CHALLENGES OF TEACHING BIOLOGY IN SENIOR SECONDARY SCHOOLS IN EGOR LOCAL GOVERNMENT AREA, EDO STATE.

BY

Marvellous Onosetale IFIONAYI

EDU1602280

FACULTY OF EDUCATION

UNIVERSITY OF BENIN

BENIN CITY, EDO STATE

JANUARY 2020

CHALLENGES OF TEACHING BIOLOGY IN SENIOR SECONDARY SCHOOLS IN EGOR LOCAL GOVERNMENT AREA, EDO STATE.

BY

Marvellous Onosetale IFIONAYI

EDU1602280

A PROJECT WORK SUBMITTED TO THE DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY, FACULTY OF EDUCATION, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE EDUCATION B.Sc. (Ed) BIOLOGY, UNIVERSITY OF BENIN, BENIN CITY, NIGERIA.

JANUARY 2020

CERTIFICATION

We, the undersigned, certify that this research work was carried out by Marvellous Onosetale IFIONAYI in the Department of Curriculum and Instructional Technology, Faculty of Education, University of Benin, Benin City.

---------- ----------

Mrs. F. N. Ofuani Mrs. F. N. Ofuani

Project Supervisor Project Coordinator

---------- ----------

Date Date

Prof. E. O. S. IYAMU

Dean, Faculty of Education

DateTABLE OF CONTENTS

DEDICATION

This work is dedicated to God Almighty whose grace and mercy has brought me thus far from the beginning of this project through to the end.

ACKNOWLEDGEMENTS

My sincere gratitude and heartfelt thanks goes to my supervisor Dr. Mrs. F. N. Ofuani whose constructive comments, instructions and cooperation assisted me much in the completion of this study. May God Almighty bless, keep and reward her immensely Amen. My profound gratitude also goes to my Head of Department Dr. J. Egharevba, my course adviser, Mrs, Uyi-Osarentin, and to all my lecturers who taught and guided me in my academic pursuit in the University of Benin. I would also love to show appreciation to the principals, teachers and students of all the schools used in the course of this study for their cooperation, without which this work would not have been completed.

My heartfelt gratitude goes to my parents, Ven. Dr. D. O. S. (JP) & Mrs. C. E. Ifionayi, for their endless words of encouragement, moral and financial support, and prayers, my grandmother Mrs. O. Edeawe, my sister, Miss Bridget Ebhodaghe, my aunt and her husband Mr. & Mrs. E. Aigbe, my uncles, Mr. Osazee Iyalekhue, Dr. Pendo Opatewa for their support may the Almighty God continually bless you all amen.

I want to also use this medium to thank the Chaplain of the All Saints Chapel University of Benin Ven. & Dr. Mrs. D. O. Egbenusi for the assistance, the encouragement, morally and otherwise I pray that the Lord Almighty would prosper you in all things.

I would not fail to thank my roomates, Opeyemi, Favour, Taiye, Augusta, as well as my friends, Boluwatife, Confidence, Easy, Chinyere, Joy, Obinna, Hillary, Chinenye, IK, Ortez, Daisy, Glory, Ofure, and Frank and to all my course mates who in one way or another supported me and lent a helping hand to see to the completion of this work may God Almighty bless you all immensely Amen.

Finally I would like to thank the entire members of the All Saint Youth Fellowship, University of Benin for their moral, spiritual support and motivation I oray that the Almighty God will continue to reward you all amen.

TABLE OF CONTENT

ABSTRACT

This study was designed to analyze the challenges of teaching Biology in senior secondary schools in Egor Local Government Area of Edo State. This study was guided by four research questions.

The design adopted for this study is the descriptive survey research design. The population of the study consisted of all Secondary Schools in Egor Local Government Area. The research instrument used for this research is the questionnaire. The validity of the instrument was done by the supervisor. The data was analyzed with the use of simple percentages and mean.

The findings revealed that the lack of instructional materials and a non-conducive environment are some challenges of teaching Biology in senior secondary schools. It is recommended that the government and all stakeholders in the Ministry of Education should make provision for instructional materials to be available in every public secondary school and that the teachers should also endeavor to incorporate the use of instructional materials in their lesson periods.

