EXAMINATION OF SAFETY PRACTICES IN BIOLOGY LABORATORY AT SENIOR SECONDARY SCHOOLS IN WARRI SOUTH LOCAL GOVERNMENT AREA OF DELTA STATE

BY

Ruth Jesurukevwe JACOB

EDU1702550

DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY

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A PROJECT SUBMITTED TO THE DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE BACHELOR OF EDUCATION B.SC (Ed) HONOURS DEGREE IN BIOLOGY EDUCATION

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CERTIFICATION

We the undersigned names hereby certify that this research work was carried out by JACOB RUTH JESURUKEVWE with Matriculation Number:EDU1702550of the Department of Curriculum and Instructional Technology, Faculty of Education, University Of Benin, Benin City in partial fulfillment of the requirements for the Award of Bachelor Degree (B.Sc.Ed) Honours in Biology Education.

_____	_____
Dr. R.O Uzamere	**Dr. (Mrs.) F.N Ofuani**
(Project Supervisor)	**(Project Coordinator)**
Date:_____	**Date:_____**

_____
Prof. E.O.S Iyamu
Dean of Faculty of Education

Date:_____

DEDICATION

This work is dedicated to Almighty God and my Saviour Jesus Christ who is my source of wisdom, strength and Success all through my Academic Pursuit.

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ABSTRACT

This study dealt on the Examination of Safety Practices in Biology Laboratory at Senior Secondary School in Warri South Local Government Area of Delta State. The questionnaire was the instrument for data collection. Data was collected from one hundred (100) public senior secondary school teachers and students selected from five public senior secondary schools in Warri South Local Government Area of Delta State. The questionnaire was the instrument for data collection. The descriptive survey research design was adopted for the study. An analysis of data was done using descriptive statistics which include frequency count and simple percentage.

The findings from the study include that the type of design and fitting in the biology laboratory do not ensure safety in senior secondary schools in Warri South Local Government Area of Delta State.It was concluded that that there is inadequate laboratory equipment. The researcher also concluded that the services of laboratory assistants and personnel ensure safety in biology laboratory and that safety practices are applied by the students during practical section in biology laboratory in Senior Secondary Schools in Warri South Local Government Area of Delta State.

Some of the recommendations made include that government should provide funds to equip scanty laboratories building for practical's that can accommodates both student and their teacher to make teaching easier and leaning faster. It was also recommended that laboratory building should be set aside at the school environment in order to avoid distractions.

CHAPTER ONE

INTRODUCTION

Background to the study

Biology is a science that is concerned with life processes. The study of biology is mainly accomplished through practical activities usually performed in well-equipped biology laboratories. The biology laboratory is a room or a building in a school or college where the practical side of biology is taught. It is usually a place set aside for conducting practical activities in biology. The central role of biology laboratory as identified by Voss (2012) is to provide illustration of some basic principles and to teach the students the applications of the principles so acquired. A well-equipped biology laboratory enables students to develop good judgments, self-reliance, critical thinking, technical personal contact with apparatus and materials present in the laboratories under the direction or supervision of the teacher.

A biology laboratory needs to be well organized so that a climate for investigating scientific concepts will exist, such a climate ensures that the laboratory is safe for those using it. Since laboratory environment is meant

for man to handle, accidents and injuries are bound to occur. Therefore, the teacher in biology laboratory is responsibly committed to teaching his students on how to handle chemicals and materials, so as to bring about good results in a safe manner of preserving life. In this regard, Byrd (2004) posited that most of the accidents and injuries that occur in secondary school biology laboratories mainly result from inadequate knowledge of safety rules, insufficient skill by the laboratory workers and carelessness.

The students when using the laboratory have the obligation to help themselves and others; the teachers on their own part have to inculcate safety knowledge and practices into their student so they can develop a philosophy of safety that emphasizes positive rather than negative habits.

According to the advanced learner dictionary, safety is freedom from danger or risk. The importance of safety measures in biology laboratories is very necessary for both students and teachers to reduce or eliminate the occurrence of laboratory hazards. In this regard, Osborne (2012) maintained that most laboratory hazards can be reduced to minimum occurrence by good value, careful manipulation of laboratory apparatus, adequate

supervision and the knowledge of the safety practices and their applications. It is obvious that anyone who is not safety conscious stands the greatest risk of turning a minor hazard into an accident which may be fatal. Also, there is need for safety facilities like; fume chamber, eye goggles, fire extinguishers, sinks, lab coat, waste containers and first aid boxes to be provided in the biology laboratory as their absence may create health hazard. Though it is not enough to provide these safety equipment, supervision of the students during laboratory activities is also necessary.

Appropriate safety practices in biology laboratories in secondary schools can reduce the rate of accidents and guarantee safety of the students in the laboratories. A standard biology laboratory should have certain specified rules and regulations as well as safety materials and equipment presented to the students before allowing them to work in the laboratory and their implementation should be ensured. These safety rules are guidelines designed to help keep both the students and the instructors' safe when experimenting. Some equipment and chemicals in a biology laboratory can cause serious harm. It is always wise to follow all laboratory safety rules

which are a sample of the most basic rules that should be followed when in biology laboratory.

