PROBLEMS ASSOCIATED WITH FAILURE IN LABORATORY PRACTICALS OF SCIENCE RELATED SENIOR SECONDARY SCHOOL STUDENTS IN EGOR LOCAL GOVERNMENT AREA OF EDO STATE

BY

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FACULTY OF EDUCATION

UNIVERSITY OF BENIN

BENIN CITY

JULY, 2021

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DEPARTMENT OF CURRICULUM AND INSTRCTIONAL TECHNOLOGY, FACULTY OF EDUCATION, UNIVERSITY OF BENIN, BENIN CITY, NIGERIA **IN PARTIAL FULFILMENT OF THE REQUIREMENT OF THE AWARD OF BACHELOR OF SCIENCE IN CHEMISTRY (B.SC. ED)**

JULY, 2021

CERTIFICATION

We, the undersigned certify that this project work was carried out by Ibeneme Godgive Onyedikachukwu of the department of curriculum and Instructional Technology, Faculty of Education and approve of it as adequate in scope and quality in partial fulfilment of the requirement for the award of a Degree of Bachelor of Science Education (B. Sc. ED).

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DEDICATION

I dedicate this research work to God Almighty my creator, my strong pillar, my source of inspiration, wisdom and understanding. He has been my strength throughout the course of this program and He alone made me scale through all the hurdles.

To my beloved parents (Pst. Ibeneme Godwin & Mrs. Ibeneme Blesing) who has never for once stop praying for me and encouraging me anytime I felt like giving up and also continually provided their moral, spiritual and financial support.

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ABSTRACT

The study investigated the "Problems Associated with Failure in Laboratory Practicals of Science Related Senior Secondary School Students in Egor Local Government Area of Edo State". In order to achieve the purpose intended, four research questions were raised. The study adopted a descriptive survey design. The total population of the study is two hundred

and three (203) science teachers. The sampled size used was one hundred and fifty (150) science teachers.

The instrument used for this study was a structured questionnaire which was validated through expert judgment approach and was tested for reliability through internal consistency method. The data obtained was analyzed using frequency count and mean.

The findings from the study revealed that laboratory practicals have an effective way of developing the curiosity and logical thinking of students which is one of the reason why teaching of practicals is very important as far as teaching of science is concerned. However, students don't understand better when they are not involved in laboratory practical experiment. The study also revealed that, most science laboratories are dilapidated, not well stocked with facilities, seats and demonstration tables, even when these materials are made available, their management becomes questionable. Moreover, the few available equipment, students are not allowed to have asses to them because of fear of being damaged or stolen. Lastly, the main problems revealed for the failure of science students in laboratory practicals include; lack of resources, lack of laboratories and laboratory equipment, lack of laboratory technicians and large classes.

CHAPTER ONE

INTRODUCTION

Background to the Study

Science education is the developing of technologically literate citizens who understand how science, technology, and society influence one another and who are able to use this knowledge in their everyday activities. Study of science is important because it has the potential for improving the quality of life and making the world safer, empowers people, giving them greater control over their lives by providing path ways for finding answers to questions (Adeyola, 2017).

The quality, relevance, methods of teaching, human resource, scientific literacy, science process skills, higher order thinking, science-technology-society, teachers' quality, and textbooks of science education directly impacts on the extent of growth and development of science and technology. The development of a modern civilization has a lot to do with advancement of science and technology. Focusing on the Science and Technology

Education is becoming common goal for nations to increase their developmental level since advancement in science and technology help as a tool for boasting countries economic, social and political development.

Mostly science practice takes place in science laboratory. Science laboratory is a very important resource input for teaching science and is an important predictor of academic achievement. Science laboratories made this world very advanced and scientific in its purposes. Many researchers suggested that learning science is enhanced and the understanding level is improved when students are engaged in science laboratory for practical experiments. The laboratory has been given a central and distinctive role in science education, and science educators have suggested that rich benefits in learning science come as result of using laboratory activities. However, the facilities for teaching science are not up to the mark at secondary stages.

Secondary school is the base in preparing students for science education. It is at this level they are exposed to laboratory equipment, activities and precaution or safety rules. A high school laboratory should have the

equipment necessary to conduct meaningful demonstrations and experiments. Teachers must understand that students with limited strength can have a full laboratory experience with appropriate accommodation, such as a lab assistant.

Hunde and Tegegne (2013), reported that, despite the fact that laboratories have multiple benefits that makes learning concrete for science education; students were deprived of such opportunities. Many countries have given attention to the effective implementation and practice of science education at their secondary schools. Malaysian Government had announced a new education policy to strengthen the education standards in science, to compete with advanced countries and vowed to stand in the list of developed countries in 2020.

The Commission for Africa report recommends that African countries have to take specific action that strengthens science, engineering and technology capacity since such knowledge and skills help countries to find their own solution to their own problem. Currently, the Ethiopian Government

determined and introduced what is now known as a “70:30 professional mix which 70% will be Science and technology streams while 30% will be Social Sciences and Humanities streams at higher education. This demonstrated that the government has given due consideration to science education

However, production of quality professionals in science is influenced by entrants who in turn influenced by the extent to which secondary education laid foundation in Natural Sciences as stated by Swail *et al*., (2003) cited in Hunde and Tegegne (2013). The implementation process of science education is limited in Ethiopian schools and students in Ethiopia generally perform poorly in science subjects.

Academically, less prepared students of secondary schools prefer humanities and social sciences than science and technology. This is not different in a far region where majority of secondary school students join social science and humanities for their higher education study.

Laboratory material practical also bear educational terminologies like: instructional materials, teaching materials, educational media, teaching aids, instructional facilities and instructional media. Chimezie, Ike and Iwu (2002), pointed out that these are devices which present a complete body of information and largely self-supporting rather than supplementing in the teaching learning process. Educational material practical's are things which are manipulated, seen, heard, read or talked about plus instruments which facilitate such activity (Okafor, 2000). Such materials in science practical's Okafor continued, are both tools for teaching and avenues for learning of Science. They include textbooks, chalkboards, model/ mock-ups, television, radio and other projected as well as non-projected devices. This study therefore seeks to investigate the problem associated with failure in science laboratory practical in science related senior secondary school students in Egor Local Government Area of Edo State.

Statement of the problem

Science laboratory practical ought to be simplified, comprehensive and concrete. Extensive use of laboratory practical makes science interesting,

stimulating and understandable to the learners. The success of science students in secondary schools largely depends on teacher's competency and effective use of science laboratory practical for the effective teaching of science in general.

Generally, teaching science subject using laboratory practical is faced with some problems, which leads to massive failure of students in laboratory practical, such as: the increased number of science students enrollment in senior in secondary schools, puts pressure on the limited qualified teachers available which also leads to reducing the time allotted to practical classes to the minimal or even omit practical lessons. Teachers find it difficult during laboratory activities to supervise and teach large classes and combine the practical's effectively with normal class lessons. Students on their part have the problem of comprehending what is taught without complementary laboratory activities in science.

Most laboratory materials in learning science practical's are either lost, damaged or carelessly stored. Storage facilities are not even available in some secondary schools and in some cases, students are not allowed to make

use of science laboratories due to fear of losing or damaging valuable materials in the laboratory.