LIST OF TABLES

CHAPTER ONE

INTRODUCTION

Background of the Study

Science has been and would continue to be of tremendous importance because of its ability to explain many natural occurrences and the central role it plays in the world's current technology development.it is known as a universal subject that spans the branch of knowledge which examines the structure and behavior of the physical and natural world through observation and experimentation. At the senior secondary level in Nigeria, science is departmentalized into Biology, Chemistry and Physics. Biology, which is the study of different life forms, their evolution, structure, functions, growth and taxonomy, occupies a unique position in the secondary school science curriculum and serves as a pre-requisite to the study of other professional courses in the higher school, such as medicine, nursing, pharmacology and biochemistry (Oyediji, 2010, cited in Usen, 2016)

Biology, which is a core science subject, was introduced into the Nigerian school curriculum as part of the instruments for achieving national development (National Policy on Education, (FGN, 2013). This was what informed its designation as part of the core curriculum at different levels of education in Nigeria. According to the National Policy on Education (FGN, 2013), the Biology curriculum, as a teaching syllabus, has four main objectives. These objectives include: "adequate laboratory and field skills in Biology", "meaningful and relevant knowledge", "ability to apply scientific knowledge to everyday life on matters of personal" and "community health and agriculture and reasonable and functional scientific attitudes".

In accordance with the above stated objectives, the content and context of the syllabus place emphasis on field studies, guided discovery and conceptual studies and hence laying emphasis on practical approach on the teaching of Biology. The study of Biology involves both practical and theoretical work. According to Ndioho (2007), the practical aspect of Biology involves any learning experience which engages the students in activities such as observing, counting, experimenting, recording, and carrying out field work. These activities are opposed to the theoretical work which involves listening to talk and taking down notes from such talks. Practical work is an aspect of great importance in the teaching and learning of Biology and yet one of the commonest errors observed in secondary

schools is the teacher's omission of some practical work activities in the teaching process. This could be attributed as one of the challenges encountered in the teaching of Biology.

The Nigeria educational system, as it is evolving, is faced with a high rate of inadequate teaching resources in secondary schools, due to poor planning and corruption. This notwithstanding, teachers have always been blamed for student's poor performance in Biology, but should not be allowed to bear the whole blame alone; rather, it should be looked at as a problem that has many contributing factors among which are teaching/learning resources, students and government factors and others. Biology teaching is a complex activity which cannot be accomplished without the use of teaching resources since it teaches an individual the basic principles of doing things through observation and experimentation. In recognition of this, Wilkings (2013) opined that effective teaching and learning of Biology cannot take place without essential resources such as teaching aids, laboratory resources, etc.

According to Ihejiamaizu and Ochui (2016), Biology teaching cannot be complete without including some practical work. The practical work according to the author ought to be carried out individually either in the laboratory or classroom with appropriate, efficient and effective application of the teaching resources. Yadar, (2007) further noted that with effective use of learning resources, the students will not only acquire skills and attitude, but will also demonstrate thorough understanding of Biological concepts and provide practical solutions to real life problems.

According to Nwagbo (2008), the use of practical activities in teaching Biology should be a rule rather than an option for teachers if the students are to acquire the necessary knowledge, skills and competencies needed to live functionally in the society. Due to several contrasting factors ranging from facilities to teacher factor, the required practical experiences are not usually possible in most secondary schools (Egbunonu and Okeke 2005). This is likely resulting from the challenges facing the teaching of Biology in secondary schools in the nation.

Generally, various factors have been identified as posing challenges to the teaching of Biology in secondary schools include lack of well-equipped Biology laboratories; poor students' attitude to Biology as a subject; non-conducive classroom environment; overloaded Biology curriculum, teachers' lack of knowledge of subject matter, inadequate motivation and the low status of the teaching profession (Braimoh and Okadeyi, 2001; Olaleye, 2002). With this in

view, this study therefore aims at examine the challenges that face the teaching of Biology in secondary schools in Edo State, Nigeria.

Statement of the Problem

The teaching of Biology over the years has faced various problems ranging from the use of poor instructional approach, relying on textbooks information and teacher's-class verbalization due to the general poor attitude towards innovation.

Presently, close observation has revealed that Biology students' interest and academic achievement in secondary schools in Edo state is declining. Where students consistently perform poorly, the belief is that effective teaching has not taken place in the schools. This is as a result of the use of poor instructional approach, relying on information solely from the textbook. Biology is seen as one of the most important science subject as it deals with life and living things in addition, a sound knowledge in biology will help prepare the student for courses such as Medicine, Optometry and Nursing etc. Students attitudes associated with biology appear to affect the student's performance in the subject. Also, many biology teachers teach the subject without the use of instructional materials and good facilities (Mberengwa 2004). The standard of teachers, classroom and laboratory facilities are grossly inadequate and obsolete. However, there are factors that enhance effective teaching and where these factors are lacking there can be no effective teaching which will result in poor performance amongst the students.