Statement of the Problem

Since the inclusion of laboratory experience in the teaching and learning of biology, the safety of both staff and students during practical work have become crucial. Biology laboratories have been established in some Nigeria secondary schools without safety considerations in their designs and constructions (Abdullahi, 2000). Poor safety practices in biology laboratories have led to accidents such as glass breaking, skin contact with specimens and chemicals, injury, fire out breaks and even death.

In the light of the above, it is therefore necessary to investigate the extent of implementation on safety practices in biology laboratories in using randomly selected secondary schools in Warri South Local Government Area of Delta state, Nigeria.

Research Questions

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

1. How does the type of design and fitting in the biology laboratory appropriate to ensure safety in senior secondary schools in Warri South Local Government Area of Delta State?

2. To what extent is safety equipment available in the biology laboratory in senior secondary schools in Warri South Local Government Area of Delta State?

3. How often do the services of laboratory assistants employed, ensure safety during laboratory instructions in senior secondary schools in Warri South Local Government Area of Delta State?

4. To which measures does the secondary school biology student apply safety practices during practical sessions in senior secondary schools in Warri South Local Government Area of Delta State?

Purpose of the Study

Specifically, the study intends to find out:

1. The general designs and fittings of biology laboratories relevant to safety in senior secondary schools in Warri South Local Government Area of Delta State
2. The availability of safety equipment and materials in biology laboratories in senior secondary schools in Warri South Local Government Area of Delta State
3. The services of laboratory assistants that are employed to ensure safety in senior secondary schools in Warri South Local Government Area of Delta State
4. The extent of implementation of safety rules biology laboratory in senior secondary schools in Warri South Local Government Area of Delta State

Significance of the Study

This research work will be beneficial to the following groups: National Science Teachers Association (NSTA), students, teachers and school administrators.

Student who have phobia for practical's in science laboratories due to the occurrences of hazards and accident in the science laboratory will find this work reliable in order to develop good attitudes, safe and conscientious laboratory habits in any practical field of study.

The teachers and other laboratory staff should also see the need of keeping the rules, developing slogans about them, writing some of them on the cardboard sheets hung on the laboratory. With these, practical work will be conducive through safety measures in the science laboratories.

The school administrators will find this work relevant by providing an adequate facility such as good modern and reliable building with necessary equipment where laboratory investigation can be conducted with ease.

The National Science Teachers Association will find the best means to administer the group of objectives that may be achieved through the use of

laboratory in science classes such as attitude, understanding the nature of science, cognitive abilities, acquisition of knowledge concept and skills.

Scope of the Study

The study looks at the extent to which safety practices are implemented by staff and adherence to safety rules among students in biology laboratories in senior secondary schools in Warri South Local Government Area of Delta State.

Definition of Terms

The following terms were operationally defined in the study

Laboratory: A room or buildings equipped for scientific experiments, research or teaching.

Laboratory Equipment: Laboratory equipment refers to the various tools and equipment that are used by professionals or students working in a laboratory.

Laboratory Assistant: Laboratory assistant is a person who work in a laboratory performing procedures, maintaining equipment and assisting students with their work in the laboratory.

Safety Equipment: Safety equipment refers to personal protective equipment (PPE) such as chemical splash goggles, face shields, lab coat, lab apron.

CHAPTER TWO

LITERATURE REVIEW

The literature of this study has been carried out and organized under the following sub-headings:

- Theoretical framework
- Concepts of biology
- Concepts of biology laboratory
- . Concept of safety practices
- Summary of literature review

Theoretical Framework

The study considered psychological learning theories such as the Brunner's theory of instruction, it also considered theories of Educational Administration and management such as the system theory and scientific management theory as being pertinent and are presented as follows

Bruner's Theory of Instruction

Bruner, a cognitive and developmental psychologist viewed human being as information processors, thinkers and creators of ideas (Bruner cited in Eze, 2006). Bruner's major concerned was to determine how individuals actively select, retain and transform information which is the main essence of learning. The theorist pointed out that acquisition of knowledge in whatever form is active process because by nature man actively interacts with his environment adjusting it to suit his purpose. Bruner also believed that a person actively constructs knowledge by relating incoming information to previously acquired psychological frame of reference. The theorist stressed that an individual is not a passive or reactive organism but one who actively select information in order to achieve valued goals (Bruner cited in Ezenwa, 2011)

Bruner's ideas about learning can be related to the extent of implementation and adherence of safety practices in Biology Laboratories since both require active participation of the learner. Also the theorist pointed out that a learner actively constructs his knowledge by relating new

content being learnt to previously acquired information as well as uses his information in future circumstances. This can equally be applied to the extent of implementation and adherence of safety practices in Biology Laboratories since students relate their previous knowledge with the learnt safety practices before implementing and adhering to it.

