**THE IMPACT OF PRACTICAL WORK ON THE TEACHING AND LEARNING OF SOME CONCEPTS IN BIOLOGY IN SOME SELECTED SECONDARY SCHOOLS**

**Abstract**

Practical is a key factor in engaging, enthusing and inspiring students, thus, stimulating lifelong interest in science. High quality, appropriate practical work is central to effective learning in science. As a result of the unique opportunities to the study, abstract concepts and generalization at such concepts are aimed through the use of real objects in the laboratory. This study aimed to find out the impact of practical work in the teaching and learning of some concepts in Biology. This study is restricted to some selected secondary schools in Abeokuta, Ogun State. A survey research design was used for the study which made use of questionnaire in collecting data from 70 respondents, where 30 respondents were selected from three schools using simple random sampling technique “SalawuAbiola Comprehensive High school, Osiele, Abeokuta, Deeper life High School, Odeda, Abeokuta, F.C.E Model Secondary School, Osiele, Abeokuta. Data generated were analyzed with the use of statistical tools such as frequency and percentage. The result shows that practical work has great impact on the teaching and learning of some concepts in Biology. It was recommended that students should be exposed to more practical work and more attention should be given to the students during and after practical classes.

**CHAPTER ONE**

**INTRODUCTION**

**1.1 BACKGROUND OF THE STUDY**

Science is a great enterprise which nations depend on, in-order to advance technologically. Science therefore is receiving much emphasis in education because of its significance and relevance to life and society. Biology is the science in which we study living things. You can learn about an organism by reading about it. You can also learn about the organism by picking it up and studying it. The former is a theoretical approach, while the later is the practical approach. It must be borne in mind always that animals should not be killed, nor plants life destroyed needlessly. After all, biology is the study of life. Biology as a branch of science and the prerequisite subject for many fields of learning contributes immensely to the technological growth of a nation. This includes Medicine, forestry, agriculture, biotechnology and nursing. The study of Biology in senior secondary school can equip students with useful concepts, principles and theories that will enable them face the challenges before and after graduation. Practical work in Biology provides opportunities for students to actually do science as opposed to learning about science. Practical work is a keyfactor in engaging, enthusing and inspiring students, thus stimulating lifelong interest in science. High quality, appropriate practical work is central to effective learning in science.The science laboratory is organized setting used by students to observe and manipulates material in order to see in concrete terms some of the concepts learned in the class during the lectures and those read in reference textbooks. Hamidu, (2002), pointed out that the teaching and learning of science progresses by exposing students to practical work and experiment in and outside the classroom or laboratory facts. He further stressed that those science teachers in Nigerian Secondary Schools do not teach practical until the second or third term of the final year in the secondary schools, he further `said that the teacher begins hurriedly to the students and then no how to attempt and answer practical questions in their final year examination. Practical work is significant in the aspect Exposure of real life situation i.e. application of practical experiences to real life situation (Onyimadu 2001).

1.2 STATEMENT OF THE PROBLEM

This project is interested in finding out “THE IMPACT OF PRACTICAL WORK ON THE TEACHING AND LEARNINNG OF SOME CONCEPTS IN BIOLOGY”.

1.3 PURPOSE OF THE STUDY

The purpose of this study is to assess the meaning and impact of practical work on teaching and learning of some concepts in Biology in some selected Secondary School. The findings from this study is expected to provide the understanding of the impact of practical work on the teaching and learning of some concepts in biology for teachers and educators.

**1.4 SIGNIFICANCE OF THE STUDY**

This study is of significant due to the following:

1. The research findings will be useful for further research work (for those that want to carry out further research work in related disciplines).

2. The findings of this study encourage the biology teachers to know the importance of practical work in the teaching and learning of some concepts in biology.

3. The findings of this study will make it easy for students to comprehend and get a clear picture of some of the basic concepts in biology. Hence, learning will be permanent.

4. The finding of the research will make students to understand the impact of practical work on teaching and learning of some concepts in Biology

1.5 RESEARCH QUESTIONS

This project will find answers to the following questions:

1. What is practical work?

2. What are the impact of practical work on the teaching and learning of some concepts in biology?

3. How does practical work influences the teaching and learning of some concepts in biology?

4. What is the relationship between practical work and performance of students in biology?

1.6 SCOPE OR LIMITATION OF THE STUDY

The study is restricted to some selected secondary schools as follows:

1. SalawuAbiola Comprehensive High School, Osiele, Abeokuta.

2. Federal College of Education Model Secondary School, Osiele, Abeokuta.

3. Deeper Life Secondary School, Odeda, Abeokuta

1.7 DEFINITION OF TERMS

· IMPACT: The part play by a person or thing in bringing about a result or helping something to advance.

· PRACTICAL WORK: It refers to practical activities that include demonstrations, discussions, simulations, exercises, observations or manipulation of real objects and materials by students and fieldwork. The students working in pairs or small group of three or four are guided by the teachers and the teaching materials to observe and interpret events or phenomena occurring to the object.

· TEACHING: It is the systematic way of impacting worthwhile values or helping people to learn.

· LEARNING: It can simply be said to mean a relatively permanent change in the learners and must be as result of experience the learner has been exposed to.

· BIOLOGY: This can simply be defined as the study of life.

· VARIATION: This can be defined as the differences which exist between individuals of the same species.

· DIFFUSION: This is defined as the process by which molecules or ions of a substance (i.e. gases and liquids) move from a region of high concentration to a region of low concentration until they are evenly distributed.

· OSMOSIS: This is defined as the flow of water or solvent molecules from a region of dilute or a weaker solution to a region of concentrated or stronger solution through a selectively or differentially permeable membrane.

· CONCEPTS: These are ideas or terms or principles that are connected with something abstract.

**CHAPTER TWO**

**REVIEW OF RELATED LITERATURE**

This chapter will be discussed under the following sub-headings: Conceptual Framework, Theoretical Framework, Related Empirical Studies

**Conceptual Framework**

**Biology as a Branch of Science**

Science has been defined science as a way of investigating about events in nature. Science is also an objective, logical and repeatable attempt to understand the principle and forces operating in the natural universe. Science is from Latin word ‘scientia’, to know, Science is not dogmatic but should be viewed as an ongoing process of testing and evaluation. According to T.O. Adeyemi (2018), science subjects in secondary schools comprises of three major branches which are physics, chemistry and biology that are core subjects in secondary school curriculum. One of the intended benefits of student taking a biology course is that they will become more familiar with the process of science. Nworgu (2015) has it that science has a dual nature, that is, it can be defined in terms of methods and processes as well as its product that make up the body of science. The study and understanding of science involves - Observation, hypothesis, experimenting, data analysis, inference, conclusions. All these make up the scientific method. Considering the dual nature of science, Nworgu (2015) defined science as an organized body of knowledge got through investigation and experimentation. To this effect, science is seen in terms of ‘processes’ and as well ‘products’.

