instrument was determined by the expert judgment. In this regard, the content of the instrument for the data collection was validated given the structured questionnaire. Draft copies of the instrument was given to the researcher's supervisor and other experts in the Department of Curriculum and Instructional Technology, Faculty of Education, University of Benin (UNIBEN) for scrutiny and the corrections made was reflected on the questionnaire.

Reliability of the instrument

The reliability of the instrument was carried out using the Cronbach's Alpha formula. The reliability coefficient was found to be 0.73. This indicates that the instrument was adequate for the study.

Method of data collection

The approved copy of the validated questionnaire was administered to the various respondents selected for the study. Instructions were stated to guide the student on how to fill their responses into the boxes provided. All completed questionnaire were collected immediately by the researcher to ensure high return.

Method of data analysis

Data was analyzed using mean (\bar{x}) and standard deviation (S.D) for the research questions. The mean response greater than 2.50 was considered as agreed while the mean response less than 2.50 was regarded as Disagreed, also standard deviation was used for the analysis.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

In this chapter, results obtained after data analysis are presented and findings are discussed.

Research Question 1: Are there chemistry laboratories in private secondary schools in Egor Local Government area.

Table 1: Summary of availability of chemistry labs in secondary schools in

Schools	AVAILABILITY OF LABORATORY	none AVAILABILITY OF LABORATORY
1	Available	-
2	-	Not Available
3	Available	-
4	Available	-
5	Available	-
6	-	Not Available
7	Available	-
8	-	Not Available
9	Available	-
10	Available	-

Egor LGA

From Table 1, it is revealed that 7 out of the 10 schools representing (70%) owned a functioning laboratory for use by their students.

Research Question 2: What are the laboratory equipment available in the teaching of chemistry.

Table 2: Availability of laboratory equipment in selected schools in

S/N	Chemistry laboratory apparatus in my school	Available	Not Available
1	Test Tubes	45(90%)	5(10%)
2	Volumetric Flask	10(20%)	40(80%)
3	Graduated Cylinders	40(80%)	10(20%)
4	Pipettes	30(60%)	20(40%)
5	Burets	45(90%)	5(0%)
6	Bunsen Burner	15(30%)	35(70%)
7	Spatulas	35(70%)	15(30%)
8	Crucibles	5(10%)	45(90%)
9	Balances	45(90%)	5(10%)
10	Tripod stand	25(50%)	25(50%)

Egor LGA

From Table 2, it was revealed that almost all schools have test tubes, as all 7 schools with functioning laboratories reported to having test tubes. Also, all

the schools have Pipettes, Volumetric flasks, burets, Bunsen burner and tripod stand in their chemistry laboratory. Some schools have graduated cylinders, spatulas and balance as 72%, 100% and 57% respectively. Only 2 schools have crucibles. It therefore means that majority of basic chemistry equipment are available in chemistry laboratories in private and public secondary schools in the Local Government Area.

Research Question 3: What is the Chemistry teachers' opinion on the use of the chemistry laboratory.

Table 3: Level of knowledge of Chemistry teachers on Chemistry laboratory use.

S/N	ITEMS	SA	A	D	SD	MD	SD
1	I can identify the various laboratory apparatus	39 (78%)	5 (10%)	3 (6%)	3 (6%)	26.5	17.7
2	I can identify the various reagents in the laboratory	26 (52%)	14 (28%)	5 (10%)	5 (10%)	26	9.95
3	I follow all the laboratory safety measures during experiment	19 (38%)	11 (22%)	12 (24%)	8 (16%)	19	4.66
4	I give detailed explanations to students during experiments	20 (40%)	10 (20%)	5 (10%)	15 (30%)	20	6.46
5	I meet with others teachers to explain how to go about experiments before I take my students to the laboratory for experiments	21 (42%)	12 (24%)	8 (16%)	9 (18%)	21	5.92
6	I can completely set the Chemistry laboratory for experiments	33 (66%)	2 (4%)	2 (4%)	13 (26%)	33	14.6
7	There is no Chemistry experiment I can exhibit/demonstrate to my students	18 (36%)	5 (10%)	15 (30%)	12 (24%)	12	5.57

From table 3, Chemistry teachers agreed that they can identify various laboratory apparatus, reagent in the laboratory that they follow all laboratory safety measures during experiments, give detailed explanation to students

during experiments and they can completely set the laboratory for chemistry experiments. They disagree that they meet other teachers for explanation on how to go about chemistry experiments before taking their students to the laboratory for experiments.

Research Question 4: what are Chemistry teachers opinion on students use of laboratory.

Table 4: Descriptive statistics of how students make use of Chemistry laboratories.