The menace of ineffectiveness on the part of Biology teachers, which has virtually resulted in the poor academic performance of students in secondary schools, has become a public outcry that has drawn attention from far and wide. Various studies by Moyer, Hackett and Everett (2007), Fensham (2008), Bennett (2003) and Borich (2004) have been conducted to ascertain the cause of such problem. This note that this study seeks to examine the challenges of teaching biology in secondary schools in Egor Local Government Area of Edo State.

Purpose of the Study

The main purpose of this study is to examine the challenges of teaching Biology in senior secondary schools in Edo State, Nigeria. Specifically, this study sought to:

i) Find out the extent to which lack of well-equipped Biology laboratories constitute problems to the teaching of biology in secondary schools in Egor Local Government Area.

ii) Assess the extent to which teacher's lack of knowledge of subject matter constitute problems to the teaching of biology in secondary schools in Egor Local Government Area.
iii) Find out the extent to which lack of instructional materials constitute problems to the teaching of biology in secondary schools in Egor Local Government Area.
iv) Examine the extent to which non-conducive classroom environment poses problems to the teaching of biology in secondary schools in Egor Local Government Area.

Research Questions

The following research questions were formulated to guide the study:

i) Does lack of well-equipped Biology laboratories constitute problems to the teaching of biology in secondary schools in Egor Local Government Area?
ii) Does lack of instructional materials constitute problems to the teaching of biology in secondary schools in Egor Local Government Area?
iii) Does teacher's non-use of instructional material constitute problems to the teaching of biology in secondary schools in Egor Local Government Area?
iv) Does non-conducive classroom environment pose as a problem to the teaching of biology in secondary schools in Egor Local Government Area?

Significance of the Study

The findings of the study will be important to different persons in different ways. It will provide the government and Ministry of Education with the necessary information that will enable them to provide the basic facilities that are lacking in secondary schools in Edo state so as to enhance effective teaching of Biology in the schools. This provision will also increase the effectiveness of the teachers and the academic performance of the students.

Findings of the study will help the teachers to overcome the challenges that make them ineffective in the discharge of their duties as the study will proffer recommendations that will help in making the teachers in effective in the teaching of Biology.

To the students, the study will help in increasing and enhancing their academic performance because when the teachers are effective in the teaching of Biology, the students will learn and perform better in Biology.

Findings of the study will also serve as a reference material for future researchers who will conduct relevant study relating to the present study.

Scope/Delimitation of the Study

This study investigated the challenges of teaching Biology in secondary schools in Edo state. However, the study was restricted public secondary schools in Egor Local Government Area and only Senior Secondary two (SS2) students were used for the study.

Definition of Terms

The following terms are defined as they were used in the study.

i. **Biology:** This is the natural science that involves the study of life and living organism, including their physical structure, function and other development.
ii. **Challenges:** Difficulties faced
iii. **Laboratory Facilities:** These are apparatus and equipment kept in the laboratory that can be used for the teaching of Biology at any given time.
iv. **Teaching:** This is an act of analysing, developing, creating and demonstrating understanding by a teacher or well experienced person so as to impart knowledge on a learner or less experienced person.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviews related literature concerning the challenges of teaching biology in senior secondary schools. As a result of the relevance of biology in our country and the world at large today. It is expected that the students are given good foundation in the subject area. Amongst the numerous challenges affecting the effectiveness of teaching biology, the researcher reviewed some of the related literature on the issues under the following subheadings:

- Concept of biology
- Importance of Biology
- Attitudes of students towards biology
- Teachers lack of knowledge of subject matter
- Lack of instructional materials
- Non-conducive classrooms
- Summary of Reviewed literature

Concept of Biology

The term biology is derived from the Greek root word 'bios' meaning life and 'logos' meaning study of or knowledge of. Therefore bringing these two words together it means the study of life. In other words, it's defined as the study of plant and animals.

Miller and Levine (2012) state that biology in addition deals with the structure, functions, growth, origin, evolutions, distributions, interrelationships, problems such as diseases, adaptation of things and proposes solutions where possible. However, biology is a branch of science that deals with life using inquiry and discovery methods.

Biology as a science of life provides potentials for the use of many inquiry

methods. Inquiry process involves asking questions that prompts students to think critically which enables students to develop a scientific knowledge and scientific habit such as curiosity, creativity, open mindedness etc. which are needed for understanding biological concepts. The curiosity of man to know more about the existence of things around them especially those that have life in them has driven him to study biology.