The number of professional teachers in secondary schools are limited and competent experienced teachers cannot give hundred percent of their time and energy to laboratory practicals due to limited quantity of materials. In addition, some science teaches in senior secondary schools are of age and therefore cannot offer hundred percent of their time and energy even though they are experienced teachers.

Moreover, most science laboratories are dilapidated because, some of them were built since 1970s with maximum occupancy limit of twenty students at a time, and presently, these same science laboratories occupy more than two hundred student's which can only to an extent be managed for instructional delivery without practical. Evidence from researchers testifies that most science laboratories are not equipped with science facilities, seats and demonstration tables, even when these materials are made available, their management becomes questionable.

These anomalies no doubt cause students failure in science practical examinations. Most research work reveal the reformation of teaching methods without delving into what effects management of material in science laboratory practical would have on students' performance. The challenge to find out the causes of the failure and to improve on the performance of science students in science laboratory practical in senior secondary schools through adequate provision and effective utilization of science laboratory equipment in secondary schools prompted this study. Consequently, based on the few problems so far listed, this survey investigates the problems associated with failure in science laboratory practical of science related senior secondary school students in Egor Local Government Area of Edo State.

Research Questions

The following research questions have been formulated to guide the study;

1. To what extent does lack of science laboratory practical activities cause students failure in laboratory practical?

2. To what extent does teachers' incompetence in the use of laboratory equipment cause students' failure in laboratory practicals?
3. To what extent does students' attitude towards science practical cause failures in laboratory practicals?
4. To what extent does gender influences poor performances in science laboratory practicals?

Purpose of the Study

The main purpose of this study is to find out the Problems associated with failure in laboratory practical of science related senior design school students. Specifically, the study intends to:

1. To determine the extent to which lack of science laboratory practical activities cause students' failure in Science laboratory practical?
2. To determine if teachers' incompetence in the use of laboratory influence students' failure in laboratory practicals?
3. To know if students' attitudes towards laboratory practical could cause students failure in laboratory practicals?

4. To know if gender of students influence their performance in science laboratory practicals.

Significance of the Study

This research work is very significant because it will benefit the researcher, parents, teachers, government, science teachers, science students, education administrators, policy maker researchers, curriculum planners, textbook writers and the entire society. If the result of this research is properly utilized, it will;

1. Promote the idea that science is both a product and a process in students by arousing interest in laboratory practical work.
2. Motivate parents to provide basic requirements of practical lesson for their children in secondary schools.
3. Convince the laboratory teachers that practical lessons are mostly essential for effective teaching and learning of science subjects like; Biology, Chemistry and Physics.

4. Make the government through the ministry of education to realize the need for provision of science equipment to school and posting of qualified laboratory teachers and technologist to secondary schools.
5. Help Nigeria society in the quest for improved technology, industrialization and economy growth.

Scope/Delimitation of the Study

The scope of the study is to investigate the problems associated with failure in laboratory practical of science related senior secondary school students in Egor Local Government Area of Edo State and the study is limited to science related senior secondary school students in Egor Local Government Area of Edo State, like; Iyoba Girls Secondary School, Evbereke Secondary School, Kings and Queens College, Evbotubu Grammar School etc.

Definition of Terms

The following concepts were defined;

Science: According to Oxford Dictionary on Lexico.com; science is defined as the intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through

observation and experiment. Science is also the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence.

Laboratory: Oxford Learner's Dictionary defines laboratory as a room or building used for scientific research, experiments, testing, etc.

Practical: According to Oxford Learner's Dictionary, practical is defined as connected with real things, situation rather than with ideas or theories.

Laboratory Practical: Laboratory practical is defined as the set of procedures used on natural sciences such as chemistry, physics and biology to conduct an experiment - WIKIPEDIA

CHAPTER TWO

REVIEW OF RELATED LITERATURE

In this chapter, related literature to the topic will be discussed under the following sub-headings:

- Theoretical Framework
- Concept of Laboratory
- Concept of Practicals
- The Purpose and Practice of Science Laboratory Practical Work in Science Education
- Problems and Challenges Associated with Failures of Science Laboratory Practical Work in Science
- Summary of Literature Review

Theoretical Framework

Piaget's Cognitive Constructive Learning Theory

Jean Piaget (1896-1980) was a biologist, who later developed interest in children's understanding, through observing them, talking and listening to them while they worked in exercises he gave to them. He carried out a lot of research in the development of human cognition. According to him, cognitive development starts from birth to adolescence. Piaget designed a proper framework to understand the structure, functioning and development of the cognitive network of the human mind. He postulated that, like physical organs of the human body, there are two aspects of the human mind, one is the cognitive structure and the other is the cognitive functioning. He is of the view that cognition developed through the construction of Schema (i.e. abilities and potentials) and the process of assimilation and accommodation. He maintained that the development of intelligence is based on environmental experiences. In other words, what is available to an individual in terms of his schemas (potentials) decides how he is going to respond to the stimuli present in his physical or social environment.

However, Piaget's cognitive constructive theory was propounded in (1973) and proposed that children progress through a sequence of stages, assumed to reflect qualitative differences in children's cognitive abilities. Limited by the logical structures in the different developmental stages, learners cannot be taught key cognitive tasks if they have not reached the particular stage of development. Piaget emphasized on the holistic approach to learning. To him a child constructs understanding through exploring and experiencing his or her environment. Later in (1985) Piaget expanded this theory to explain how new information is shaped to fit with the learner's existing knowledge. Existing knowledge is modified to accommodate new information which leads to master developmental process. The major concepts in this cognitive process include;

- Assimilation: it occurs when a learner perceives new objects or events in terms of existing schemes or operations. This information is compared with existing cognitive structures.
- Accommodation: it occurs when existing schemes or operations have been modified to account for a new experience.

- Equilibration: it is the master developmental process, encompassing both assimilation and accommodation. Anomalies of experience create a state of disequilibrium which can be only resolved when a more adaptive and more sophisticated mode of thought is adopted.

Piaget's constructive theory generally regards the purpose of education as educating the individual child in a fashion that supports the child's interests and needs; consequently, the child is the subject of study, and individual cognitive development is the emphasis. This is a child-centered approach that seeks to identify, through scientific study, and the natural part of cognitive development. It also assumes that learners come to classrooms with ideas, beliefs, and opinions that need to be altered or modified by a teacher who facilitates this alteration by devising tasks and questions that create dilemmas for the learners. Considering the educational reflections of this theory, Piaget sees the child as continually interacting with the world around the child, solving problems that are presented by the environment and learning occurs through taking action to solve these problems.

The laboratory work in this study will also be based on these principles. Within Piaget's theory, the basis of learning is discovery, to understand is to discover, or reconstruct by rediscovery and such conditions must be complied with if in the future individuals are to be developed who are capable of production and creativity and not simply repetitive. According to Piaget, children go through stages in which they accept ideas they may later discard as wrong. Understanding, therefore, is built up step by step through active participation and involvement. Piaget further states that children begin to think logically between the age of 8 and 11 years, a stage he called the "concrete operational stage of development". The average age for senior secondary school's year one (SSI) students (the targeted population for the study) is 13 years and above which implies that learners at this age can apply logical thought to practical works and be able to understand them better. Laboratory activities require meaningful learning, i.e. learning that involves critical and creative thinking. Piaget's ideology supports this with the idea of logical thinking. This implies that teachers should create situations that would help the learners to discover facts by themselves. In this case, the

teacher should establish an explorative environment for the learners to explore facts or truth by themselves. Prepackaged information can lead only to rote memorization of facts. Rote memorization is of no substantial benefit to the learner because it is not of much benefit in the exploration of the environment and the solution of problem. Individual acquires information through his interaction with the materials and the environment. Such information is retained and utilized for the solution of the environmental problem. Piaget's cognitive constructive learning theory is related to the present study, the availability and utilization of laboratory practical's in teaching and learning science in secondary schools, because laboratory work encourages student's active participation, critical thinking, problem solving abilities and others. Hence this proposition/assumptions will be embedded in the instructional strategy.