According to Okeke (2007), the nature of science is that it seeks for explanations utilizing investigative methods that are objective and can even be replicated. The entire process demands rigor patience, perseverance, and honesty which cannot but yield credible result. Superstition is prevalent in our society. This is in conflict with science education where persons are encouraged to seek explanations that are based on logical, objective and testable scientific principles and theory. The fact is that explanations based on superstition and supernatural powers are rooted in cultural beliefs and make no intellectual demands on individuals to rationalize, making this option to enjoy greater patronage than the option of scientific explanations. This puts science in a disadvantaged position toward contributing to utilitarian values.

According to Ukoli (2013), the aspect of science which science education provides the individual with, should among other things do the following.

Develop among increasing numbers a questioning intellectual temper towards traditional belief so that issues which were formerly accepted without questions are now subjected to systematic and critical thought.

Free the minds of people from superstition.

These views of the intellectual advantages of science are the same as those of the national teachers association at the United States of America. One of the most important goals of science education is to develop scientifically literate person with the necessary intellectual resources, values, and attitude and inquiry skills to promote the development of a man as a rational human being.

Such is the tremendous advantage of science when taught properly. Talking about the nature of sciences, Osogbonye (2012) asserted that learning more and more of the scientific knowledge does not make one a scientist, rather, children should be taught the skill and attitudes of science which are used to search for the scientific knowledge. This will prepare the children to be able to solve problems that will confront them in future (Osobeonye, 2012).

However, science has its nature as tentative, dynamic and objective activity which has greater implications to the teaching and learning of science. It means a change from teaching students about science to educating them through science. This shift in teaching method has been identified and accepted by the Nigerian government (Nwosu, 1999).

According to the Federal Republic of Nigeria (FRN, 2013) policy document “Science education should emphasize the teaching and learning of science process and principle. This type of teaching de-emphasizes rote memorization and regurgitation of facts, stresses development of skills and thereby making student to do science rather than learning science.

Abugu (2015) conceptualized science education as any systematic training and instruction that enables the learners upon completion to achieve among others the ability to manipulate scientific equipments, interpret and prepare maps, graphs, charts and table appropriate to problem. Along with the ability to demonstrate problem solving skills like observing, testing, inferring, defining problems, making hypothesis, carrying out investigation, outlining scientific procedures to test hypothesis, controlling and manipulating variables, formulating models, making valid conclusions, predicting, etc.

All these according to Adey and Harlen (2011) lead to the advocating of process approach to teaching science as opposed to the use of content approach, illustrating the significance of science process skills.

**Biology Teaching and Learning**

Biology occupies a unique position in the school curriculum. Biology is central to many science related courses such as medicine, pharmacy, agriculture, nursing, biochemistry and so on. It is obvious that no student intending to study these discipline can do without biology.

Longman Dictionary of contemporary English (2018) defined biology as the scientific study of living things. Biology is also a natural science concerned with the study of life and living organisms, including their structure, function, growth, origin, evolution, distribution and living organisms, including their structure, function, growth, origin, evolution, distribution and taxonomy.

As has been noted before, Odigie (2011) explained that biology is the prerequisite subjects for many fields of learning that contribute immensely to the technological growth of the nation. This includes medicine, forestry, biotechnology etc.

Teaching is defined by Onwuka (2012) as the direction of the activities of learners towards worthwhile educational goals. Ngwoke (2010) defined learning in a broad sense as a process which causes a change in behavior of an individual.

This change in behavior results from experience or interaction between the individual and his environment. He also noted that learning is an activity, something the learner does and not something the teacher does for the learner.

Meaningful learning occurs if students can relate their learning with daily experiences.

In spite of the importance and popularity of biology among Nigerian students, performance at senior secondary school level had been poor (Ahmed, 2018). The most general causes of the poor performance in science are poor quality science teachers, over–crowded classrooms, and lack of suitable and adequate science equipment, among others (Kareem, 2013). The teaching method is a significant factor in biology teaching and learning.

Ajaja (2015), in respect of this said that unfortunately, teaching is largely teacher- dominated and the laboratory neglected. This he noted in his investigation on “evaluation of science teaching in secondary school in Delta State”. All these factors and lots more contribute to ineffectiveness of biology teaching and learning. Emphasizing on the qualities of a good biology lesson Nworgu (2015) outlined the following.

Biology lessons should have clearly stated set of instructional objectives.

Involve the use of relevant activity oriented

Facilitate the transfer of knowledge to the wider society.

To solidify this, objective of teaching and learning of biology can be seen in the biology curriculum. It was derived from the national policy on education (1977, 1981, 2013, 2013) these includes

Adequate laboratory and field skills in biology.

Meaningful and relevant knowledge in biology.

Ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture.

Reasonable and functional scientific attitudes.

It goes to say that for effective learning of biology to occur, it has to be student – oriented and accompanied by practical activities.

Biology Practical Activities

As defined by Opuh, Eze and Ezemagu (2018), biology practical activities is the scientific study of the life and structure of plants and animals and their relative environment in real or experimental setup rather than dwelling on theory and ideas. UNESCO (2015) stated that in making observations, designing and carrying out their own experiments, students are most likely to learn about the nature of science. Similarly, Onah (2013) believed that if the progress of experimental science has demonstrated anything, it is that there is nothing better than genuine knowledge and fruitful understanding. This is the lesson of laboratory and the lesson all educators have to learn. A Chinese proverb was cited by Emmanuel and Eze (2007) as follows: -we hear we forget; what we see, we remember but that which we take part in we understand-. Explaining further they noted that in biology lesson, students have to take part in doing and on the course of doing (practical) students learns.

Lunette (2018) explained that laboratory has been given a central distinct role in science education, and science educators have suggested that there are rich benefits in learning using the laboratory activities.

UNESCO (2015), reported that conducting set experiment, building models for understanding other practical tasks provides opportunities for developing many of the essential learning which includes understanding and appreciating the need to change on the basis of new audience, discovering new knowledge from the work present which can be applied in building new scenarios, transferring knowledge and understanding new situation, contributing to the creation of a culture of learning in a community, working effectively as a member of a team to achieve individual and shared goals, etc.. From the foregoing, practical lessons have been acclaimed to be mostly essential in effective teaching and learning of biology. The Nigeria council on science education annual report on secondary schools science instruction, as cited in Emmanuel and Eze (2007) noted that many schools teach the science subject including biology without any laboratory work.

Udeh (2014) concluded in her research that one of the problems militating against the effective teaching of biology with practical activities in secondary schools in Enugu East L.G.A. of Enugu state is that laboratory equipment are lacking and there is insufficient time for biology practical. Eze and Ezemagu (2018) similarly agreed with the fact that science particularly biology cannot be adequately learnt from a book but by carrying out experiments using tools in the laboratory. Emmanuel and Eze (2007), emphasized that because of its very empirical nature, biology must be studies with the aid of the laboratory classes. Okoye (2014) opined that laboratory activities should be investigative in approach so that they can provide the students the opportunity of acquiring process skills. He strongly believe that laboratory work through making careful study or enquiry, helps the students to acquire basic skills in handling laboratory activities. In a sharp contrast, Lunette (2018) deviated by saying that at this time however, some educators have started questioning the effectiveness and role of laboratory work and the case for laboratory teaching is not self evident as it is once seemed.