Biology has become a critical factor in the economic and social development of any country, that life without it can no longer be contemplated. The knowledge of Biology helps in checking environmental degradation such as desertification erosion, water hyacinth, land, and air and water pollution. Sub-disciplines of biology are defined by the scale at which organisms are studied and the methods used in studying them. For example, molecular biology studies the complex interactions among biological molecules, biochemistry examines the rudimentary chemistry of life, Botany is the study of the biology of plants, ecology examines how organisms interact in their environment, zoology is the study of animals, entomology is the study of insects, and parasitology is the study of micro-organisms.

The main objectives of biology education are to prepare the students to acquire adequate laboratory and field skills in biology, meaningful and relevant knowledge in biology, ability to apply scientific knowledge to everyday life in matter of personal and community health and agriculture and lastly reasonable and functional scientific attitudes (Federal Ministry of Education 2004). Practical biology is the scientific study of life and structure of plant and animals and their relative environment in real or experimental set-up rather than dwelling in the theory and ideas (Opuh, Eze & Eze Magu 2008).

The knowledge of the content of biology will go a long way in making living worthwhile. Biology as a science subject is not taught in isolation of other subjects and it is more or less transfer of science knowledge to other disciplines of learning.

Importance of Biology

Biology as we already know, is the science that deals with the study of life or living things. Those who study biology are referred to as biologists. There are various organisms in existence so getting to know more about them will go a long

way to make living worthwhile. Having seen the wide content or scope of biology, one then begins to wonder if one could actually study all these areas.

The importance of studying biology cannot be overemphasized as far as life and living is concerned in the sense that:

1. The production of better and improved varieties of plants, food crops and animals, fish farming, aquaculture, introduction of better farming methods and styles are all evidence of the knowledge of biology (Okenyi, 2012)

2. Quite a number of vocations requires the knowledge of Biology; some non-biological vocations like psychology, textile industries, criminology requires a knowledge of biology in their operations. In vocations such as medicine, pharmacy, nursing, physiology, anatomy, agriculture, biology is indispensable (Okenyi, 2012)

3. Production of drugs, antibiotics, vaccines, vitamins, hormones such as insulin, enzymes etc. in the medical field (body) prevention and cure of diseases in nature, improvement of health standard generally are made possible by the knowledge of biology (Okenyi, 2012)

4. In most industries, micro-organisms and enzymes which are organic catalysts speed up chemical reactions in living organisms , have been used in industrial processes for the manufacture of products such as yoghurt, cheese, bread, beverages etc (Okenyi, 2012).

The knowledge of biology is also indispensable in the processing, preservation and storage of food. Enzymes are used for tendering meat, softening vegetables, to improve flavour and texture of various foods. It also helps to stimulate the individual's interest in biologically based hobbies such as collecting insects, growing flowers etc. thereby encouraging leisure activities for individual enjoyment and appreciation of nature.

The study of Biology also prepares the individuals for future employment opportunities in areas such as medicine, pharmacy, agriculture, forestry, food industries, and fisheries.

From the above, we can say that biology is a vital aspect of modern life.

Every sector of the modern life has been improved upon one way or another by the contributions of great biologists.

Attitude of Students Towards Biology

Students play a vital role in the school curriculum because without the students, there will be no teaching. A student's intelligence may be a basic tool for learning but the real determinant of his achievement is his attitude; thus Biology topics when simplified during teaching are usually fascinating and interesting. But this is only possible when the students' show positive attitude towards such activity. Thus even with adequate facilities and effective teaching, achievement of a student will be poor as they have not developed a right attitude towards the subject. Attitude as defined by the Cambridge dictionary (2008) is a feeling or opinion about something, someone or way of behaving that is caused by this, that is the students' attitude and interest goes hand in hand. This is to say that if a student shows interest in a particular subject, he will show positive attitude towards the subject. Students contribute to the cause of their poor performance in Biology. It has been observed that science is boring for many students; difficult, not relevant to the people's lives, more attractive to boys and less interesting to older students (Delpech 2002). A lot of variables have contributed to the change and modification in attitudes of secondary school. Since there are inadequate or lack of basic amenities in the rural areas, teachers find it difficult to go there to teach and those who are there by compulsory or without alternative posting do so with mixed feelings, and as a result the quality of rural children education is adversely affected. It is established that poor teaching produces poorly educated children. The spatter distribution of amenities and infrastructure in those rural areas develop negative attitude towards teaching (NTI 2003). Majority of the students had little exposure to science at the primary levels. Some are influenced by superstitious beliefs common to their different cultures. This may lead to misconceptions about scientific issues.