Concept of Laboratory

Many researchers have defined laboratory in different ways but all the definitions come to give the same meaning. Ardo (2004), defines school laboratory as an instructional facility for helping students to learn what

science is and how scientists work. Bello and Oguntona (2001) said that nature should be a laboratory and that learning of science should be through inquiry rather than dogma. This will help for logical, critical and independent thinking. Adeyemi (2006) sees science laboratories to be central to the teaching of science in the secondary schools. Akano and Nma (2003) defined laboratory as a place where people engage themselves in human enterprise to examine and explain natural phenomena.

Laboratories have been found to be a primary vehicle for promoting formal reasoning, skills and students understanding, thereby enhancing the desired learning outcomes in students (Ogunleye, 2009). Proeter (2005) agreed to the view that laboratory is a room or building with specific equipment for doing scientific test of teaching science or a place where chemicals and medicines are produced.

According to Hornby (2005) laboratory is a room or building used for scientific research, experiment and testing. Laboratory is a place equipped for making tests or doing experimental work (Blood, Studdert and Gay, 2007). Laboratory is a place where scientific research and development is

conducted and analysis performed (Britannica Concise Encyclopedia, 1994 – 2010). Espindle (2004) sees laboratory as a room or building where scientific work or tests are carried on. Wikipedia defines a laboratory as a facility that provides condition in which scientific research, experiment and measurement may be performed. Omosewo (2010) defined laboratory as a place equipped for experimental study. She added that the world in the minds of most people is synonymous with scientific investigation, while Kamar (2009) sees laboratory as a place where the scientists do their work. He also added that it is a room that is well equipped for the purpose of carrying out practical work and allows students to have experiences that are consistent with the goal of scientific literacy. Mahanoy (2007) opined that a laboratory is essential in the secondary schools to practice various experiments by the students and get convince about the fact, events, phenomena etc. Laboratories have been found to be scientists' workshops where practical activities are conducted to enhance a meaningful learning of science concepts and theories (Olubor and Unyimadu, 2001). Laboratories have been found to be a primary vehicle for promoting formal reasoning

skills and students understanding, thereby enhancing the desired outcome in students (Adeyemi, 2006).

From the above definitions, Laboratory can be summarized as a place for students to practice various experiments so as to be convinced about scientific facts, events and phenomena. This place also enhances meaningful learning of science concepts and theories through hands on experiments. Therefore, the researcher wishes to find out the problem associated with failure in laboratory practical of science related senior secondary school students in Egor Local Government Area of Edo state.

Concept of Practicals

Practicals as defined by Hornby (2006) are supplies of something that a country, an organization or a person has and can use, especially to increase wealth. Hornby further explained that practicals are things that can be used to help achieve an aim, e.g. a book, equipment etc. that provide information for teachers and students. In the context of this work, practical are discussed as it concerns science laboratory.

Laboratory practicals can be viewed as supplies of individuals and materials whose utility in one way or the other help in the actualization of educational objectives. All practicals have unique qualities of utility, availability and consumption (wikipedia, 2011). Practicals are vital for any teaching-learning process to proceed effectively. The desirability of adopting material practical for teaching science cannot be over emphasized in making the lesson concrete and practicable. They are necessary tools that facilitate learning. Chime (2010) is of the opinion that resource materials enable the teacher to teach more effectively or better still enable the children to learn more readily. Learning practical motivate students and serve as effective ways to explain and illustrate subject content. In a similar vein, Oladipo (2008) asserted that resource materials facilitate understanding of concrete materials, create motivation and interests for the subject. These laboratory resource materials reinforce learners to retain information for a long period of time. Chukelu (2009) agrees with Okafor (2000) that utilization of material practical for teaching-learning processes has the following positive effects on the learners:

- Holds students interest.

- Retains information.
- Provides concrete and realistic experience.
- Stimulates imagination and self-activity.
- Helps to clarify abstract ideas.
- They promote greater acquisition and longer retention of factual knowledge.
- They offer real life experience which stimulates self- activity on the students.

Laboratory Practicals are broadly classified into two, namely: Human and Material practicals. Researchers have identified different types of practical. For instance, practicals could be identified as human practicals, natural practicals, material practicals, community practicals and personnel practicals. Chimezie, Ike and Iwu (2002) categorized practicals into message, people, materials, devices, techniques, settings and the learner. For the purpose of this research work, only human and material practicals are discussed.

Human Laboratory Practicals otherwise called Resource Persons are people who possess more authentic knowledge and needed information and skill, and are also willing and able to communicate to students the information. They can be foreigners or indigent. They provide wonderful opportunities through creative activities for self-expression. Their invitation and selection depends on the content, objectives and methodology most appropriate for each topic. Wikipedia (2011) view Human Practicals as a term used to describe the individuals who make up a work force of an organization. Human Practicals are the skills, energies, talents, abilities and knowledge that are used for the production of goods or the rendering of services (Wikipedia, 2011). Resource persons also called human practical are expertise individuals with specialties in different professions. These specialized experts have the needed skills which can be transferred to others. Human practicals is selected based on professionalism and talent not because of age, gender or location. Laboratory Human Practical's are both academic staff as well as the laboratory staff. Nwagbo (2005) highlighted some of the qualities of a science teacher as a competent resource person as:

- Being emotionally stable.
- Have good disposition.
- Show a democratic and cooperative attitude.
- He/she should also demonstrate empathy, patience, humor and fairness. However, these personality traits of the teacher add to the effectiveness in teaching and learning of science.

The Purpose and Practice of Science Laboratory Practical Work in Science Education

The purposes of laboratory work in science education have been stated in many literatures in different ways. Students interpretations of the taught models, used to explain theory can be tested and re-evaluated through such laboratory work, thus, improving students conceptual understanding. (Hofstein & Lunetta, 2004; Högström, Ottander, & Benckert, 2006; Lazarowitz & Tamir, 1994). According to Jenkins (1999), Laboratory work is used to motivate and increase students' interest in science practical activities. The skill category involves laboratory work that aims to allow

students opportunity to practice, handling special equipment, using standard techniques, comprehension and execution of instructions.

Different authors in science education contend that laboratory practical work in science has many purposes. These are motivations for students; the excitement of discovery, consolidation of theory, development of manipulative skills, knowledge of standard techniques, general understanding of data handling, development of other skills which analytic, evaluative, planning, applied mathematically. The role of laboratory practical work in science teaching recorded in the literature includes to encourage accurate observation and description, making phenomenon more real, arousing and maintaining interest and promoting a logical and reasoning method of thought stated in Science Community Representing Education (SCORE, 2008). It is also indicated that understanding of how science works, concepts of scientific process, collaborative working and fair testing helps to give student comprehensive understanding of Science. In Science, learners do Laboratory Practical Work to expand their knowledge

in an attempt to understand the world around them (Kolucki & Lemish, 2011). It develops learners understanding of ideas, theories and models (Millar & Abrahams, 2008). Research has established that achievement and skills are improved when students are taught Science using Laboratory Practical Work (Kerr, 2013; Turpin & Cage, 2004; Aladejana & Aderibigbe, 2007; Watts, 2013).