S/N	ITEMS	SA	A	D	SD	MD	SD
1	Students perform personal project and experiment in the laboratory in my school any time they want to	5	10	20	15	5	7.64
2	Students are taken to the chemistry lb every week for practical	6	15	15	14	6	5.20
3	My school performs Chemistry practical regularly in the laboratory	8	11	13	18	8	2.52
4	Laboratory experiments re carried out once in a month in my school	8	10	14	18	8	3.06
5	I use the laboratory only when we are preparing for certificate examinations	12	23	4	11	12	9.54
6	My school performs Chemistry practical only when the topic taught needs to be practicalised.	12	13	15	10	12	1.53

Research Question 5: How does chemistry laboratory experiment affect secondary school students' performance in chemistry?

Table 5: Descriptive statistics on the influence of chemistry on experiment students learning.

S/N	ITEMS	SA	A	D	SD	MD	SD
1	My student understand better when difficult topics are explained with laboratory equipment	16	13	9	12	3.5	2.89
2	THEIR performance in examination has improved as a result of constant laboratory practices	13	12	11	14	0.5	1.29
3	Chemistry theory accompanied with experiment helps students retain knowledge	16	12	9	13	3.5	2.89
4	During chemistry examination it is easy to remember answer answers to questions on topics that they perform experiments on than the one they did not.	17	6	10	17	4.5	5.45
5	My students do not perform well if I do not carry out chemistry practical	9	6	22	13	3.5	6.95

Discussion of Findings

The findings of this study showed that many Private and Public Secondary Schools surveyed in Egor Local Government Area of Edo state agreed that the use of the chemistry laboratory develops academic performance and scientific attitudes, such as (Honesty, Critical thinking skills, Analytical skills, Patience, Skepticism, Excellence, among others) in students towards the learning of chemistry with the Descriptive statistics of the influence of Chemistry Experiments on students learning giving the mean deviation of 3.5 which is greater than the test value of 2.89 was obtained, which shows that students understand better when difficult topics are explained with laboratory equipment. Experiments in Chemistry greatly influence students' academic performance in private secondary schools in Egor Local Government Area of Edo State. This finding is in agreement with the finding of Hodson (1993) and Trumper (2003) who observed that the laboratory should focus on teaching students practical skills and abilities, and not the nature of science, scientific concepts, nor affecting student attitudes about

science, page (20). Usually, practical work in secondary schools serves as extension of the students' knowledge, which sometimes confirms or disabuses their current ideas. Omiko (2007) in stating the functions of the laboratory iii science teaching observed that the use of the laboratory develops interest, good attitudes and values in students.

It was also found that Teachers strongly agree that the presence of Chemistry Laboratories in secondary schools is necessary, teachers should be able to use the Chemistry laboratory and also agrees that theoretical teaching of Chemistry should be accompanied by the use of Chemistry Laboratory.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter deals with the summary of the study, the conclusion drawn from analysis of data obtained and recommendations offered based on findings made.

Summary

The study was carried to investigate the influence of Chemistry laboratory Experiment on Students' performance in public secondary schools Egor Local Government area of Edo state. A questionnaire was used as the research Instrument in collecting research information which was collected from 36 respondents randomly selected from 36 public secondary schools in Egor Local Government area of Edo state. In this study Simple mean was used to collect data statistically.

In the course of conducting the study, five (5) research questions were raised and from its analysis, it was established that the use of Chemistry laboratory by Teachers during the teaching and Learning of Chemistry influences students performance in private secondary schools.

Conclusion

Based on the discussion of the results on the influence of the Chemistry laboratory in teaching the subject, especially the practical aspects, the researcher observed that, the influence of Chemistry laboratory experiment on students academic performance are based on the fact that although majority of the equipment are available in the Chemistry laboratory in private secondary schools. The teachers agreed that they have high level of knowledge on the use of a Chemistry laboratory. It was also found that Chemistry students do not often make use of the Chemistry laboratory and the experiment performed greatly influence students' learning.

Recommendations

Based on the findings of this study, the researcher made the following recommendations:

- All the topics in chemistry which are practically oriented should be taught in the laboratory, using all the necessary equipment and

reagents. By using the chemicals/reagents, the students would acquire the skills involved in handling dangerous substances.

- All the science laboratories in the school should be equipped with modern equipment and other necessary teaching aids or instructional materials. The provision of these materials/equipment will help both the teachers and the students in their teaching and learning process.
- The science (chemistry) teachers should be encouraged to attend conferences, seminars and workshops. This will help them to learn new things, methods and acquire new skills in teaching difficult chemistry topics.
- •The science teachers should be motivated through payment of special allowance; or they may be placed one step ahead of their counterparts on the same salary grade level.
- There should be more periods on the time-table for practical chemistry lessons. The teachers and their students should use the correct chemistry textbooks recommended by the federal, and states ministry of Education in teaching the students.

- There should be an increased and enough finance for the purchase of essential laboratory equipment. As a matter of urgency, adequate provision should be made with regards to practical guide or workbook for students and teachers if any meaningful achievement is expected from them.

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