Nevertheless, Nnamonu (2013) and other proponents of biology practical activities have suggested that effective use of biology laboratory properly maintained is most beneficial in effective teaching of biology.

From the foregoing, it is clear that practical biology is highly indispensable in biology education. In fact, the benefit of practical classes in biology can never be overemphasized because laboratory (practical) activities is the life-wire of biology and without which biology loses its scientific nature.

**Laboratory Facilities and Students Performance in Biology**

Hofstein and Lunetta (2014) defined laboratory as an appropriate learning environment for promoting meaningful learning, enhancing students understanding of both scientific knowledge and the nature of science, where students interact with material, and/or with models to observe and understand the natural world.

Nworgu (2015) also defined laboratory as a room or building used for scientific research and experiment. She went on to say that the laboratory is the focal point of science activities. She went further to state that for biology teaching to be meaningful, it has to be accompanied by laboratory activities. Akpan (2012) summarized the place of laboratory activities as “in the laboratory, people carry out measurement, verify situations, obtain basic information, manipulate instruments, get to know the equipment and materials by name and are exposed to the activities of scientist, and are trailed in experimental procedures.

In the laboratory, people get to appreciate the information presented in the textbook or in lecture classes by getting to know the basic principles and abstractions that are involved in the process. The goal of every teaching is the learner. The importance of laboratory is not authentic if students are not engaged in the laboratory activities. Unfortunately, most laboratory assessments are accomplished with objective items, paper-and-pencil instruments rather than hands-on mode (Hofstein and Lunetta, 2014).

Tobin (2011), suggested that meaningful learning is possible in the laboratory if the students are given opportunities to manipulate equipment and materials in an environment suitable for them to construct their knowledge of phenomena and related scientific concepts.

As has been noted earlier in this work, several schools don’t make full use of the laboratory in teaching biology. They only organize practical for students when the one short-end of course examination (SSCE) commences; hence teachers and parents begins to expect the students to do some magic and pass in flying colours the Senior Secondary School Examinations. In support of this Ahmed (2018), has noted that some of the observed poor achievement of biology students in SSCE is due to ill-equipped biology laboratory.

This is not meant to be so, the laboratory need to be equipped, and students regularly visit it for experiment in order to acquire necessary skills. According to Lunetta (2007), science laboratories have very important role in the educational system for science students. He noted again that these laboratories have made this world very advanced and scientific in its purpose.

Osogbonye (2012), reported that modern science curriculum reforms seems to hold that the major functions of the laboratory are to convey the method and spirit of science inquiry, to provide students with opportunities to investigate to inquiry and to find out things by themselves. Osogbonye (2012) is of the opinion that the laboratory is the right place where students learn to do what scientists did, i.e. where they use the skills and attitudes of science to go through the scientific process to seek knowledge. It is in the laboratory that they put into practice these scientific skills and attitudes developed in them to make them self-reliant in the future. Hence Osogbonye (2012) stated that the goal for laboratory instruction in modern science courses “focuses upon the inquiry/discovery process or methodological phase of science and upon its intellectual components” besides, laboratories are essential for the teaching of science related courses, is so much dependent on the laboratory provisions made for it. Osogbonye (2012) maintains that students rely on the laboratory as a place where they can both watch the teachers demonstrates as well as carry out practical works themselves. Biology as a science subject is to a large extent experimental.

Osogbonye (2012) sees higher quality laboratory programs as capable of eliciting thinking skills, and students’ motivation necessary to produce a well prepared group of scientist, engineers, biologists and citizens to meet the scientific and environmental challenges of today and the future.

Based on the foregoing, Dienye and Gbananje (2011), reported that the functions/merits of the laboratory are grouped into five main categories which represented important goals in biology education and also demonstrate how teaching of biology in the laboratory is appropriate with advancement in science and technology.

**Merits of Teaching with the Laboratory**

i. The learner in this method learns about the nature of science and technology in order to foster the knowledge of human enterprises of science and thus enhance the aesthetic and intellectual understanding of the child.

ii. Acquisition of problem skills: The basic goal of science Teaching is to help students learn skills that can be applied to other life situation in future.

iii. The student learns to appreciate and emulate the role of the Scientists through acquisition of manipulative skills.

iv. Develop interests, attitudes and values: When the students are accorded the chance for personal experience by handling the real things, their interest in science increases as they yearn to investigate and explore more about their environment.

v. They also learn the major scientific concepts, models, principles and theories and understand their tentative natures. The laboratory experience affords students opportunities to gain exposure to facts in scientific phenomena.

**Demerit of Teaching with the Laboratory**

The two major setbacks encountered in the use of laboratory are as follows;

i.It is time consuming in terms of planning and preparations.

ii.It is expensive due to the materials and equipment that will be used.

Practical Biology and Effective Teaching

According to UNESCO (2015), it is acknowledged that many teachers intuitively included the essential learning within their teaching and have long done so. They recognized the need of knowledge skills at a particular subject. Opportunities present by the particular or in the classroom are recognized and used. T he research observed from the literature at hand that effective teaching of biology can be sub-divided such as qualification of teachers teaching method effective use of laboratory and mastery of the subjects. The science teachers conference reported on Udeh [2014] stated that ‘if Nigeria teachers can cope adequately with tasks of them they have to be well trained for their job. The national conference maintained that if our education is to achieve the national objective well qualified trained, efficient, satisfied and educated teachers are absolutely necessary. Opuh, Eze and Ezemagu (2018) conceived that it is not easy to think of effective teaching of biology without qualified teachers for the work force. Eze (2012) regretted that the lack of qualified teachers in the secondary schools especially in the area of practical. It is often said that teachers is the hub of any educational system for schools cannot be better than their teachers. This entail that highly qualified teachers will impact better knowledge or higher standard education on the students, Orjika (2014) Ajaelu in Opuh (2018) noted that educationists had expressed that science teacher should possess a good professional training and biology teachers are not exceptional.

Many researchers are of the opinion that the teaching method employed during science classes contribute a lot to effective teaching of biology. Nnamonuh (2013) stated that laboratory method is the method used in effective teaching and learning of science subjects especially biology. It encompasses activities carried out by an individual or a group for the purpose of learning. Okoye (2014) had earlier opined that laboratory method of teaching should be investigated as an approach so that this activity can provide student the opportunity of acquiring process skills. Meregini (2015) reported that recent classroom observation studies have shown that teacher’s instructional materials/methods were at variance with the method implied in science curriculum. Accordingly, Nnamonu (2013) stated that laboratory and field work are central to the teaching of science. Without laboratory method, teaching of science will be ineffective. Laboratory work should be seen as a mean of relating science concept, enquiry process, observation and interpretation of data.