The school science curriculum in most countries has two distinct purposes; the first one is to provide every young person with sufficient understanding of science to participate confidently and effectively in the modern world. Modern society needs some understanding of the nature of scientific knowledge in order to evaluate claims that may affect their everyday decisions and to reach informed views of public policy. Secondly, it is to provide the foundations for more advanced study in science in their future life (Millar, 2004). The research project which was done in Europe from seven countries (Denmark, Germany, Britain, France, Greece, Italy and Spain) showed there were large differences between countries, in terms of

how much time was devoted to experiments. However, there were no major variations in how laboratory work was performed (Séré, 2002). According to this study the main purpose of the laboratory work from a teacher's perspective was to better understand the theory and link theory to practice. Many research studies have indicated the aim of laboratory identifies three main categories of aims: cognitive and affective aims and aims concerned with the acquisition of technique and manual skills. Aims categorized as cognitive, address students' development of knowledge and understanding. In this aspect, Laboratory Work can be used to help students make links between theory and practice.

In general, many researchers have confirmed that learning science is enhanced and the understanding level is improved when students are engaged in science laboratory for practical experiments (Hofstein and Lunetta, 2004; Hofstein, 2004; Lunetta *et al., 2004)*. The Laboratory had been given a central and distinctive role in science education, and science educators have suggested that rich benefits in learning Science comes as a

result of using laboratory activities. Hence, Practical Work is basic for students to help them to understand and develop their skills in science education.

Attending laboratory sessions is important in learning physical science because practical work in a way brings to life what is explained in textbooks. By seeing educators demonstrating or conducting experiments themselves, learners supplement what is in textbooks and as a result learning is enhanced. An advantage of laboratory usage is that it helps improve learner's higher order learning skills such as analysis, problem solving and evaluating. Secondary school is basic in preparing students for science education. It is at this level they expose, observe and interact with laboratory equipment, activities and learn precaution or safety rules. Poor performance in Sciences is due to absence of Practical Work while teaching of Sciences (Makgato, 2007).

The main factors frequently indicated for the failure of students in Science Laboratory Practicals, include: Large class size, lack of resources, lack of

laboratories and lab equipment and lack of laboratory technicians (Mokotedi, 2013). Similarly, studies that have been done in South African schools have shown that some teachers do not use Laboratory Practical Work to teach physical sciences (Rumnarain, 2011; Hatting & Rogan, 2007). Further conditions inhibiting the use of Science Laboratory Practical Work when teaching Physical Sciences are some teachers teach subjects in which they are not specialized (Muwanga-Zake, 2008, Onwu & Stoffels, 2005). Teachers who teach subjects which they do not specialize are known to be reluctant to do Science Practical Work (SCORE, 2008; Soares& Lock, 2007; Abrahams & Millar, 2008). Muwanga-Zake (2008) observed that many rural schools in South Africa do not have laboratories and it is reasonable to conclude that such schools also did not have technicians. Other studies also point to learners' persistent lack of experimentation skills (Onwu&Stoffels, 2005; Magkato, 2006; Luben *et al*., 2010; Ramanrain, 2014). Sometimes high school graduates are hired to work as untrained Laboratory Technicians from the same deficient school system and hence cannot effectively function

as Laboratory Technicians (Smithers & Robinson, 2005) and (Helliar & Harrison, 2011).

Hence, basic factors that are fully responsible for students' failure in science laboratory practical work in public senior secondary schools have been identified in this review. The summary of factors are presented in the following table 1, with each basic factor again sub factors under them. It is illustrated with rank order based on the most frequently stated in different literature. Moreover, the detail description of each factors are presented in the next sections.

Problems and Challenges Associated with Failures of Science Laboratory Practical Work

RANK	BASIC FACTORS	DETAIL LISTS OF FACTORS UNDER EACH BASIC FACTORS IN RANK ORDER
1.	Facilities and Resources related issues	a)Lack of Laboratory equipment and supply b) Lack of laboratory manuals c) Lack of Laboratory room d) Large class allocation
2.	Teachers and laboratory technical issues	a)Teacher's perception and motivation b) Teacher's skills competence c) Teacher's work experience

		d) The need for technicians e) Job Satisfaction f) Teacher's work load g) Class time
3.	Exam and assessment related issues	Classrooms and standard examinations
4.	Students related issues	Student's motivation and perception
5.	Curriculum related issues	Content of the curriculum
6.	Educational administrations related issues	a) School principal b) Higher authorities c) Support and recognition from other stakeholders.

The above table is adapted from

https://www.researchgate.net/publication/348133923

Facilities and Resources Related Issues

a. Lack of Laboratory Equipment and Supply

For all kinds of scientific experiments, whether in a research laboratory, in schools or colleges, there is need for various laboratory apparatus and laboratory equipment. Laboratory apparatus are tools and equipment used by scientists, researchers, science teachers, and science students to carry out science investigations. Any apparatus and equipment found in any given laboratory could vary depending on the field of study, nature of study and

level of the researchers, like high school, or professional. The various fields of science are complex and very wide.

Laboratory equipment are the key to any practical work, which promotes long term memory in students, enhances student's development of the ethical dimension of science, inspires the spirit of collaboration and active participation among learners, exposes learners to scientific experiences that could ultimately help them in developing scientific attitudes and skills and inculcate in the students the spirit of inquiry and scientific mode of thinking.

b. Lack of Laboratory Manuals

School teachers use the most commonly laboratory style which is, the instructor explains the topic which is going to be investigated and link it with previous work, then the students just repeat the steps by imitating the teacher or follow the laboratory manual (Tamir, 1977). This style used by teachers is widely the cook book approaches as all the teachers prefer the clear and predetermined outcome for their laboratory outcome and they do not ask the students to create the procedure and instead they use a prescribed

manual. The advantage of this style was to provide the opportunity for a large number of students to perform the same activity and saving resources such as time, instructors, place equipment and materials (Lagowyski, 1990).

In Kenya, factors impacted on the successful implementation of effective science teaching was noted that in many secondary schools the curriculum materials like laboratory manuals are in short supply (Oyoo, 2013). Effectiveness in Science laboratory instruction requires that learners be provided with practical guides. To practice laboratory experiments, there are no well-prepared laboratory manuals (Feyera, 2014). Similarly, in Nigeria as one of laboratory-related factors, the lack of instructional materials like laboratory guidance and too short period allocated for practical work were the problems identified for implementation of practical work (Adedayo, 2015).

c. Lack of Facilities in Practical Laboratory Room

Laboratories have multiple benefits ranging from making learning concrete to lying basis for science education in the subsequent levels (Hunde &

Tegegne, 2010). There is no controversy that science teaching must take place in a laboratory. Science simply belongs in a laboratory as cooking naturally belongs in a kitchen and gardening in a garden. In laboratories a minimum requirement room should have enough space; should have gas electricity and water in sufficient quantity to use; be 'future proofed' as far as possible (SCORE, 2008).