The attitude of students' to science particularly biology, has highly contributed to their poor academic performance. Most students' poor performance is due to their careless reading, poor techniques of answering questions and poor terminology, wrong use of time. Students tend to display some negative attitudes some of which includes; being inattentive during a lesson, absenteeism, truancy

during classes, bad study habits and incomplete assignments. These negative attitudes, have had great effects in the performance of the students, because the amount of content matter a student comprehends is greatly affected by how much attention paid in the process of teaching; students who attend classes and pay attention to lessons are more likely to perform better in a test or exam. Looking at the study habits, Hassan (2004) asserted that students lack of connection during lessons, lack of communication, high rate of truancy, inability to study well, neglect of assignment and pleasure seeking attitudes contributes significantly to students' poor achievement.

Abdullahi and Aninyei (1983) showed that the students run away from science subject; mainly because of its wide curriculum syllabus. It can be said that the effect of success and failure, or poor academic achievement of students' is dependent on the personality of the student. Mc Bee and Luke (1996); Broodie (2001); Finger and Schlesser (2002) and Williams (2004) find significant relationships between attitude to subject and the achievement in that subject. Attitudes are related to academic performance when measured on promotion grades (Dulton, 2004). Developing positive attitude towards Biology enhances the learning of scientific information and science process skills. Some reasons why students develop more negative attitudes includes:

i. Low achievement with school work

ii. More emphasis on specific science facts

iii. More emphasis on test results

iv. Not much opportunity for students to enjoy science (Yager 1996)

When students succeeds in areas such as problem solving produces stronger faith in one's ability and leads to a more positive self-concept which in turn leads to higher levels of achievement. There is now a good deal of research evidence to suggest that the more time and efforts students invest in the learning process and the more intensely they engage in their own education, the greater will be their growth and achievement, their satisfaction with their educational experiences and their persistence in school, and the more likely they are to continue their learning (Aremu & Sokan, 2003)

Lack of Instructional Materials and Availability of Effective Laboratory Facilities

Laboratory facilities are the material resources that facilitate effective teaching and learning in school laboratories (Jaiyeoba and Atanda 2005, Timilehin; 2010) posited that laboratory facilities are those things which enable a skillful science teacher to achieve a level of instructional effectiveness that far exceeds what is possible when they are not provided. The study of biology can be successful through practicals which are conducted in well-equipped laboratories.

The need to emphasize on the use and importance of instructional materials in any learning environment cannot be underestimated as students accessibility to practical afford greater recall of information learnt and better understanding of the under living concepts and principles involved. According to Shaibu and Mari (2000), laboratory activities stimulate the acquisition of both manipulative and cognitive skills by learners. Oyetunde (2008) in his work stated that the problem of lack of school facilities or inadequate school facilities is affecting all state secondary schools in the nation. One of the reasons why students find it difficult to comprehend what they are being taught by the teachers immediately is due to the non-availability of instructional materials that can easily convey the message of the lesson to the students. Lack of adequate facilities such as text books, workshops, practical guide, chemicals, electrical facilities, ill equipped classrooms, laboratories and libraries are among the probable causes of students' poor performance in examination. Despite the fact that practical work is a unique source of teaching science, it is widely acknowledged that laboratory equipment are lacking in most schools (Omosewo 2010). She also concluded from her studies that practical work was difficult to organize as a result of lack of apparatus.

These shortages of laboratory facilities could have serious implication on the quality of schools output as it results to failure in biology skills because their teachers were unable to conduct practical as they would like to. Biology is an activity-based and students centered course and as such it cannot be taught effectively without the use of equipment (Nwagbo 2008). She further stated that lack of equipment has provided excuses for biology teachers who intentionally neglect the practical aspect which is of greater potential for the development of critical thinking and objective reasoning ability in students. They resort to

expository method of teaching which is known for promoting rote learning (memorization technique based on repetition) and hindering transfer of learning. Laboratory facilities are materials that facilitate effective teaching and learning and also promote students' performance. It can therefore be said that a student needs to be guided properly by the teacher by way of employing various methods and means through which his teaching could be meaningful and effective. This also goes to show that without a well-equipped laboratory learning has not fully taken place and as such makes practical a vital part of biology teaching.