Fafunwa in Ugwu (2015) observed that most teachers resort to the use of lecture method not minding the lecture modification, the concept of education while maintaining that the best learning is that which result from purposeful practical activity. Ugwu (2015) suggested that teachers should use as many techniques as possible to gain the attention and interest of the students. The teacher should apply any method of motivation, so as to heighten the spirit of the students. Laboratory method is inevitable in the teaching of biology. Nnamonu (2013) advocated that teachers should be using laboratory method mostly in teaching to avoid making biology largely a memory work. He further observed that schools where the laboratory is effectively used significantly performed better in science than others. In his own contribution, Okri was quoted by Uche (2014), as follows: the techniques employed in impacting information to the students may have effect in creating favorable or unfavorable impression about biology in the mind of the students.

Another factor that affects effective teaching of biology is mastery of the subject matter. Ugwu (2015) stated that the teachers whose attitude shows a wealth of knowledge at their finger tips about what they are teaching will restore confidence on their students. Okoye (2015) stated that teachers’ knowledge of the subject matter is another factor that contributes to effective teaching and learning. A teacher who knows his subject matter very well uses his own language to teach his students by using concrete examples to illustrate his points. Killdara (2007) advocated that for effective teaching to occur the teacher should be very knowledgeable with regards to their subject matter and this should be excellent use of specific terminologies throughout the lesson. Similarly, Opuh, Eze and Ezemagu (2018), asserted that the quality of a goof teacher is good mastery of the subject matter. The teacher has to know everything concerning the subject. Eze (2015) noted that some unskilled teachers abuse the use of teaching methods. Keldare (2007) went further to stress that continuity from previous lesson s and new information should be linked to previous learning. In light of the above, Ude (2014), recommended that the place in which biology is to be taught is the indispensable laboratory. It is essential for every teacher of biology to become acquitted with teaching method that will help his students achieve their learning objectives. In summary, teachers affect change in the society. These changes can be affected if teachers themselves are well educated, competent industrious and disciplined. It is also when the desired and desirable changes in the students learning have been realized that the teaching of biology can be effective. Effective teaching and learning is dependent on the effectiveness on the quality of the teacher.

**Biology Practical and Effective Learning**

It has been earlier deduced that effective learning is dependent on effective teaching. It has also been noted in this work that biology practical occupy the central position of effective teaching of biology. Hence it is also logical to state that biology practical contributes to effective learning of biology. According to Kuren, Zonntja, Navelle and Jeanne (2015), many students expressed their interest and enthusiasm in practical exercise. It is well known that students who enjoy science practical do well in science. Ude (2014) accepted that there is a positive link between biology practical and effective learning of biology. Supporting her idea, she quoted the ministry of education as saying that since biology is a science subject; effort should be made to maintain reasonable extensive science equipment coupled with suitable method of teaching. The researchers believed that students attitude and interest towards practical classes contributes immensely to the effective learning of biology. Karental, Ime, Smi and Henry (2015) have a similar view. They opined that improving students based course. Karase, Hartley, James and Mclus (2015) recommended that it’s particularly important to address these issues (students’ interest and attitude to practical work). They further opined that laboratory practical experience rank highly as contributing factor towards effective learning in science in general and biology in particular. Nnamonu (2013) declared that students attitude towards laboratory work helps for effective teaching and learning of science and improve academic performance of students. Consequently, Cosbourne, Simon and Collins (2013) agreed that if the laboratory and practical experience is accessible, it should play a major role in influencing students’ attitude and academic achievement. In fact, it can define students’ performance in science. Hofstein and Lunette (2013) disclosed that a significant fact that continues to reduce learning in the laboratory is the recipe-book style that limits students’ opportunity to experience ownership, creativity and development of effective learning.

Uzel cited in Eze (2013) and Orjika (2007) stated that, practical agriculture (similarly Biology) has positive effect on students motivation. He also maintained that practical enhance both skills acquisition and the quality of learning because the students can equally add their understanding by discussing about the work done. Somi and Henry (2013), demonstrated that providing a constructively laboratory experience resulted in higher mean grade and enhanced interest, enjoyment and learning awareness. Anichebe (2007) in his study emphasized that teachers must understand their students as individual knowing how they learn best and how they may best transmit their skills and knowledge in order that the students may e educated.

Finally, practical laboratory experiences are unique to biology in that it allows students to gain hands-on experience in the subject matter. It clearly provides students with the opportunity to become highly engaged in the process of learning and promote academic performance of students.

**Biology Practical and Academic Performance**

By providing students with practical laboratory lessons, that are academically stimulated, students are more likely to engage meaningfully with tasks and subsequently achieve higher assessment grades (Karen et al 2015). Nevertheless, it was earlier observed by WAEC Chief Examiner (2013) that academic performance of candidates in biology fell below expectation. The chief examiner lamented that “there were many candidates who could not answer correctly a single question in biology practical, in most cases, they have wild guesses and guess unrelated answers that were sometimes unbiological. And also the candidates were faulty in experimental procedures”. Students that neglect practical work often encounter problems with questions that require some mathematical skills, deductive reasoning, proper observation and interpretation of data.

In addition, Sandbarey, Armstrong and Wischusen (2015), explained that enquiry based practical offers students a more realistic experience where the answer is not always predetermined and which requires students to come up with their own ideas from their own observation. Allan, Rob and Jonathan (2013) complained that students who avoid practical classes are always frightened by figures of graph during examinations and this made them not to understand the figures for correct interpretations. Eze and Ezemagu (2018) observed with Adeleye that schools which are involved in practical classes perform better in SSCE than those that neglect practical work. As disclosed by Sandberg (2015), educators were initially slow to change their methodologies in biology but with good result (improved academic performance) and support from national science and educational organizations, there is now progress (Myer and Burgess 2013). From the above, it can be stated categorically that biology practical have a positive effect on the academic performance of students in biology examinations.

**Problems Associated with Conduct of Biology Practical**

Inadequate Laboratory Facilities :- the absence of adequate laboratory facilities in secondary schools has been a problem in teaching and learning of biology activities. Ani and Eze (2007), established that students understand better when they have practical experience, when the students perform experiments themselves during practical for obtaining the correct result, they cannot only remember the procedure involved but also feel proud of themselves for obtaining correct result. It is therefore essential that laboratory is properly equipped for the study of biology activities, and the students should very much be allowed to use in the laboratory since it is an established fact that they perform better when they partake in the activities. Lunette (2018) noted that the laboratory helps students in making accurate observation, devising hypotheses, finding the reasons for the results, planning control and withholding judgment.

Time Management :- this affects the students in such a way that many candidates out of nervousness and fear develop examination fever and this affect them badly. Some students spend a lot of time in reading and thinking out answers to a particular question at the expense of others. Students in their attempt to impress their examiner become verbose thereby giving unnecessary details to some answers and end up rushing through other questions. Tan (2018) reported that students should note that practical biology questions usually require or call for precise and direct answers.

Comparing and Contrasting Specimen :- comparing and contrasting the features of one specimen with another are vital problem of biology methods in science study. Students usually perform poorly in these tasks due to lack of the skills or lack of technical know-how. The simplest and the most reliable method of comparison is by use of tabulation. Comparing or contrasting features of specimen with those of another specimen means identifying and stating the similarities and differences between on specimen and the other.