In most African countries, single science laboratory room serve for all the science education. In such cases, the time allocated for each science subject cannot sufficiently provide for the day to day practical activities. Laboratory room is not proportional with the number of students and some schools do not have totally laboratory rooms, materials and technicians (Feyera, 2014). Most of the laboratory rooms were not up to the standard (or not built for laboratory purpose) and lacked even the most basic facilities like running water, source of electricity; working tables, sinks, hoods, etc. In some cases, the rooms had broken windows, roofs, doors etc., and as a result were not secure places in which to keep materials (Gerekidan, 2014).

d. Large Class Allocation

It is noted from different studies, that generally, uneven allocations are made for the study of Science in Nigeria. Many schools have large class sizes, in some cases, as many as eighty students, with few possibilities of meaningful group or individual work, has few opportunities for direct contact with teachers (Oli, 2014). Hence, Class sizes are often excessively large, and taught in the poorest conditions by limited number of teachers. Similarly, class size of secondary schools in Nigeria, was extremely large when compared. It was found that 71.69% of the sample teachers replied that the average number of students in their school was between 70 and 80. In this regard, the majority of class room teachers could not check up their students' exercise, homework and assignment. However, the teaching and learning of Science has been highly affected. Students, when it comes to laboratory practical class and large student's population than the available apparatus during science practical class were identified as students-related factors

influencing the student's attitude towards practical science in secondary schools (Adedayo, 2015).

Teacher's Related Issues

a. Teacher's Perception and Motivation

The types of practical work that can be done depend on the teachers' perception and motivation (Hatting, 2007). Teachers who are motivated to do practical work will find ways to do so even in the most poorly resourced schools. Also, those who are not motivated will not do practical work even when they have access to the best of resources. The teachers' poor motivation, lack of skills in planning flexible and creative lessons, and lack of understanding of curriculum objectives are all likely to be contributory factors in determining why so much of the science that is taught appears to diverge from the expectations of the curriculum developers (Oli, 2014).

b. Lack of Teacher's Skill Competence

Teachers' skills play a pivotal role in the process of promoting change within their own practical laboratory class and education system generally. The success of practical work in science education in secondary school will depend to a large extent on the teachers' involvement in teaching skills. They manage the entire school, teachers facilitate learning, handle the laboratory implementation and help their students transfer what they have learned theoretical to practical work settings.

Qualifications and experience are very important in this regard, but more significantly, the pedagogic style practiced by teachers will need to be child centered to address practical work in science learning and school-based practices that put the best interest of student at the center of all decision-making processes. Teachers have problems of how to teach and what to teach (Adeboyenga, 2010). So the way the teacher teaches need serious improvement in science education and practicals especially. When students are well taught, they will be able to apply laboratory training in solving their individual and social problems (Henshaw, 2013). The students are not

properly taught because they have blamed the declining performance of students to lack of hands-on activities (Bello, 2008) and (Igwe, 2013). If one pays a visit to school a, you would observe one of these three activities taking place rather than practical activities namely; written work, copy note and listening dominates practical classes.

As stated in the findings done by Adedayo (2015) while the teachers are professionally qualified and were unbiased in their teachings, students attitudes towards practical science in senior secondary schools in Ekiti State are influenced by the teacher's poor knowledge of practical work, non-availability of competent Science teachers, absenteeism of the teacher at practical classes, teacher's method of teaching being too advanced than the students, unfriendly attitude of the teachers with the students and late commencement of teaching practicals. Teachers should use varieties of teaching methods to achieve the desired objectives for quality practical lesson for example; demonstration project, individualized and instruction methods. The teaching must be varied to accommodate students at work

instead of theorizing most class periods, encourage hands-on activities, take student out to explore in industries, let them see and touch the instrument and record steps on industrial preparations of simple equipment and models. The teachers must relate their practical instruction with the commercial and industrial environment rather than only the hypothetical standard principles that is too academic. They should record step for the preparations of substance as it is in the industry, so that they will be self-reliance and also fit to render service to the industries.

c. Poor Teachers Work Experience

As a result of experience, teachers will develop confidence which is very important personality for the teachers to be successful to overtake planned activities in practical work. A research has been conducted in UK and over 60% of both primary and secondary teachers said they were fairly confident. The main reasons given for this were experience (including experience gained e.g. as a scientist, prior to becoming a teacher), knowing the subject and having enthusiasm for it, and having time to practice in school or to

attend courses and conferences. Teachers must understand that students with limited strength or mobility can have a full laboratory experience with appropriate accommodation, such as a lab assistant (Tenaw, 2015). Higher institutions in Nigeria charged with the responsibility of training science teachers at all levels, are increasingly turning out teachers without requisite laboratory experience. Science teachers usually lack the necessary confidence to conduct practical classes with their students (Abimbola, 1996).

d. Lack of Teachers' Job Satisfaction

Teachers who are dissatisfied within the profession are not likely to produce quality lessons, deliver and engaging instruction in the classroom (Baker & Smith, 1997). Teachers that are satisfied with their jobs tend to produce more in the classroom and yield better instructional results with their students. (Baker & Smith, 1997). Hence, job satisfaction of science teachers can have direct relationship with teaching science and also can affect the performance of students in practical work in different secondary schools.

e. Lack of Laboratory Technicians

Technicians in science have an essential role to play in current and future science education. Trained and experienced technicians have a detailed knowledge of practical techniques and often greater expertise (than the science teachers) in matters of technique, health, safety, efficiency and economy. They also enable teachers to offer varied and stimulating science lessons. Recently, there has been much discussion about reducing the workloads of teachers by increasing the role of teacher assistants. Trained Laboratory Technicians should be used instead of teacher assistants their support can help to make science teachers workloads more manageable. Inadequate technician's support can often be linked to achieving science student's failure in science laboratory practicals.

f. Limited Provision of Practical Sessions in School Timetable

The basic framework for learning special practical work in science is availability of time. Following this, the teachers and students needs enough time to carry out laboratory practicals in Science. Special practical work

requires adequate time to teach and learn. The problem of inappropriate time schedule becomes obvious when we realize that the last five minutes in each lesson periods are often expectedly devoted to entry behavior and closure of activities (Henshaw, 2013). We must devote adequate time for practical teaching instead of the lesson period to be one or two times 30-40 minutes each per week. If time for practical instruction is as important in learning as the designers of curriculum and many researchers think, the period for all practicals in Sciences must be increased to three or four periods of 40 minutes each per week.

Most of teachers' practical time, is used for dealing with the practicalities of the tasks, such as giving instructions, collecting the equipment, handling them in, producing the data and cleaning up afterwards (Abrahams, 2011). Very little or no time at all is devoted to discussing the ideas behind the phenomena or otherwise developing the conceptual skills of the students. In a prior study (Millar and Abrahams, 2009) found that most of the teachers in the study (24 out of 25) devoted very little or no time at all for supporting

the development of the student's knowledge through discussion, instead, the time was spent concentrating on the practicalities.

Exams and Assessment Related Issues

Currently, there is little assessment of practical techniques such as assembling apparatus and measuring that require direct observation by the assessor, yet these skills are an essential part of practical work. Teachers need to find better ways of assessing practical work to ensure that credit can be given for the acquisition of practical skill as well as scientific reasoning.