Teachers' Lack of Knowledge of Subject Matter

Teaching is a profession, and all who desire to belong to the profession should be well grounded in the art of teaching, they need to be conversant with the philosophy guiding the educational enterprise, they need to have mastery of the subjects in which they specialized, or for which they are trained. A teacher is expected to plan his lesson(s) ahead of class time; it is during the planning stage that he will take care of the type of behaviors relevant to his teaching task, in view of his instructional objectives.

The preparation of quality biology teachers must include a solid foundation in biology content. Prescribed courses of study should provide breadth of the basic concepts and principles on which the discipline of biology is built, but must also concentrate on the depth of knowledge available for the teachers in the subject-matter field. The need for the teacher trainees' emphasis on adequate grasp of subject matter knowledge by the teacher trainee involves an in-depth and adequate knowledge of the teaching subjects both major and minor. According to Conant (2003), the subject matter knowledge level of a teacher on topics has a direct bearing on the students' understanding of subject matter.

Ingersoll (2003) finds that when teachers are prepared according to six key elements, attrition of first year teachers is cut in half. The rates of beginning teacher attrition are almost half the level found in beginning teachers who have not had this kind of preparation. Ingersoll's findings strengthen an earlier study by Shen. Shen (2003) examined attrition rates among 1,702 teachers who had graduated from college within five years, and found that 34 percent of the sample had left teaching. In addition, reinforcing both Ingersoll and Shen's findings, Boe,

Bobbitt, Cook, Whitener & Weber in Jadama (2014) analyzed data from the Schools and Staffing Survey and found that teachers with full certification (including preparation in content and pedagogy) were less likely to leave teaching than those who were only partially certified and concluded that lack of adequate preparation and lack of knowledge of subject matter is a threat to the profession of teaching in schools.

Goldhaber (2006) analyzed ten years of student test scores linked to individual classrooms and teachers. He examined over 700,000 student records in grades 4–6 and the licensing records for almost 24,000 teachers. Goldhaber found that teacher education makes a difference. He concludes that "students of teachers who graduate from a North Carolina-approved training program outperform those whose teachers do not" i.e., those who get a degree from an alternative state program or a program from outside the state (Goldhaber, 2006). The effect is significant. The researcher further revealed that the knowledge of the teacher as regards the subject matter enhances effectiveness and that lack of such knowledge poses a challenge to the teaching of Biology.

In sum, the significance of subject matter knowledge is underscored by the 2008 Ofsted report, which acknowledges the diverse backgrounds and qualifications of primary school teachers, and suggests that expert subject leaders be given access and schools do the following:

- Try to provide access to an expert subject leader or the resources to nurture one for each subject
- review their policies on the role of a subject leader so that these are comprehensive and include the role of training other staff
- within the context of the school development plan, develop teachers' subject knowledge, taking account of the demands of different subjects identified in this and Ofsted's subject reports
- seek links with neighboring schools to share good practice and capitalize on local expertise
- take advantage of subject-specific opportunities for continuing professional development

Therefore, lack of subject matter knowledge is a very serious challenge to the teaching of Biology in secondary schools. Moreover, a teacher who is largely ignorant or uninformed about a subject matter can pass inaccurate ideas to students, use texts uncritically and even change them unsuitably (Jadama, 2014). A teacher will find it extremely difficult to answer varied questions from students about a subject matter if the teacher has little knowledge about it.

Non-Conducive Classroom Environment

Education in its broadcast serve act that has formative effect on the mind, character or physical ability of an individual. It plays an important role in the life of an individual since it provides him with the necessities for living and relating with others. Hence the education process must be effective. The success and effectiveness of education lies within many factors. To properly put in effect the said process, one primary factor to consider is an environment for conducive learning. An environment is the natural surroundings of an organism and it can be land, air or water (Asogwa, 2008). Environment is of three parts namely: physical, social and abstract. Physical environment is objects or materials found in the home, school or community. Research within a variety of fields shows that the balance of students' perceptions in different classroom settings can affect their academic achievements and interaction (LaRocque, 2008; Veltri et al. , 2006). Educators, psychologists and architects and designers stress that the classroom environment has a power to facilitate and enhance the learning process. Kopec (2006) stated that "researchers confirm that the design of physical environments will affect children's perception, learning and behaviours. As expert who found that early development of motivation, cognition, and social skills can be supported by the design of children's play spaces"(Kopec, 2006). Allen and Hessick (2011) referred to the physical environment in the classroom as the 'silent curriculum', an essential factor leading to the optimal education and learning experience. Students are influenced by their classroom environment even if they do not understand the implication of the environmental settings on learning. The physical environments includes

1. Spatial environment
2. Visual environment
3. Acoustic environment
4. Thermal environment

Spatial environment

The spatial formation of the classroom is important; linking the spatial environment factors with the quality of learning and outcomes is crucial and much literature discusses this in depth (Newton et al. , 2009).