Drawing and Labeling :- biologists attach a lot of importance to making of diagrams with correct labeling of the specimen under study in practical classes. Tan (2018), reported that biology diagrams are different from those of fine art in which artists are expected to make colorful artistic diagrams. In drawing and labeling of biology specimen, the following are considered: size, proportionality, title and view or perspective.

Observation :- observation is a vital aspect of practical biology. The importance of close observation of specimen in a practical biology examination can never be overemphasized. Candidates are expected to observe the specimen given to them very carefully and critically without which, proper specimen’s identification, full representation in drawing and realistic comparative analysis cannot be done.

Different reasons have been given to the problems relating to laboratory work (Tan 2018). According to Benze and Hodan (2015), problems in laboratory work arise when students blindly follow the instructions of the teachers. Some researchers on the other hand claim that the laboratory instead of being a place for science practical and experiments has become a place where tasks set by the teachers are carried out. No attention is given to the method or purpose during laboratory work, only the set tasks are carried out (Hurtegal 2012). Jimenz Alexander (2014), Wikinson and Wand (2007) have connected the problem with laboratory work to a poor evaluation of the purpose of the tasks undertaken in the laboratory.

The multiple purpose of the laboratory work has been subject of discussion worldwide for many years. Multiple list of these purpose have been prepared for different levels of education. Many of these list focus on carrying out experiments through scientific methods and technical skills while some strongly emphasize effective objectives others have dwelled on other purpose (Johnstone and Al-Shuali 2011; Reid and Shah 2007). When university biology laboratory are considered the general purpose of laboratory work may be:

Supporting or strengthening theoretical knowledge

Experiencing the pleasure of discovering and developing of the psychomotor skills

Teaching how scientific knowledge may be used in daily life.

Increasing creative thinking skills

Gains in scientific working methods and high thinking skills

Developing communication skills

Developing manual dexterity by using tools and equipment

Allowing students to apply skills instead of memorizing (Bayraktar 2014).

**Theoretical Framework**

This research employed the General System Theory (GST) as the theoretical framework for the study. Higgs and Smith (2018) defined system theory as general science of organization and wholeness. It can also be regarded as a philosophy that claims that life is a system of which we are parts. The key assumptions in system theory are: everything including human beings is a system of some sort (Higgs and Smith 2018) and all systems are purposeful and goal directed. In other to achieve goals of the system, all part of a system must work in harmony with one another and their environment. The General System Theory (GST) was first developed by a biologist Von Bertalnffy in (2018) his assumptions pertained primarily to the living organisms, machines, galaxies and organizations. He postulated that part of a system do not work in isolation, they work within a system. His postulation countered a popular scientific view that a system a system could be understood first by breaking it down into its components so that each component could be studied and analyzed as an independent entity. And that the components could be added in a linear fashion to describe the totality of a system. Bertalnffy (2018) defined a system as set of elements standing in interrelation. System can either be closed or opened. The school is an example of open system in which two or more persons work together in a coordinated manner to attain common goals (Norlin 2015).

All schools are open system though the degree of interaction with their environment may vary. The school is a system with the following components, environment inputs transformation process, output and feedback. The open system is that type of system that receives input from the environment and releases the output to the environments. Any change in the environment can profoundly impact on the open system. Parts of the system interact together for the school system to succeed or help locate the source of the problem and as a result find the solution. This theory has been adopted for this study because the school is an example of the social open system with goals to achieve excellence in all the subjects. One of the major goals of biology teaching and learning in secondary schools is to equip students with the necessary skills and attitudes of scientists that will propel to undertake professional courses such as Medicine, Dentistry, Pharmacy, Nursing among others in universities (Abugu 2015). However, this cannot be achieved unless the parts/aspects of biology (theory and practical) work together as expected to achieve the desired goal. With regards to this study, all aspect of biology teaching and learning could affect the degree of performance of the students in examination. If one aspect of the system is lacking, the effect will be negative but if all the aspects of the system work together, meaningful learning will be achieved with increase in the academic performance of the students.

**Piaget's Theory**

Piaget's theory of cognitive development is a comprehensive theory about the nature and development of human intelligence. It was first created by the Swiss developmental psychologist Jean Piaget (1896–1980). The theory deals with the nature of knowledge itself and how humans gradually come to acquire, construct, and use it. Piaget's theory is mainly known as a developmental stage theory. Piaget "was intrigued by the fact that children of different ages made different kinds of mistakes while solving problems". He also believed that children are not like "little adults" who may know less; children just think and say words in a different way. By Piaget thinking that children have great cognitive abilities, he came up with four different cognitive development stages, which he put out into testing. Within those four stages he managed to group them with different ages. Each stage he realized how children managed to develop their cognitive skills. For example, he believed that children experience the world through actions, representing things with words, thinking logically, and using reasoning.

To Piaget, cognitive development was a progressive reorganization of mental processes resulting from biological maturation and environmental experience. He believed that children construct an understanding of the world around them, experience discrepancies between what they already know and what they discover in their environment, then adjust their ideas accordingly. Moreover, Piaget claimed that cognitive development is at the center of the human organism, and language is contingent on knowledge and understanding acquired through cognitive development. Piaget's earlier work received the greatest attention.

Child-centered classrooms and "open education" are direct applications of Piaget's views.[5] Despite its huge success, Piaget's theory has some limitations that Piaget recognized himself: for example, the theory supports sharp stages rather than continuous development (horizontal and vertical décalage).

**Related Empirical Studies**

Henry (2018) carried out a study on effect of biology practical on student academic performance in biology in Enugu State secondary schools (a case study of Nsukka Local Government Area). This study concerned itself with practical work conducted in biology in secondary schools. It examined whether the way practical experience were presented to the students and students’ engagement in them enhanced the attainment of goals of practical work. The procedures of conducting practical work in biology were of great concern and more especially the skills emphasized during practical work in biology lessons. The study also examined the teachers and students attitude towards practical work in biology. All these are done with view of identifying the problems and giving recommendations that could guide practice and effective teaching and learning of practical work in biology in particular and biology in general. The study adopted a descriptive survey research design. The population of the study comprised of all the 47 public secondary schools in the local government from which 9 sample schools were selected using a combination of stratified, purposive and systematic sampling procedures. It involved 29 biology teachers and 309 from biology students comprising 170 boys and 139 girls respectively. The main finding of the study indicated that science laboratory in secondary schools in Nsukka local government area were fairly equipped with better apparatus, chemicals and materials and students were indeed involved in a variety of practical activities in biology. However, basic scientific skills such as experimental design and formulation of hypotheses were found wanting in the area of students. The study recommended that that NECO should assess students in as many skills in NECO biology examination including simple aspects of experimental design.