The Systems Theory

In this theory an organization is seen as a social system which can be further sub-divided into subsystems each having a supra system which constitute its environment. There is a believe that the only meaningful way to study an organization is to study it as a system. A system can therefore be regarded as a structure with inter-dependent parts. For example, with the educational system, there is other sub system as Primary, Secondary and Tertiary sub-systems. It is based on the concept of system that the system theory was developed.

Consequently, looking at Biology Laboratory system, the system theory is relevant to the implementation and adherence of safety practices in biology laboratories because, the entire Biology Laboratory set up is a

system, where the concept of interaction and interdependence of parts with others is applicable. According to (Edem, 2006), in any social system, all the subsystems work towards the maintenance of the life of the social system as a whole, the survival of which depends on its capacity to maintain consistency in the processes and relationship within and outside the system. To survive, the system and its subsystem must be open, that is, they must have the capacity to relate to and exchange matter with their environments, unlike a closed system which cannot do so. Hence the extent of implementation and adherence of safety practices in Biology Laboratories depends on the whole Biology Laboratory system.

In Biology Laboratory System, three main levels can be identified first, the technical function which are the actual processes of teaching. Second, the managerial system or administration whose functions are to mediate between the school and outside world as well as to administer the school's internal affairs. And third, the community system, which is a wider social system that prescribes conditions for the control of the activities of the school so that it can reach its goals and be acceptable to public.

The Scientific Management Theory

The scientific management being one of the earliest administrative theories emphasized productivity at the expense of the human worker. All actions are intended to increase the productivity of the worker. For example, encouraging overtime work and pressurizing people seen only as a work harder. A worker is seen only as a worker who has no independent decisions about their work. The manager has the overall authority and control over him. According to Nwankwo (1988) in Okpala Oka (2009) it is believed that man can be so managed that he can work as fast and efficient as a machine. A proponent to this school of thought is Frederick W. Taylor. He is regarded as the father of scientific management' because of his pioneer works in this area. Taylor's main concern was the achievement of efficiency of workers by maximizing their outputs through the application of what he called principles of scientific management. He believed that best way to run organizations is for the administrator to know what to expect from the workers, and ensure that the workers achieve those things in the cheapest way possible. Accordingly, Taylor proposed six management principles

which were summarized and highlighted by (Ukejie; Akabogu and Ndu 1992:28-29) In (Okpalaoka 2009) as seen in the subsequent paragraphs.

- **Time Study Principle**

This principle is that any work to be done must be accurately measured by time and standard time should be established for all works. This means that any given work must be finished within a stipulated period of time.

- **Piece Rate Principle**

It holds that the amount of money to be earned by a worker should be determined by the amount of work done. This payment should be by result.

- **Scientific Method of Work Principle**

It holds that, the management is expected to identify the best way to perform any organization's Jobs and train workers accordingly.

- **Managerial Control Principle.**

It is expected that management should be knowledgeable in scientific management principle through training and should be able to apply them accordingly.

Notwithstanding, scientific management theory evoked public disapproval being criticized as an attempt to reduce human beings to machine, Foster the attainment of organization goals and objectives and make provision for the selection and training of staff remains indisputably important. (Edem, 2006) stressing further, Taylor's idea of efficiency demands that an organization must attain its objective and that those responsible for its administration must aim at a result to achieve. It also advocates the award on benefits, merit and stresses the need to keep on working until the result is achieved.

However, we must note that some of Taylor's ideas is not applicable in school. For example, the standardization of work thus, there are as many methods to use when working in biology laboratory. Therefore, the ability to apply the right concepts of system theory and scientific management theory

at the appropriate situation affect the extent of implementation and adherence of safety practices in biology laboratories among senior secondary schools.

Concepts of biology

Biology, also referred to as the biological sciences, is the study of living organisms. Utilizing the scientific method (Howell and Elizabeth 2014), Biology examines the structure, function, growth, origin, evolution, and distribution of living things. It classifies and describes organisms, their functions, how species come into existence and the interactions they have with each other and with the natural environment. Four unifying principles form the foundation of modern biology: cell theory, evolution, genetics and homeostasis. Biology as a separate science was developed in the nineteenth century, as scientists discovered that organisms shared fundamental characteristics. Biology is now a standard subject of instruction at schools and universities around the world, and over a million papers are published annually in a wide array of biology and medical journals. Most biological sciences are specialized disciplines. Traditionally, they are grouped by the

type of organism being studied: botany, the study of plants; zoology, the study of animals; and microbiology, the study of microorganisms

The fields of biology based on scale

Biology is often approached on the basis of levels that deals with fundamental units of life. The fields within biology are further divided based on the scale at which organisms are studied and the methods used to study them: biochemistry examines the fundamental chemistry of life; molecular biology studies the complex interactions of systems of biological molecules; cellular biology examines the basic building block of all life, the cell; physiology examines the physical and chemical functions of the tissues and organ systems of an organism; and ecology examines how various organisms interact with the environment . Applied fields of biology such as medicine and genetic research involve many specialized sub-disciplines (Benson David 2008).