Many teachers lack experience with assessment methods aimed at assessing their students understanding and performance in the science laboratory (Yung, 2001). As a result, in many cases, student's final grades do not include a component that directly reflects their performance in laboratory work and their understanding of that work. Therefore, Science students are bound to fail science laboratory practicals.

Students Related Issues

Students' interest and their academic achievement in science education have direct relation and at the same time, affective practices of students in classroom are strongly related to their academic achievement (George & Kaplan, 1998). Students are effectively successful through practicing the subject matters. Students tend to understand and recall what they see more than what they hear as a result of using laboratories in the teaching and learning of science so as to get better achievement (Farounbi, 2008).

Consequently, students seems to find practical work relatively useful and enjoyable as compared to other teaching methods, but because some of these students are being confused of the practical procedures and also afraid of the measurements involved, it makes them lack interest for any practical class and therefore do not prepare for it. However, students' lack of participation or absence during practical activities has influence students' scores in science subjects.

Educational Administrations Related Issues

School Head is pivotal for the school to provide important facilities and laboratory room for the implementation and successful achievement of science practicals. According to Nworgu, (2015), stated that reason for very little implementation of practical activities were lack of concern and support of school principals (Endalamaw and et *al*., 2017). Adequate planning by the school Head, with appropriate involvement of teachers, learners, parents and the community, can raise curriculum standards and help the school meet learning achievement goals and successfully implement their important policy directives or targets. The school Head must be able to adjust the internal workings of the school to monitor and guide teachers' conditions of service and school financial system on implementation of practical work. Promote powerful learning-teaching processes that facilitate overall science educational achievement for all students. This occurs when school leadership sets realistic and high expectations for both students and teachers in the laboratory and classroom, and provides various ways for them to pursue learning through the active participation of the learner and

the reflective guidance of the teacher. It would appear that in a school where innovation is generally supported, science teachers engage in higher levels of practical work (Hattingh, 2007).

Some studies identified that school management did not influence the implementation of practical work in the school (Hattingh, 2007). It would appear that in a school where innovation is generally supported, science teachers engage in higher levels of practical work. A review in Ornstein and Hunkins (1998) examines that the school principals as key guarantor of successful implementation of the school curriculum so as to improve students' academic achievement. According to them, school principals are those who are knowledgeable and committed to the curriculum and they also view their roles in providing encouragements on one end of the continuum and serving as curriculum leaders on the other end.

Summary of Literature Review

Practical work in teaching science and learning situations, offer learners opportunities to practice the process of science investigations. Also, practical

work involves hands-on and minds-on practical learning activities, where learners practice and develop various science processes and skills including; hypothesizing, observation, interpreting, predicting, problem solving, communicating, drawing and evaluating conclusions.

The role of practical work in science teaching recorded in the literature includes encouraging accurate observation and description, making phenomenon more real, arousing and maintaining interest and promoting a logical and reasoning method of thought. It is also understanding of how science work such as; concepts of scientific process, collaborative working, reproducible results, fair testing. In Science, learners do practical work to expand their knowledge in an attempt to understand the world around them. Achievement and skills improved when students are taught science using practical work.

The main factors frequently indicated for the failure of science students in laboratory practicals include; lack of resources, lack of laboratories and laboratory equipment, lack of laboratory technicians, and large classes. The

other factors are related to absence of laboratory technicians, teachers' perception and motivation, teachers' skill competence, teachers' work experience, teachers' work load, job satisfaction, class time allocated, exam and assessment related issues, students related issues, curriculum related issues and educational administration related issues are all involved in the failure of laboratory practicals among science students.

CHAPTER THREE

RESEARCH METHOD

In this chapter, the researcher describes the procedures and methods employed in collecting data for the study. The following sub-headings are organized accordingly;

1. Design of the study
2. Population of the study
3. Sample and sampling technique
4. Research instrument
5. Validity of the instrument
6. Reliability of the instrument
7. Administration of the instrument
8. Method of data analysis

Design of the Study

Descriptive survey design was used for the study. According to Ali (2006), descriptive survey design is concerned with the documentation and

description of what exists or the present status of existence or absence of what is being investigated without any manipulation of what caused the event, it develops a profile on what is and not why it is so. It is considered appropriate for the study because it is based on the views and opinions of the respondents in the area of the study.

Population of the Study

The target population for this study is comprised of the entire science teachers in Egor Local Government Area of Edo State. The total population for this study is two hundred and three (203) science teachers of Egor Local Government Area.

Sample and Sampling Technique

The simple random sampling technique was used to select 10 out of the 12 senior secondary schools in Egor L.G.A. 15 science teachers were randomly selected from each school making a total sample of 150 science teachers as the sample size for the study.

Research Instrument

The research instrument used for the collection of data necessary for the success of the study is a structured questionnaire. The questionnaire consist of items meant to gather information on issues relating to the various research questions raised.

Validity of the Instrument

The research instrument was validated using the expert judgment of the supervisor and one other lecturer in my subject unit. They helped to scrutinize the items in the instrument to determine their relevance for the investigation. Corrections and suggestions offered by the experts were taken into consideration in providing the final copy.

Reliability of the Instrument

After trial testing, the instrument was subjected to a test of internal consistency to ensure its reliability. Research questions 1-2 was analyzed using frequency and percentage. Research questions 3-4 cronbach alpha method was used. The scores obtained was used to calculate the variations

and the coefficient of reliability was found to be 0.693. This indicates that the instrument is reliable for the study.

Administration of the Instrument

The researcher will personally administer copies of the questionnaire to the respondents to seek their views and on the spot collection will be made. The direct method was adopted by the researcher in order to offer assistance to the respondents when needed.

Method of Data Analysis

The research questions was analyzed using frequency and mean. For four (4) points scale responses, values of 4, 3, 2 and 1 for strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree respectively were assigned to responses from which a mid-point mean value will be calculated.

Formula for Standard Deviation

$$\sum = \frac{FX}{N}$$

$\sum$ =sum of

F = Frequency

X= Nominal value

N = Total number of respondents

The numeric values assigned to a different scaling items used are as follows:

Strongly Agree (SA) = 4

Agree (A) = 3

Disagree (D) = 2

Strongly Disagree (SD) = 1

$$\bar{X} = \frac{4 + 3 + 2 + 1}{}$$

$$= 2.5$$

However, the decision rule was based on the values of the calculated mean of the response options numerical values. Therefore any item of mean score which is 2.5 and above was agreed by the researcher as positive influencing the questionnaire items, while any point that is below 2.5 was disagreed by the researcher as negative.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF RESULTS FINDINGS

This chapter deals with the presentation of results and findings from the analyses of data obtained and the discussion of results. The results are carefully interpreted and presented in tables according to the research questions.

Research Question One

Items 1-5 was used to investigate research question one; **“**To what extent does lack of science laboratory practical activities cause students’ failure in laboratory practicals?”