Visual Environment

The psychological studies show that there are positive relationships between the visual elements and the students' behaviour, which improves the quality of the teaching and learning environment (Lippman, 2010).

Acoustic Environment

Acoustic quality in a classroom improves the ability of students' learning. The teacher's voice, for example, has to be audible to all students in the classroom (Klatte et al. , 2010b). External noises that affect the classroom like airplanes and road traffic must also be kept to a minimum (Bronzaft and McCarthy, 1975). Internal noises like students' movements and voices are also a significant concern for the designer (Promethean Education Strategy Group, 2014). Research shows that the reading achievement grades for schools that are located in quiet areas were considerable higher than achieved by students in noisy schools (Earthman, 2002a).

Thermal environment

The thermal quality has an impact on learning; the temperature in learning spaces affects students' behaviour and achievement (Harmon, 1953). Each student has different expectations of an ideal thermal environment. High temperatures as well as low ones in classrooms candecrease students' achievement of class tasks (Shield and Dockrell, 2004). The ideal temperature depends on the climate condition in each country, and student's preferences which also vary; therefore, students and teachers need to be able to control the classroom temperature during class time (Teli et al. , 2012). The social environment is the social life, societies, clubs among others. The social learning environment is a crucial element within learning theory which cannot be classified as an separate factor within learning philosophy (Mercer, 2000). It is a major topic of interest within the concept of describing the learning environment. Casper and Barnett (2001), identify it as the physical surroundings, social relationships, psychological aspects and cultural backgrounds which affect students' function, interaction and performance. However, Jordan et al. (2008) emphasise that the social environment is classified as a personal process that includes multiple factors such as social setting and relationships with their colleagues. Martin et al. (2006) emphasise that the function of the spaces is important, and they consider the social rules and settings for each group of the society to enhance the user's ability to perform, behaviour and attitudes. Understanding the social dynamics of space in the early stages of building design is an important element for learning, which transforms the quality of teaching and learning environment (Wannarka and Ruhl, 2008). The relationships between the social environment and physical environment in learning spaces are significant and

have been discussed widely in the literature (Martin et al. , 2006)The sociological theory about classroom activity was developed by Hirschy and Wilson (2002), which indicates that knowledge is socially constructed, since students are part of the community and their environment. This allows their experience to be dissected, evaluated and reflected upon. Wolff (2003) also suggested that the students' sense of security and confidence in the learning environment increases if they are allowed to personalise their environment, which gives students a sense of ownership. Numerous studies show that the relationships between social environmental and other educational factors are crucial, and could create a positive influence on health, activity, behaviour and productivity. These influences are vital for providing positive learning environments for educational quality (Lee and Cho, 2013; McNeill et al. , 2006). While abstract environment is the reactions, feedbacks responses received on interaction with others.

According to Teachernet (2008) the environment in which teaching and learning take place can greatly affect the teachers level of effectiveness and the can greatly influence the academic performance and well-being of the students. According to them, the architectural layout and facilities of the school play a vital role in shaping the learning environment. A lesser number of student in a class influences the conduciveness of the environment. With a limited number of student in class, the teacher can easily facilitate access and evaluate student academic performance. There will be an increase in the level of concentration amongst the student. Class size refers to educational tools that can be used to describe the average number of students per class in a school. Class size is an important factor with respect to teaching, learning and academic performance of students. There is a consensus among researcher educational scholars that students achievement decreases as class size increase.

In a study conducted by Burcher in Ibrahim, (2013) on the effect of environment on teaching and learning, the findings of the study showed that teachers in schools with good and comfortable environment performed better in teaching than those in schools without good and comfortable environment. The researcher further stressed that teachers and student in such classroom with controlled temperature did better than those in the uncontrolled ones.

The influence of class size has a great impact on the teaching-learning process. The smaller the class size, the easier it is for the teacher-learner interaction thus improving the teaching-learning process since the teacher will be able to give

the learner individual attention. Large class size impacts negatively on the teaching-learning process since the teacher is not even able to move freely to assess the students work as they do their exercises.