A central organizing concept in biology is that life changes and develops through evolution and that all life forms known have a common origin. Charles Darwin established evolution as a viable theory by articulating its

driving force, natural selection (Alfred Russell Wallace is recognized as the co-discoverer of this concept in 1835). Darwin theorized that species and breeds developed through the processes of natural selection as well as by artificial selection or selective breeding.

Genetic drift was embraced as an additional mechanism of evolutionary development in the modern synthesis of the theory. Biological form and function is created from and is passed on to the next generation by genes, which are the primary units of inheritance. Despite the complexity of the science, there are certain unifying concepts that consolidate it into a single, coherent field. Biology recognizes the cell as the basic unit of life, genes as the basic unit of heredity, and evolution as the engine that propels the creation and extinction of species. Living organisms are open systems that survive by transforming energy and decreasing their local entropy to maintain a stable and vital condition defined as homeostasis. Sub-disciplines of biology are defined by the research methods employed and the kind of system studied: theoretical biology uses mathematical methods to formulate quantitative models while experimental biology performs empirical experiments to test the validity of proposed theories and

understand the mechanisms underlying life and how it appeared and evolved from non-living matter about 4 billion years ago through a gradual increase in the complexity of the system.

The concept of a biology laboratory

A biology laboratory is a work place for conducting scientific research. In the school, it is an instructional facility used by the teacher to help students learn about science and how scientists investigate the world around them. It provides learners with the opportunity to design and execute investigation, engage in scientific reasoning, manipulate equipment, generate, record and analyze data and then discuss results. In the biology laboratory learners are brought into direct contact with materials, object apparatus, devices, tools, which they manipulate through procedures that reflect scientific thinking. The procedures entail mimicking and learning how a scientist works. Laboratory activities enable them to acquire and apply science, process skills which include observation, experimentation, hypothesizing etc. All these leads to acquisition of first hand scientific knowledge and development of scientific habits, skills and attitude. The

laboratory provides learners the opportunity to develop the personal qualities of scientist, which include honesty, openness, accuracy fairness, patience, perseverance and objectivity (Ezugwu2017).

Concept of safety practices

Safety is the state of being safe and the condition of being protected from harm or to reduce the risk of injury and exposure, decrease the risk of injury and exposure, decrease the risk of property loss, and minimize environmental damage. Safety can also refer to the control of recognized hazards in order to achieve an acceptable level of risk (Charles G. Oakes 2012).

Safety practices are generally written methods outline on how to perform a task with minimum risk to people, equipment, materials, environment and processes. Safety practices are developed as a result of completing a hazard assessment and laboratory or sector of construction. Safety practices include appropriate facilities and equipment, adequate training, personal protective equipment and safe working conditions. Some

safety practices require specific procedures which clearly set out in a chronological order to each step in a process.

Empirical review

According to the advance learners English dictionary, to organize means to coordinate and prepare for an activity while to manage means to organize or to deal with something that one has or controls. Osborne (2008), he stated that laboratory organization begins by providing the necessary facilities, services and materials while the stage where the provided facilities, services and materials have to be looked after adequately and made available for use is seen as laboratory management. Furthermore, Iwang (2010) pointed out that laboratory management consists of controlling the use of laboratory materials and facilities in order to make the laboratory a safe place for all the people making use of it. He also pointed out that making the school laboratory a safe place for teachers and students to work is a very essential aspect of laboratory management. Mbanugo (1999), suggested that the science teachers 'activities during practical classes should include handling of chemicals, labeling of containers, transferring of liquids, water

mixing and cleaning of glass wares. In his own view, he maintained that poisonous and highly toxic substances must be labeled and kept in a locked cupboard or store while apparatus and laboratory materials should be used only for purposes sanctioned by the teacher. Students must not be allowed to perform unauthorized experiments. He further explained that waste solid must be put in trash bins provided and not in sinks; liquid substance should not be tasted without definite instruction from the teacher. Again the working environment in the laboratory should be conducive so as to ensure safety.

(Ogbodo 2010) He discovered that the type of personnel employed as laboratory attendants do not help matters in terms of maintaining safe and good working environment. He identified the lack of qualified laboratory technicians as the cause of the unsafe practices and problems which exist in the biology laboratories. He reported that another factor that hinders good laboratory environment and instruction is unqualified science teachers. The qualified science teachers employ laboratory management skills and knowledge to a large extent than the lowly experienced science teachers.

Teacher's Role in Maintaining Safety Practices in Biology laboratory

Ogbodo (2010) pointed out that all items that clearly pose danger to student should be removed or controlled by the laboratory assistant. A very good way of avoiding accidents during laboratory activities is to prompt them to students before they occur, highlight all possible dangers if any before the beginning of each laboratory activities The teacher should be observant by going round the laboratory while students are carrying out laboratory activities and fully equipped first aid boxes should be kept in the vicinity of everybody in case of any accident.