Table 1:

S/N	ITEMS	SA 4	A 3	D 3	SD 1	N	MEAN	DECISION
1	Lack of practical activities does not stimulate students creativity, curiosity and critical thinking about laboratory practical	70 280	55 165	20 40	5 5	150 490	3.26	Accepted
2	Lack of practical activities does not promote student engagement with the scientific method use in laboratory practical	50 200	58 174	30 60	12 12	150 446	2.97	Accepted
3	Lack of laboratory practical activities discourages active learning and problem solving in laboratory practical	65 260	69 207	10 20	6 6	150 493	3.28	Accepted
4	Lack of practical activities under develops students' interests, attitudes and values.	80 320	62 186	8 16	0 0	150 522	3.48	Accepted
5	Lack of laboratory practical activities reduces students interest to learn science practical	150 200	75 225	17 34	8 8	150 467	3.11	Accepted

Analyses in table 1 above, **s**hows that high mean scores for items 1, 2, 3, 4 and 5 had the mean values of 3.26, 2.97, 3.28, 3.48, and 3.11 respectively. The values were up to 2.5 and above which was interpreted as accepted, which therefore indicates that lack of science laboratory practical activities causes students failure in science laboratory practical, because their creativity, curiosity, and critical thinking were not stimulated. Lack of practical activities does not promote student engagement with the scientific method in laboratory practical, rather it discourages active learning and problem solving among students in laboratory practical, that is, lack of practical activities under develops students interest and reduces social interactions among student's.

Research Question Two:

Item 6-10 was used to investigate research question two; "To what extent does teachers' incompetence in the use of laboratory equipment causes Students failure in Science practical?"

Table 2:

S/N	ITEMS	SA 4	A 3	D 2	SD 1	N	MEAN	DECISION
6	Poor knowledge of teachers on the importance of laboratory practicals in the teaching and learning of science practicals causes student's failure in laboratory practical	80 320	64 192	3 6	3 3	150 521	3.47	Accepted
7	High incompetence of teachers in the use of laboratory equipment causes students failure in laboratory practicals	90 360	57 171	3 6	0 0	150 537	3.58	Accepted
8	Lack of laboratory practical activities discourages active learning and problem solving in laboratory practicals	55 220	72 216	15 30	8 8	150 474	3.16	Accepted
9	Teachers inability to assists students effectively during laboratory practical causes students failure in laboratory practical	85 340	60 180	3 6	2 2	150 528	3.52	Accepted
10	Poor knowledge of teachers on the topic in the teaching and learning of laboratory practical causes students failure in laboratory practical	75 300	62 186	9 18	4 4	150 508	3.38	Accepted

Data analyses in table 2 above, shows that high mean scores for items 6, 7, 8 9, and 10 had the mean values of 3.47, 3.58, 3.16, 3.52 and 3.38 respectively. The values were up to 2.5 and above and was interpreted as accepted, which therefore indicates that, high incompetency of science teachers in the use of laboratory equipment increases students' failure in laboratory practicas. Poor knowledge of science teachers on the important of laboratory practicals and core principles guiding the use of laboratory equipment has a negative effect on students' failure in laboratory practicals and also poor knwledge of teachers on science subjects affects teaching and learning of science practical which has negative effect on students' failure in laboratory practical.

Research Question Three:

Items 11-15 was used to investigate research question three; "To what extents does students attitudes towards practicals affect their failure rate in laboratory practicals?"

Table 3:

S/N	ITEMS	SA 4	A 3	D 2	SD 1	N	MEAN	DECISION
11	Science students see laboratory practical as a mere waste of time since they think that they can do without it in learning science	15 60	45 135	65 130	25 25	150 489	2.33	Rejected
12	Science students placed high value in laboratory practical to understand science	30 120	40 120	60 120	20 20	150 380	2.53	Accepted
13	Science students carry out laboratory practical for doing sake just to satisfy the teacher(s)	5 20	40 120	60 120	45 45	150 305	2.03	Rejected
14	Science students engage in laboratory practical not to learn it for future use but for sole aim of passing it in their O' level examinations.	25 100	65 195	40 80	20 20	150 395	2.63	Accepted
15	Poor conception of science by students affect their performance.	76 304	54 36	18 36	2 2	150 504	3.36	Accepted

Data analyses in table 3 above, shows that high mean scores for items 11, 12, 13, 14, and 15 had the mean values of 2.33, 2.53, 2.03, 2.63 and 3.36 respectively. The values which were up to 2.5 and above was interpreted as accepted, and therefore indicate that students' attitudes towards laboratory practical causes students failure in laboratory practical. Science students see laboratory practical as a mere waste of time which causes their failure in laboratory practical and most times, when students' carryout laboratory practical they do it for doing sake just to satisfy the teacher.

Research Question Four:

Item 16-20 was used to investigate research question four; "To what extent does gender influence students failure rate of science laboratory practical?

Table 4:

S / N	I T E M S	S A 4	A 3	D 2	S D 1	N	MEAN	DECISION
1 6 .	Female self-perception of themselves as weaker gender, inferior make them to fail in laboratory practicals.	7 0 280	5 0 150	2 1 4 2	9 9	1 5 0 4 8 1	3.20	Accepted
1 7 .	Nigeria homes tends to shape the girl-child away from science and science related disciplines.	1 0 4 0	5 0 150	6 0 120	3 3	0 1 5 0 0 3 4 0	2.65	Accepted
1 8 .	Males tend to be dominating in competitive activities while females are always shy and may prefer working in groups or under male counter parts during laboratory practical	5 0 200	6 5 195	2 5 7 5	1 1	0 1 5 0 0 4 8 0	3 . 2	Accepted
1 9 .	Gender in equality in science teaching practical and methods used by science teachers creates wider gap in their performance.	5 4 216	7 5 225	1 8 3 6	2 2	1 5 0 4 7 9	3 . 1	Accepted
2 0 .	Male students were superior over female students in problem solving and laboratory practical in Science.	1 5 6 0	4 5 135	6 0 120	3 3	0 1 5 0 0 3 4 5	2 . 3	Rejected

Data analyses in table 6 shows that high mean scores for items 16,17, 18, 19 and 20 had the mean values of 3.20, 2.65, 3.2 and 2.3 respectively. The values were up to 2.5 and above which was interpreted as accepted, and therefore indicates that gender makes science students fail their laboratory practical, female self-perception of themselves as weaker gender, inferior affect their performance in laboratory practical, gender inequality, in science teaching practical and methods used by science teachers creates wider gap in their performance in laboratory practical.

Discussion of Findings

Findings of research question one revealed that lack of laboratory practical activities causes students failure in laboratory practicals of senior secondary schools in Egor L.G.A. This is in agreement with that of Kiladare and Okoro (2007) who established that students don't understand very well when they are not involved in practical experiments. This also affirmed the fact that students' does not perform better if they are not regularly involved in practical activities. Science laboratory practical helps to make abstract ideas

more concrete for learners, such that basic concepts could be understood. The lack of laboratory practical activities when teaching science subjects makes learning boring and tiring. Keeping the students inactive, creates a non-participation class during teaching, thereby making students discouraged and making them not have new ideas by themselves.

Findings of research question two revealed that teachers incompetence in the use of laboratory equipment makes students to fail in laboratory practical of science related senior secondary school students in Egor L.G.A. From the findings, science teachers are still unable to prepare and design a robust practical or experiment for students to learn. Science teachers should be proficient on how to adopt and plan better steps in teaching laboratory practicals. According to Erin and Alicia (2009) designing, learning instructions, setting goals and structuring teaching steps are important. However, the findings show that teachers are still inefficient in handling laboratory equipment and could not manage a systematic and effective experiment.