Also research work done by Nwagbo, Chukelu and Uzomaka (2015) investigated the effect of biology practical activities on secondary school students process skill acquisition in Abuja municipal Area council. The design of the study was quasi experimental, specifically the pretest, posttest non-equivalent control group design. Samples of one hundred and eleven senior secondary one (SS1) biology students randomly drawn from two co-educational schools were used for the study. An instrument known as science process skill acquisition test (SPSAT) was used for data collection. The data collected were analyzed using mean, standard deviation and Analyses of Covariance (ANCOVA) at 0.05 level of significance. The result revealed that practical activity method was more effective in fostering students’ acquisition of science process skills than the lecture method of instruction. There was no interaction between method and gender on student process skill acquisition.

Summary of Review of Literature

In this study science was defined as a way of investigating about events in nature. And also as an objective, logical and repeatable attempt to understand the principle and forces operating in the natural universe. Science was from Latin word ‘scientia’, to know. Good science is not dogmatic but should be viewed as an ongoing process of testing and evaluation. On the other hand, biology was seen as the scientific study of living things. Biology is also a natural science concerned with the study of life and living organisms, including their structure, function, growth, origin, evolution, distribution and living organisms, including their structure, function, growth, origin, evolution, distribution and taxonomy. As has been noted before, Odigie (2011) explained that biology is the prerequisite subjects for many fields of learning that contribute immensely to the technological growth of the nation. This includes medicine, forestry, biotechnology etc. other various aspects that were also extensively discussed under the conceptual framework included

Theoretical framework was base on the General System Theory developed by Von Bertalnffy in 2018. The theory maintained that everything including human beings is a system of some sort and all systems are purposeful and goal directed. In other to achieve goals of the system, all part of a system must work in harmony with one another and their environment.

Finally in this chapter, related empirical studies were painstakingly reviewed and acknowledged.

**CHAPTER THREE**

**RESEARCH METHOD**

The following are discussed in this chapter; research design, area of the study, population of the study, sample and sampling technique, instrument for data collection, validation of the instrument, reliability of the instrument, method of data collection, method of data analyses and decision rule.

3.1 Research Design

The design adopted for this study is a survey research design. The researcher adopted this design because according to Iketaku (2011), a survey research design is one in which a group of people or items are studied by collecting and analyzing data only from a few items considered to be representatives of the entire group. This buttresses the fact that survey research design is more ideal than any other methods, for this study.

**3.2 Area of the Study**

This study was carried out in public secondary schools in Abeokuta, Ogun State.

**3.3 Population of the Study**

The population of this study comprises of the entire senior secondary students offering biology in the eleven (11) public secondary schools in Abeokuta, Ogun State. This is made up of three thousand four hundred and fifty (3,450) students [Post Primary School Management Board (PPSMB) 2015/2016 school population].

**3.4 Sample and Sampling Technique**

The sample size for the study consists of one hundred (100) students randomly drawn from five (5) schools in Abeokuta, Ogun State.

Simple random sampling technique was used to select five schools out of the entire eleven secondary schools, it was also used to sample out twenty (20) students each from the five sample schools; bringing the sample to a total number of one hundred (100) students respectively.

**3.5 Instrument for Data Collection**

The researcher developed an instrument to elicit information from the respondents. The instrument was a close – ended structured questionnaire. The questionnaire was developed in line with the modified four point Likert scale of Strongly Agreed (SA) Agreed (A) Disagreed (D) and Strongly Disagreed (SD) in accordance with the three research questions raised for the study. The questionnaire consists of two sections; section A contains brief information of personal data of the respondents, while section B was made up of 15 items statements in which the respondents are expected to tick (√) as appropriate to them.

**3.5.1 Validation of the Instrument**

The research instrument was validated by three experts: two from Science Education Department (Biology) and one expert from measurement and evaluation Department, Ogu State College of Education Ogun state. They were asked to examine the items in terms of clarity of instruction to the respondents, proper warding of the items and appropriateness and adequacy of the items in measuring what they are supposed to measure. The validator’s corrections and recommendations were used to prepare the final copy of the questionnaire.

**3.5.2 Reliability of the Instrument**

Test – retest method was employed in order to establish the reliability of the instrument. The researcher administered the instrument on two different occasions to the same set of 20 students from a school outside the area of study. Two different sets of responses were obtained and correlated using Pearson’s Product Moment Correlation Coefficient (PPMCC) an index of 0.82 was obtained which showed high reliability.

**3.6 Method of data Collection**

The questionnaires were administered personally by the researcher to the students and were collected at the spot after their responses.

**3.7 Method of Data Analyses**

The responses obtained from the respondents were analyzed using frequency and mean to answer the research questions.

Since the questionnaire was designed based on the 4-point Likert scale system of SA, A, D, and SD respectively, numbers were assigned to each of them as follows

Strongly agreed (SA) -----------4

Agreed (A) ---------------------3

Disagreed (D) ------------------2

Strongly Disagreed (SD) --------1

Mean of response $\frac{∑fx}{n}$ = $\frac{4+3+2+1}{4}$ = $\frac{10}{4 }$ = = 2.50

Therefore, any item response with mean below 2.50 will be accepted as Disagreed while responses with mean of 2.50 and above will be accepted as Agreed.

**CHAPTER FOUR**

**DATA PRESENTATION AND ANALYSIS**

The data are presented and analyzed to provide answers to the research questions that guided the study.

**Question One**

What impact do biology practical pose on the students’ academic performance in biology in Abeokuta, Ogun State ?

Table 1: Mean response from the respondents on the impact which biology practical pose on students’ academic performance in biology.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS STATEMENT** | **SA** | **A** | **D** | **SD** | **N** | **EFX** | **X** | **Remark** |
| 1 | Practical work stimulates learners’ interest in biology. | 50 | 30 | 15 | 15 | 100 | 335 | 3.35 | Agreed |
| 2 | Practical biology exposes students to acquiring skills. | 60 | 15 | 10 | 15 | 100 | 320 | 3.20 | Agreed |
| 3 | Practical work makes teaching and learning easy and faster to the students. | 30 | 40 | 10 | 20 | 100 | 280 | 2.80 | Agreed |
| 4 | Practical work enhances students’ performance in biology. | 30 | 10 | 30 | 30 | 100 | 240 | 2.40 | Disagreed |
| 5  | Practical work promotes retention in students. | 10 | 20 | 40 | 30 | 100 | 210 | 2.10 | Disagreed  |
| **Grand Mean** |  |  |  |  |  |  | 2.77 | Agreed |

In table 1 above, the researcher presents the responses by the respondents to questionnaire item 1 to 5 in relation to first research question which sought to find out the impact which biology practical pose on students’ academic performance in biology.

From the calculations made above, the first question has a mean score of 3.35 which is above the criteria mean of 2.50, the second and third questions have a mean score of 3.20 and 2.80 respectively which are also above the criteria mean of 2.50 and as such termed as agreed, then the fourth and fifth questions have the mean score of 2.40 and 2.10 respectively which are below the criteria mean of 2.50 and as such termed as disagreed.

From the grand mean calculated which has a mean score of 2.77 which is denoted as agreed, indicated that practical activities has a great impact on students academic performance in biology.