Location, Shape and Design of biology Laboratory

The biology laboratory can be on its own or part of a building. It can be a part of bungalow or a storey building. If part of a storey building, it can be upstairs or downstairs. It should be on its own, a separate building bungalow or a storey building preferably, located towards the east end of the school compound. It should be separated and a little distance away from other buildings in the school compound for some reasons, such as

1. In future it can be expanded when the need for that arises and requirements are available.
2. To protect other school facilities and their users from radiation, smells, fire, explosion and other hazards that might come from the laboratory.
3. To reduce noise and other forms of distraction that might come from the classroom, offices, workshops, hostels, playgrounds etc to interfere with instructions and activities in the biology laboratory.
4. To avoid damages, injury or losses that could be caused by sports game and sports equipment from playing ground if located close to the laboratory.
5. To enhance safety of the laboratory and its equipment from thieves, fire out break from other facilities. It is better to burglar- proof and guide it better when it is separated from other facilities. (Ezugwu, 2017)

Good modern reliable building materials are used to construct the walls and floor of the laboratory while Asbestos or aluminum are used for the roof and the ceiling. The floors of a biology laboratory should be even and smooth.

The laboratory hall proper can be square, rectangular, U- or semi- circle or T - shaped.

In the biology laboratory the largest space is the hall, where the learners interact with the science curriculum, instructional materials and the teacher. It is the actual learning environment. The hall is equipped with tables, cupboard, racks shelves, tools as well as real conventional science laboratory materials, tools, equipment, apparatus and gadgets which the learners and teacher work with.

Ideally, the laboratory hall is designed to have large double doors at opposite ends to enhance free movement into and out of the laboratory hall. The windows are large, low and oppositely located. According to Maria Harris (2018) a biology laboratory is an expensive investment and is expected to last for many years. A well designed laboratory will impact generations of students, teachers and technicians.

According to (Omiko 2007) he sees the biology laboratory as the heart of a good scientific program which allows students to have experiences which are consistent with the goals of scientific literacy. This implies that

science teaching and learning cannot be completely done in a secondary school where there is no well-designed and equipped laboratory.

Summary of literature reviewed

The reviewed of related literature critically examine the concept of biology. Biology, also referred to as the biological sciences, is the study of living organisms. Utilizing the scientific method, Biology examines the structure, function, growth, origin, evolution, and distribution of living things. This was followed by the concept of biology laboratory. A biology laboratory is a work place for conducting scientific research. In the school, it is an instructional facility used by the teacher to help students learn about science and how scientists investigate the world around them. The literature review finally highlighted the concept of safety practices. Safety practices are generally written methods outline on how to perform a task with minimum risk to people, equipment, materials, environment and processes. Safety practices are developed as a result of completing a hazard assessment and laboratory or sector of construction.

CHAPTER THREE

RESEARCH METHODOLOGY

The purpose of this study is to identify the extent of implementation and adherence to safety practices among staff and senior secondary school student in Biology laboratories in Warri South Local Government Area. This chapter is discussed under the following headings:

- Research Design
- Population of the study
- Sample and sampling techniques
- Research Instrument
- Validation of the instrument
- Reliability of the instrument
- Method of data collection
- Method of data analysis

Research Design

The research design adopted for this study is the descriptive survey research design. This method was considered the most appropriate for the research. The descriptive survey is a design that collects data on a given population, and describes the data in a systematic manner pointing out the characteristic features or facts about that population. It was designated in such a way that their needed result will be accomplished to achieve a higher level of confidence.

Population of the study

The population of the study is all the secondary school teachers and students in Warri South Local Government Area of Delta State. There are fifteen (14) secondary schools with 29 biology teachers and 13,424 senior students in Warri South Local Government Area of Delta State.

Sample and Sampling Techniques

A simple random sampling procedure was employed to sample. Five (5) schools out of the secondary schools were selected, five (5) teachers and

(15) students in each of the five secondary schools were sampled from each of the schools making a total of (20) respondents from each of the five secondary schools giving a total of 100 respondents.

Research Instrument

The instrument used for the data collection is Likert questionnaire, which was titled "Questionnaire on the Examination of Safety Practices in Biology Laboratory at Senior Secondary School in Warri South Local Government Area of Delta State". It was used for biology teachers and students in the sampled senior secondary schools. The questionnaire is made up of two sections A and B, section A contains the biographical data of the respondent while section B contains items relating to the research study.

Validation of the instrument

This questionnaire was subjected to two forms of validation, face and content validation. Face and content validation was carried out by the supervisor. The instruments were examined based on clarity of questions, appropriateness of the questions to the student's level of understanding and experience as well as agreement in addressing the purpose of the study.The

supervisor made corrections and the suggestions were incorporated into the final draft before producing it, which greatly enhanced the thorough validation in order to ensure that the instrument measured what it is intended to measure.