Findings of research question three revealed that, attitude of science related senior secondary school students affect their performance rate in laboratory practicals. They see laboratory practicals as a mere waste of time and therefore carry out laboratory practicals for doing sake just to satisfy their teacher(s). Moreover, science students engage in laboratory practical not to learn it for future use but for some aim of passing it in their O'level examinations.

Findings of research question four revealed that, the word gender does not mean that there is a clear difference between male and female performances in laboratory practical. If there are difference, they are based on hierarchical structures within the culture of what is suitable for male and female respectively. Considering the findings of different people, it is clear that there is not yet a consensus as to whether gender influences performances in laboratory practical.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

In this chapter, the summary of the study was presented as well as the conclusions drawn from the analysis of the data collected in the course of the study. The recommendations offered in relation to findings of the study are also highlighted.

Summary

The study investigated the "Problem associated with failure in laboratory practical in science related senior secondary school students in Egor Local Government Area of Edo State". Four research question guided the study.

The review of related literature of the study was organized under theoretical framework, concept of laboratory, concept of practicals, the purpose and practice of science laboratory practical work in science education, problems and challenges associated with failures of science laboratory practical work in science and summary of literature review.

Descriptive survey design was adopted for the study. The study was carried out in Egor Local Government Area of Edo state. The sample for the study comprised of one hundred and fifty science teachers drawn from population of the study using simple random sampling techniques. The instruments for data collection for this study is questionnaire and was analyzed using frequency an mean

The results revealed that students don't understand better when they are not involved in laboratory practical experiment. Lack of laboratory practical activities, reduces curiosity and critical thinking among students when doing laboratory practical work. There is no clear difference between male and female poor performances in laboratory activity.

The study also revealed that there are some problems that causes students failure in laboratory practicals, which are teachers incompetence in the use of laboratory equipment when teaching practicals, students wrong attitudes towards laboratory practical activities and inadequate supply of laboratory equipment by the government.

However, in line with the findings of the study, the educational implications of the findings were highlighted and the recommendations were equally proffered among others that all science teachers should encourage students to develop interest in laboratory practical lessons by engaging them in it, and providing practical activity that will challenge them to be actively involved during practical lessons.

Finally, Ministry of Education and Professional Organizations like STAN should organize workshop, seminar and conferences for science teachers, the government should provide more adequate qualified competent science teachers to all the public secondary schools in Egor L.G.A.

Conclusion

There is no denying the fact that laboratory practical teaching can only be effective and result-oriented when students are willing and the teachers are favorably disposed, using the appropriate methods and resources in teaching the students. With the current increase in scientific knowledge all over the world, much demand is placed and emphasis is laid on the teacher, the

curriculum and the learning environment in the whole process of teaching and learning practical science. Laboratory practical has an effective way of developing logical and mental reasoning of science students which is one of the reasons why teaching of practicals is very important as far as teaching of science is concerned. However, learners do practical work to expand their knowledge in an attempt to understand the world around them.

This study has shown that learners and teachers do well when they are motivated and enough teaching and learning facilities are provided for them. The failure of government to adequately provide laboratory equipment and materials which are vital leads to failure in laboratory practicals of science related senior secondary school students in Egor Local Government Area of Edo State.

Recommendations

Based on the findings, the following recommendations were made: Teachers should encourage students to develop interest in laboratory practical activities by engaging them in practicals and practicing laboratory experiments that will challenge them to be actively involved during practical lessons.

Ministry of Education and professional organization like STAN should organize workshops, seminars and conferences for science teachers on how to use laboratory apparatus etc. Science concepts should be taught with laboratory practical equipment and materials so that the students will do Science instead of learning Science.

The government/ministry of education should provide more competent science teachers to all the public secondary schools in Egor Local Government Area. The government should provide fund for schools so as to enable them procure the relevant resources for effective teaching and

learning of laboratory practical in all the public secondary school in Egor local Government Area.

Suggestions for Further Study

This research study was delimited to only Egor Local Government Area of Edo State. However, for further studies;

- Other local government areas may be explored.
- The study should be replicated with other laboratory practical topics in a particular science subject, like Biology, Chemistry etc.
- Another study should be conducted to find out the effect of chemistry practical activities on students' performance.

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APPENDIX 1

Department of Curriculum and Instructional Technology (CIT)

Faculty of Education,

University of Benin,

Benin City.

RESEARCH QUESTIONNAIRE

Dear respondent,

The researcher is an undergraduate of the above named university, who is conducting a research on problems associated with failure in laboratory practical of science related senior secondary school students in Egor Local Government Area of Edo State. The research is purely an academic exercise, and any information given will be treated with confidentiality and will only be for the purpose of this study. Please try to respond correctly to the items, as your co-operation would be highly appreciated.

Yours Sincerely,

HOD

APPENDIX II

QUESTIONNAIRE

Instruction: Please tick (√) the option that best represent your opinion on the items provided. The response option below are: SA = Strongly Agree, A = Agree, D = Disagree and SD = Strongly Disagree.

Research Question One:

To what extent does lack of science laboratory practical activities causes students' failure in science laboratory practical?

S/N	ITEMS	SA 4	A 3	D 2	SD 1
1	Lack of practical activities does not stimulate students creativity, curiosity and critical thinking about laboratory practical				
2	Lack of practical activities does not promote students engagement with the scientific method use in laboratory practical				
3	Lack of laboratory practical activities discourages active learning and problem solving in laboratory practical				

4	Lack of practical activities under develops students' interests, attitudes and values.				
5	Lack of laboratory practical activities reduces students interest to learn science practical				

Research Question Two:

To what extent does teachers' incompetence in the use of laboratory equipment cause students' failure in science practical?

S/N	**ITEMS**	**SA 4**	**A 3**	**D 2**	**SD 1**
6	Poor knowledge of teachers on the importance of laboratory practical in the teaching and learning of science practical causes student's failure in laboratory practical				
7	High competence of teachers in the use of laboratory equipment impacts high level of Success on student in laboratory practical				
8	Poor knowledge of teachers on the core principles guiding the use of laboratory equipment has a negative effect on student's failure.				

9	Teachers inability to assists students effectively during laboratory practical causes students failure in laboratory practical				
10	Poor knowledge of teachers on the topic in the teaching and learning of laboratory practical causes students failure in laboratory practical				

Research Question Three: To what extents do students attitudes towards practical affect their rate of failure in laboratory practical?

S/N	**ITEMS**	**SA 4**	**A 3**	**D 2**	**SD 1**
11	Science students see laboratory practical as a mere waste of time since they think that they can do without it in learning science				
12	Science students placed high value in laboratory practical to understand science				
13	Science students carry out laboratory practical for doing sake just to satisfy the teacher(s)				
14	Science students engage in laboratory practical not to learn it for future use, but for the sole aim of passing it in their O'level examinations.				

15	Poor conception of science by students affect their performance.				
16	Female self- perception of themselves as weaker sex, inferiority complex makes them to fail in their laboratory practical.				
17	Nigeria homes tends to shape the girl-child away from science and science related disciplines.				
18	Males tend to be dominating in competitive activities while females are always shy and may prefer working in groups or under male counter parts during laboratory practical.				
19	Gender in-equality in science teaching practical and methods used by science teachers creates wider gap in their performance.				
20	Male students were superior over female students in problem solving and laboratory practical in Science.				