**Question Two**

What impact do teacher’s related factors pose on students’ performance in biological practical in Abeokuta, Ogun State ?

Table 2: Response from the respondents on the impact which teachers’ related factors pose on students’ performance in biology practical.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS STATEMENT** | **SA** | **A** | **D** | **SD** | **N** | **EFX** | **X** | **Remark** |
| 6 | Poor teachers’ relationship affect students performance in biology practical | 50 | 30 | 15 | 15 | 100 | 335 | 3.35 | Agreed |
| 7  | Laziness of teachers affect students performance in biology practical | 70 | 10 | 10 | 10 | 100 | 340 | 3.40 | Agreed |
| 8 | Preparation of teachers affect students positively during practical  | 20 | 10 | 30 | 40 | 100 | 210 | 2.10 | Disagreed |
| 9  | Truancy on the part of teachers affects student performance in biology practical  | 30 | 10 | 40 | 20 | 100 | 250 | 2.50 | Agreed |
| 10 | Lack of motivation from teacher affects student interest in biology practical | 15 | 60 | 10 | 15 | 100 | 275 | 2.75 | Agreed |
| **Grand Mean** |  |  |  |  |  | 2.82 | Agreed |

In table 2 above the researcher presents the response by the respondent to Question item 6 to 10 in relation to research Question two which sought to know the impact which teachers’ related factors pose on students’ performance in biological practical.

Based on the calculations made above, the first question has a mean score of 3.35 which is above the criteria mean of 2.50, the second question has a mean score of 3.40 which is also above the criteria mean of2.50, which are then termed as agreed, the third question has a mean score of 2.10 which is below the criteria mean of 2.50 which showed disagreed, then the fourth and fifth questions have the mean score of 2.50 and 2.75 respectively which is above the criteria mean of 2.50 and also termed as agreed.

From the grand mean calculated which has a mean score of 2.82 which was denoted as agreed indicated that among the effect to be considered, teacher related factors has a great impact on students academic performance in biology.

**Question Three**

What impact do school management factors pose on the practice of biology practical towards the academic performance of students in biology in Abeokuta, Ogun State ?

Table 3: responses from the respondent on the impact which school management factors pose on the practice of biology practical towards the academic performance of students in biology.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS STAATEMENT** | **SA** | **A** | **D** | **SD** | **N** | **EFX** | **X** | **Remark** |
| 11 | Inadequate provision of infrastructure affect the effective practical activity performance in school | 20 | 10 | 40 | 30 | 100 | 220 | 2.20 | Disagreed |
| 12  | Lack of proper supervision during practical affect students performance in biology  | 50 | 25 | 15 | 10 | 100 | 315 | 3.15 | Agreed |
| 13 | Inadequate maintenances of laboratory affects students performance | 20 | 10 | 45 | 25 | 100 | 225 | 2.25 | Disagreed |
| 14 | Unavailability of instructional materials affects students’ performance. | 40 | 10 | 30 | 20 | 100 | 270 | 2.70 | Agreed |
| 15 | Inadequate facilities affect students’ performance in biology practical. | 45 | 25 | 10 | 20 | 100 | 295 | 2.95 | Agreed |
| **Grand Mean** |  |  |  |  |  |  | 2.65 | Agreed |

From table 3 above, the researcher presents the responses by the respondents to items 11 to 15 in relation to research question three which sought to find the impact which school management factors pose on the practice of biology practical towards the academic performance of student in biology.

From the calculations made above,the first question has a mean score of 2.20 which is below the criteria mean of 2.50,the second question has a mean score of 3.15 which is above the criteria mean score of 2.50,the third question has a mean score of 2.25 which is below the criteria mean of 2.50 and then termed as disagreed, the fourth and fifth questions has the mean score of 2.70 and 2.95 respectively which is above the criteria mean score and then termed as agreed.

Based on the grand mean calculated, which has a mean score of 2.65 which was denoted as indicated that school management factors on the practice of biology practical has an impact on the academic performance of students in biology.

**CHAPTER FIVE**

**DISCUSSION, SUMMARY, CONCLUSION AND RECOMMENDATIONS**

**Discussion of Findings**

The findings in table 1 which sought to find out the impact which biology practical pose on the students academic performance in biology showed that practical work makes teaching and learning easy and faster for the students. This study is in agreement with the findings of Nwaodo (2018), which stated that inadequate laboratory facilities reduces students’ interest in practical activities and leads to poor academic performance. The finding also showed that practical biology exposes students to acquiring process skills. It has link with the findings of Ezemagu (2018), that biology practical activities is the scientific study of the life and structure of plants and animals and their relative environment in real experimental set up. The findings revealed that practical work assists students in utilizing their knowledge and skills acquired in real field outside classroom. This also has link with the finding of Ude (2014), that laboratory and field work are central to the teaching of biology.

The finding of table 2 which sought to find out the impact which teachers’ related factor pose on students performance in biology practical showed that poor teaching relationship affect students performance in biology practical. This also agreed with the findings of Ugwu (2014). That the use of practical activities to the teaching of biology concept should therefore be a rule rather than an option to biology teachers.

The finding also showed that poor preparation of teacher affect students during practical. This has link with the finding of Agaelu in opuh (2018) that science teacher should possess a good professional training and biology teachers are expiations.

The finding in table 3 which sought to know the impact which school management factors pose on the practice of biology practical towards the academic performance of students in biology showed that adequate provision of infrastructure affect student’s performance in school. This was made known by the responses of the respondents hence indicating that inadequate provision of infrastructure affect the students’ performance in school. This also has link with the finding of Nwagbo (2018) that laboratory activities help to increase overall quality of education of the student and also help the participants actively in learning.

The finding also showed that lack of proper supervision during practical affect students’ performance. This agreed with the finding of Okonye (2012) that the laboratory activities should be investigated in approach so that they can provide students with the opportunity of acquiring process skill.

Summary of the Findings

The study was carried out on the impact of biology practical on the effective academic performance on senior Secondary school in Abeokuta, Ogun State. Having justified the findings empirically the following are the summery of the major findings.

Good teacher relationship defiance student academic performance in biology practical. Practical biology exposes student to acquiring process skills. Practical work assist student in utilizing their knowledge and skills acquiring in real field outside the classroom.

Poor preparation of teachers affect students during practical. Good supervision during practical enhance student academic performance in the school, provision of infrastructure enhance student academic in school. School management related factor affect academic performance of student in biology practical.

Conclusion

The findings conclusions are based on the finding of the biology.

1. Secondary school students have interest in learning when learning facilities are available in school.

2. Student academic performance are enhanced when teacher relationship are improved.

3. Student academic performance are enhanced when there is adequate proper supervision during practical.

Recommendations

Based on the findings of the study, the following recommendations were made.

1. The ministry of education as a matter of fact should ensure that learning facilities are available in the school so as to make learning interesting to students.