Reliability of the Instrument

Reliability is the consistency of an instrument in measuring what it is set out to measure. The coefficient of correlation was used to determine the internal consistency of the instrument The data obtained were analyzed finding the relationship of each item in the instrument using pearson's product moment formula and result obtained was 0.83 indicating that the instrument is reliable for the study.

Method of Data Collection

The instrument used in data collection was personally administered by the researcher to the teachers and students. After discussing with them the purpose of her coming and of the study, the researcher proceeded to distribute the questionnaire to the teachers and the students. The direct method was adopted by the researcher to reduce the chance of errors, loss

rate and to offer the respondent the opportunity to ask questions when they find difficulty in understanding any item in the course of filling the questionnaire. The questionnaires were retrieved immediately after it had been filled by the respondent.

Method of Data Analysis

In analyzing the data, the researcher made use of frequency count and simple percentage to compute the findings of the study.

CHAPTER FOUR

PRESENTATION OF RESULT AND DISCUSSION OF ANALYSIS

This chapter presents the data collected from respondents, as well as the results of their analyses. The presentation and analyses are according to the research questions. The summary of findings from the analyses is also presented.

Research Question 1: How does the type of design and fitting in the biology laboratory appropriate to ensure safetyin senior secondary schools in Warri South Local Government Area of Delta State?

Table 1: Responses on the designs and fittings in the biology laboratories to ensure safety

S/N	Questions	Agree	%	Disagree	%	Total no of respondents
1.	The biology laboratory is separated a little distance away from other buildings in the school compound	17	17	83	83	100
2.	The biology laboratory size is large and it accommodates learners for practical work	47	47	53	53	100
3.	The Biology is laboratory equipped with different types	31	31	69	69	100

	of furniture such as tables, stools, cupboards, racks, shelves and chairs					
4.	The Biology Laboratory is designed with large double doors at opposite ends	37	37	63	63	100
5.	There are low and large windows facing one another as well as high windows in the biology laboratory	43	43	57	57	100

Analysis of data in table 4.1 revealed that item 1, 17 respondents representing 17% of the entire sampled population agreed that the biology laboratory is separated a little distance away from other buildings in the school compound while 83 respondents representing 83% of the sampled population disagreed. In item 2, 47 respondents representing 47% of the entire sampled population agreed that the biology laboratory size is large and it accommodates learners for practical work while 53 respondents representing 53% of the sampled population are of the contrary view. Under item 3, 31 respondents representing 31% of the entire sampled population agreed that the Biology laboratory is equipped with different types of furniture such as tables, stools, cupboards, racks, shelves and chairs while 69 respondents representing 69% of the sampled population disagreed. In item 4, 37 respondents representing 37% of the entire sampled population agreed

that the biology laboratory is designed with large double doors at opposite ends while 63 respondents representing 63% of the sampled population disagreed. Under item 5, 43 respondents representing 43% of the entire sampled population agreed that there are low and large windows facing one another as well as high windows in the biology laboratory while 57 respondents representing 57% of the sampled population held the contrary view. Analysis of data in table 4.1 therefore implies that the type of design and fitting in the biology laboratory do not ensure safety in senior secondary schools in Warri South Local Government Area of Delta State.

Research Question 2: To what extent is safety equipment available in the biology laboratory in senior secondary schools in Warri South Local Government Area of Delta State?

Table 2: Responses on the availability of safety equipment in biology laboratory

S/N	Questions	Agree	%	Disagree	%	Total no of respondents
1.	There are first aid kits in the biology laboratory	33	33	67	67	100
2.	Hand gloves and goggles are available in the biology laboratory	41	41	59	59	100
3.	Fire extinguishers are available in the biology laboratory	27	27	73	73	100
4.	Bucket of dry sand are available in the biology laboratory	47	47	53	53	100
5.	The student wash their hands after practical	71	71	29	29	100

Analysis of data in table 4.2 indicated that item 1, 33 respondents representing 33% of the entire sampled population agreed that there are first aid kits in the biology laboratory while 67 respondents representing 67% of the entire sampled population disagreed. Under item 2, 41 respondents representing 41% of the entire sampled population agreed that hand gloves and goggles are available in the biology laboratory while 59 respondents representing 59% of the sampled population disagreed. In item 3, 27

respondents representing 27% of the entire sampled population agreed that fire extinguishers are available in the biology laboratory while 73 respondents representing 73% of the sampled population are of the contrary view. Under item 4, 47 respondents representing 47% of the entire sampled population agreed that bucket of dry sand are available in the biology laboratory while 53 respondents representing 53% of the sampled population are of the contrary view. In item 5, 71 respondents representing 71% of the entire sampled population agreed that student wash their hands after practical while 29 respondents representing 29% of the sampled population disagreed. Analysis of data in table 4.2 implies that availability of safety equipment in biology laboratory is inadequatein senior secondary schools in Warri South Local Government Area of Delta State.