2. Parent should be enlightened on how the practical activities influence the academic performance of the students.

**References**

Ajuwa, Y. J. (2000). Development of Scientific Reasoning in College Biology: Do two Levels of General Hypothesis- Testing Skills exist? Journal of Research in Science Teaching, 37(1), 81-101.

Alexander, O. (2014). Leading in a cultural of change (San Francisco, CA Jossey Bass).

Amichebe, H.J (2007). Measuring, Improving and Sustaining Healthy learning environments in H.J Freberg (Ed) School climate: measuring improving and Sustaining healthy learning environment (Philadelphian, PA. Falmes press) p.11.

Aniodoh, I. (2018). History of Science of Degree Student Author (p.3).

Benze, J., and Hudson, R. (2015). Asking the Right Question About leadership, America psychologist, 62(1), 43-47.

Emmanuela, K.J., Arthze, J.M. (2007). Computer Experience a Poor Predicator of Computer Attitude Computers in Human Behavior, 20,823-840.

Eze, H., and Ezemagu, R. (2018). Examination of Computer Attitude Among Teacher Employed in Primary Schools in Terms of Different Rain-Able. Inonu University Journal of the Faculty of Education, 6(10) 27-35.

Fafunwa, E. and Ugwu, G. (2015). Learning to Notice Scaffolding New Teaching Interpretation of Classroom.

Henry, S. (2015). A Comparison of Exemplary, Recognized and Accepted Schools rated or the taxes. Assessment of academic skills and climate: Dissertation abstracts international, AAT 3008 1481 (doctoral dissertation, the university of histone).

Hostaton, M. and Lunette, L. (2013). Enhancing Leadership Effectiveness ( Lenexaks. Joshas publishing).

Ibe, D.C. (2013). Prospective Gymnasium Teachers Conceptions of Chemistry Learning and Teaching. International Journal of Science Education, 22,209-224. Lawson, A.E clark Br, Cramermeldrum, E. Falconer, K.A. Sequist.

Johnstone, R.H., Al-shuili, G.A (2011). School Culture and performance: Testing the Invariance of an Organizational Model School Effectiveness and School Improvement 9,(1), 76-96.

Karental, Ime, E., Somi J., and Henry, S. (2015). Developing Principals as Instructional Leaders. Phi delta kappan, 82,598-606.

Keldage, R.H (2007). A. 4-step process for identifying and Reshaping School Culture, Principal Leadership, 1(8), 48-51.

Killdare, E. (2007). High School: a Report on Secondary Education in America. (New York Harper and Row)

Kuren, E., Zonnetye, D., Navelle, B., and Jeanne, K. (2015). Shaping School Culture, the Heart of Leadership (San Francisco, CA Jossey Bass)

Kuruse, R., Hurtely, B., James, P., and McInnis, R. (2015) Professional Learning Communities of Work. (Bloomington in: National Education Service).

Lunelte, F.O (2015). Planning and Organization of Practical Work in Biology in Secondary School Journal of the science teachers association of Nigeria: 19 (2): 49-60

Meregine, H.C (2015). The Interplay of a Biology Teacher Belief Teaching Practice and Gender Based Student Teacher Classroom Interaction Educational Research, 42 (1) 100-111.

Nonlheless, R. and Nnamonu, G. (2013). Studding the Impact of the Lesson Analysis Framework on Pre-Service Teacher Ability to Reflect on Videos of Teaching Journal of Teacher Education 61 (4), 339e349

Nwagbo, J.G. (2018). An Exploratory Survey of Male and Female Leaner Opinion Secondary School Biology Education in South Africa Journal of Education 24 (2) 105-107.

Nwosu, P. and Ibe, S. (2013). Second Proceedings 2018. Omni Press, 7p Publication, Research Peer-Review> Article in proceeding.

Nzeni, S.M (2018). Technology and the Gender Gap. Journal of School Health, 68, 165-166.

Obiekwe, J. (2018). Educating Teaching to Combat Inequality. In G.K Verma (ed.), Inequality in Teacher Education: An International Perspective (pp. 6-14) was Higton DC. Falmer press.

Okoye, M. (2012). Falling at Fairness: How America’s Schools Cheat Girls. New York, NY, Charles Scribner’s Sons.

Onah, R. (2013). A Techniques for the Measurement of Attitudes Archives of Psychology, 140 1-55.

Opuh, B. (2014). The Role of Laboratory Work in School Science Educators and Students perspective www.fedyuaceec.ac/docs/cv-pdf/hassan.

Orjika, H.J (2015). School Climate: Measuring Improving and Sustaining Healthy Learning Environments (Philadelphia, PA. Falmer press).

Sarrojini, C.M (2015). Asking the Right Question About Teacher Preparation: Contributions of Research to Teach Thinking, Education Researcher, 17(2) 5-12.

Simon, M., and Collins, E. (2013). Organization Problem Solving: An Organization Improvement Stratagem (Fayheville, AK Organizational Health Diagnostic and Development corp.)

Tan, W.K. (2018). Organization Climate and Culture, a Conceptual Analysis of the School Work.

QUESTIONNAIRE

SECTION A: (PERSONAL DATA)

Name of school ----------------------

Sex ---------------------------------

Class -------------------------------

Highest Education Qualification at Hand: FSLC [ ], NCE [ ],

B.Sc [ ], ABOVE [ ]

SECTION B

In the following items please tick (V) in the appropriate columns. The keys are Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD).

Research Question One

What impact do biology practical pose on the students’ academic performance in biology?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS STATEMENT**  | **SA** | **A** | **D** | **SD** |
| 1 | Practical work stimulates learners’ interest in biology. |  |  |  |  |
| 2 | Practical biology exposes students to acquiring skills. |  |  |  |  |
| 3 | Practical work makes teaching and learning easy and faster to the students. |  |  |  |  |
| 4 | Practical work enhances students’ performance in biology. |  |  |  |  |
| 5  | Practical work promotes retention in students. |  |  |  |  |

Research Question Two

What impact do teacher’s related factors pose on students’ performance in biology practical?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS STATEMENT** | **SA** | **A** | **D** | **SD** |
| 6 | Poor teachers’ relationship affect students performance in biology practical |  |  |  |  |
| 7  | Laziness of teachers affect students performance in biology practical |  |  |  |  |
| 8 | Preparation of teachers affect students positively during practical  |  |  |  |  |
| 9  | Truancy on the part of teachers affects student performance in biology practical  |  |  |  |  |
| 10 | Lack of motivation from teacher affects student interest in biology practical |  |  |  |  |

Research Question Three

What impact do school management factors pose on the practice of biology practical towards the academic performance of students in biology?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS** | **SA** | **A** | **D** | **SD** |
| 11 | Inadequate provision of infrastructure affect the effective practical activity performance in school |  |  |  |  |
| 12  | Lack of proper supervision during practical affect students performance in biology  |  |  |  |  |
| 13 | Inadequate maintenances of laboratory affect students performance |  |  |  |  |
| 14 | Unavailability of instructional materials affects students’ performance. |  |  |  |  |
| 15 | Inadequate facilities affect students’ performance in biology practical. |  |  |  |  |