Research Question 3: How often do the services of laboratory assistants employed, ensure safety during laboratory instructions in senior secondary schools in Warri South Local Government Area of Delta State?

Table 3: Responses on the services of laboratory assistants and personnel ensuring safety in biology laboratory

S/N	Questions	Agree	%	Disagree	%	Total no of respondents
1.	The laboratory assistants supervise the learners during practical activities in the biology laboratory	77	77	23	23	100
2.	The laboratory assistant gives out detailed instructions to the student before and during practical work	59	59	41	41	100
3.	Labeled reagents are used during practical	81	81	19	19	100
4.	Library assistant keep close watch over students during biology practical	66	66	34	34	100
5.	Library assistant gives room for students to ask questions during practical	91	91	9	9	100

Analysis of data in table 4.3 revealed that item 1, 77 respondents representing 77% of the entire sampled population agreed that laboratory assistants supervise the learners during practical activities in the biology laboratory while 23 respondents representing 23% of the sampled population disagreed. In item 2, 59 respondents representing 59% of the entire sampled

population agreed that laboratory assistant gives out detailed instructions to the student before and during practical work while 41 respondents representing 41% of the sampled population disagreed. In item 3, 81 respondents representing 81% of the entire sampled population agreed that labeled reagents are used during practical while 19 respondents representing 19% of the sampled population disagreed. In item 4, 66 respondents representing 66% of the entire sampled population agreed that library assistant keep close watch over students during biology practical while 34 respondents representing 34% of the sampled population disagreed. Under item 5, 91 respondents representing 91% of the entire sampled population agreed that library assistant gives room for students to ask questions during practical while 9 respondents representing 9% of the sampled population are of the contrary view. Analysis of result gotten therefore implies that the services of laboratory assistants and personnel ensure safety in biology laboratory in Senior Secondary Schools in Warri South Local Government Area of Delta State.

Research Question 4: To which measures do the secondary school biology students apply safety practices during practical sessions in senior secondary schools in Warri South Local Government Area of Delta State?

Table 4: Responses on the extent to which the safety practices is applied during practical section in biology laboratory

S/N	Questions	Agree	%	Disagree	%	Total no of respondents
1.	The students adhere strictly to the instructions given to them before and during practical work	62	62	38	38	100
2.	The students wear their laboratory coat before entering the laboratory	89	89	11	11	100
3.	The students wear flat shoes to the laboratory	73	73	27	27	100
4.	The students read safety rules and slogan hung on the wall before practical	69	69	31	31	100
5.	The students made use of trash bins which are present in the biology laboratory	81	81	19	19	100

Analysis of data in table 4.4 revealed that item 1, 62 respondents representing 62% of the entire sampled population agreed that students

adhere strictly to the instructions given to them before and during practical work while 38 respondents representing 38% of the sampled population are of the contrary view. In item 2, 89 respondents representing 89% of the entire sampled population agreed that students wear their laboratory coat before entering the laboratory while 11 respondents representing 11% of the sampled population disagreed. In item 3, 73 respondents representing 73% of the entire sampled population agreed that students wear flat shoes to the laboratory while 27 respondents representing 27% of the sampled population disagreed. Under item 4, 69 respondents representing 69% of the entire sampled population agreed that students read safety rules and slogan hung on the wall before practical while 31 respondents representing 31% of the sampled population disagreed. In item 5, 81 respondents representing 81% of the entire sampled population agreed that students made use of trash bins which are present in the biology laboratory while 19 respondents representing 19% of the sampled population are of the contrary view. Analysis of data in table 4.4 implies that safety practices are applied by the students during practical section in biology laboratory in senior secondary schools in Warri South Local Government Area of Delta State.

Discussion of Findings

The analysis of data collected and results obtained in the course of the study have been quite revealing. Evidence gathered from the analysis of data revealed that the type of design and fitting in the biology laboratory do not ensure safety in senior secondary schools in Warri South Local Government Area of Delta State. In support of this findings, Omokheni (2011) found out that the unkempt nature of laboratory in contemporary time has made it difficult for students to ensure safety during practical.

The findings of study also revealed that availability of safety equipment in biology laboratory is inadequate in Senior Secondary Schools in Warri South Local Government Area of Delta State. Corroborating this findings, Ezenagu (2013) found out that the lack of proper funding of education on the part of the Nigeria government has resulted in inadequate laboratory equipment which has posed a threat to the overall development of education in the country.

Furthermore it was observed that the services of laboratory assistants and personnel ensure safety in biology laboratory in Senior Secondary

Schools in Warri South Local Government Area of Delta State. In support of this findings, Ogbodo (2010) found out that the type of personnel employed as laboratory attendants do help matters in terms of maintaining safe and good working environment within the school system.

Evidence from the analysis of data clearly shows that safety practices are applied by the students during practical section in biology laboratory in Senior Secondary Schools in Warri South Local Government Area of Delta State. In support of this findings, Afolabi (2015) found out that due to the increase of awareness in recent time, students are more conscious to apply safety practices in laboratory as they are being made to be aware of the inherent dangers of some of the equipment which are available.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

This section deals with the summary of the study, the conclusions drawn, results obtained and recommendations offered.

Summary

This study dealt on the Examination of Safety Practices in Biology Laboratory at Senior Secondary School in Warri South Local Government Area of Delta State. The questionnaire was the instrument for data collection. Data was collected from one hundred (100) public senior secondary school teachers and students selected from five public senior secondary schools in Warri South Local Government Area of Delta State. The questionnaire was the instrument for data collection. The descriptive survey research design was adopted for the study. An analysis of data was done using descriptive statistics which include frequency count and simple percentage. The analysis of data obtained produced the following findings

Findings of the research

Findings from the study include:

- That the type of design and fitting in the biology laboratory do not ensure safety in senior secondary schools in Warri South Local Government Area of Delta State.
- That availability of safety equipment in biology laboratory is inadequate in Senior Secondary Schools in Warri South Local Government Area of Delta State.
- That the services of laboratory assistants and personnel ensure safety in biology laboratory in Senior Secondary Schools in Warri South Local Government Area of Delta State.
- That safety practices are applied by the students during practical section in biology laboratory in Senior Secondary Schools in Warri South Local Government Area of Delta State.

Conclusion

The research study examined the Safety Practices in Biology Laboratory at Senior Secondary School in Warri South Local Government

Area of Delta State. Based on the findings of the study, the following conclusions were drawn that; the type of design and fitting in the biology laboratory do not ensure safety in secondary schools in the local government, that there is inadequate laboratory equipment. The researcher also concluded that the services of laboratory assistants and personnel ensure safety in biology laboratory and that safety practices are applied by the students during practical section in biology laboratory in Senior Secondary Schools in Warri South Local Government Area of Delta State.

Recommendations

Based on the findings and conclusion drawn, the following recommendations were proffered:

1. The government should provide funds to equip scanty laboratories building for practical's that can accommodates both student and their teacher to make teaching easier and leaning faster.
2. The laboratory building should be set aside at the school environment in order to avoid distractions.

3. The school authority should send some personal for seminar and workshop in order to implement good attitude and safe practice to other students.
4. Student should observe the rules and regulation guiding the biology laboratory which leads to safety practices.

Suggestions for Further Studies

The researcher focused on the Examination of Safety Practices in Biology Laboratory at Senior Secondary Schools only in Warri South Local Government Area of Delta State. Other research on the topic can be carried out in other local government areas of the state for a better generalization of the study.

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APPENDIX

DEPARTMENT OF CURRICULUM
AND INSTRUCTIONAL TECHNOLOGY
FACULTY OF EDUCATION
UNIVERSITY OF BENIN,
BENIN CITY

Dear respondent,

I am a final year student of the above named department. I am carrying out a research project on the **Examination of Safety Practices in Biology Laboratory at Senior Secondary School** in Warri South Local Government Area of Delta State. It is for academic purpose and responses will be treated with utmost confidentiality. I would appreciate if you can help by filling this questionnaire accurately with sincerity. Thank you for your cooperation.

Indicate the extent to which you agree or disagree with the following statements.

Key: Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD)

S/N	ITEMS	SA	A	D	SD
	How does the type of design and fitting in the biology laboratory ensure safety?				
1.	The biology laboratory is separated a little distance away from other buildings in the school compound				
2.	The biology laboratory size is large and it accommodates learners for practical work				

3.	The Biology is laboratory equipped with different types of furniture such as tables, stools, cupboards, racks, shelves and chairs				
4.	The Biology Laboratory is designed with large double doors at opposite ends				
5.	There are low and large windows facing one another as well as high windows in the biology laboratory				
	To what extent is safety equipment available in the biology laboratory?				
6.	There are first aid kits in the biology laboratory				
7.	Hand gloves and goggles are available in the biology laboratory				
8.	Fire extinguishers are available in the biology laboratory				
9.	Bucket of dry sand are available in the biology laboratory				
10.	The student wash their hands after practical				
	How often services of laboratory assistants employed do ensures safety during laboratory instructions				
11.	The laboratory assistants supervise the learners during practical activities in the biology laboratory				
12.	The laboratory assistant gives out detailed instructions to the student before and during practical work				
13.	Labeled reagents are used during practical				
14.	Library assistant keep close watch over students during biology practical				
15.	Library assistant gives room for students to ask questions during practical				
	To which measures do the secondary school biology students apply safety practices during practical sessions?				
16.	The students adhere strictly to the instructions given to them before and during practical work				

17.	The students wear their laboratory coat before entering the laboratory				
18.	The students wear flat shoes to the laboratory				
19.	The students read safety rules and slogan hung on the wall before practical				
20.	The students made use of trash bins which are present in the biology laboratory				