Wabuoba (2011) quoted in Chuma (2012) observed that overcrowding in classroom environment make it difficult for pupils to write the teacher is also unable to move around the class to assist needy pupils and this affects the teaching-learning process. Crowded classroom conditions not only make it difficult for learners to concentrate but inevitably limit the amount of time teachers can spend on innovative teaching methods such as cooperative learning and group work. Smaller class size allows educators to focus more on the pupils in their teaching coming to better understanding and adjust their methods to diverse individual needs. Large class size makes monitoring of pupils attendance very difficult thus encouraging pupils absenteeism, and the quality of feedback to pupils become very low thus making the teaching learning process ineffective (Bascia, 2003). The small class size allows for individualized attention and this strengthens the cordial relationship between the teachers and learners. Fafunwa (2010) postulated that there is a gap in the quality of students in crowded classrooms, using inadequate and obsolete equipment, disillusioned teachers. These combined deficiencies perhaps are the cause for the poor performance of students. Egede (2005) pointed out that an alarming class size of 100 or more students in the secondary schools leave the teacher overworked and therefore unable to exercise patience and positive attitude. They are also reluctant to offer extra time to help the intellectually ill students.

Summary of Reviewed Literature

In the summary of review, various authors and researchers are reviewed in this chapter indicating the " challenges of teaching biology in senior secondary schools " such as qualifications of teachers, the teachers lack of knowledge of

subject matter, the attitude of students toward biology, lack of instructional materials as well as ineffective and unequipped laboratories and non-conducive classrooms. Each of these factors are challenges faced in senior secondary schools in the State and country at large.

However it is important to note the importance of Biology, as it has a major role to play in the environment and also while choosing a career. It is therefore the sole responsibility of the school authority to provide the teachers with adequate materials to enable easy comprehension of this subject (Biology), as well as. It was established in the literature review that, with these in factors in place, teaching becomes interesting and easier much more for the students who are at the receiving end (learners) as it helps boost their intellectual abilities and helps them to become skilled in biological fields. The teachers also should endeavor to upgrade their knowledge as there new findings everyday regarding Biology.

DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY (CIT), FACULTY OF EDUCATION, UNIVERSITY OF BENIN, BENIN CITY.

QUESTIONNAIRE ON THE CHALLENGES OF TEACHING BIOLOGY IN SENIOR SECONDARY SCHOOLS IN EGOR LOCAL GOVERNMENT AREA OF EDO STATE.

Dear respondent

The researcher is an undergraduate student of the above named university, who is conducting a research on the challenges of teaching biology in senior secondary schools. The researcher is soliciting for your maximum cooperation as the research is purely an academic exercise, and any information given by you will be treated confidentially and will only be used for the purpose of this study.

Yours faithfully

Ifionayi Marvellous Onosetale

SECTION A: Respondents personal data

Please tick ( ) in the space provided appropriately.

Sex: Male ( ); Female ( )

School: _____

Age: 13 – 15 ( ) 16 – 18 ( ) 18 and above ( )

SECTION B:

INSTRUCTION: Please tick ( ) in the option that best represents your opinion on the items provided.

S/N	ITEMS	A	SA	D	SD
	Are there adequate laboratory facilities in the senior secondary school?				
1	There are no laboratory facilities in my school				
2	There are enough laboratory facilities/apparatus in the school which aid teaching of biology				
3	The teachers often take us to the lab to conduct experiment where necessary				
4	The availability and use of laboratory equipment affects students' academic performance				
5	The use of laboratory equipment helps the student have better understanding of what is being taught				
	To what extent are instructional materials made available to biology teachers in senior secondary schools?				
6	Instructional materials are used during all biology lessons by my teacher				
7	The use of instructional materials / teaching aid enables me to recall faster during exams				
8	My biology teacher uses different instructional during the course of the lesson				
9	My school has a good supply of instructional materials that my teacher can use				
10	My teachers knows how to use the different instructional materials available				
	Does teacher's non-use of instructional material constitute problems to the teaching of biology in				

	secondary schools in Egor local government area?				
11	My school has a well-equipped laboratory that makes us see the practical aspects of topics / lessons taught				
12	There is a laboratory attendant in my school that assists the students with practical needs				
13	Teachers who use instructional materials are more effective than those who use verbal communication				
14	Availability of instructional materials makes comprehension easy				
15	Instructional materials are readily available for use by the teacher				
	How does a non-conducive class-room environment pose as a challenge to the teaching of biology in senior secondary schools?				
16	There is low participation of students in classrooms due to overpopulation				
17	My classroom is spacious so the teacher can move around easily				
18	Securing students attention while teaching is difficult in a large class				
19	Reduced class size enhances better understanding				
20	In my classroom all students are properly seated				

CHAPTER THREE

RESEARCH AND METHODOLOGY

This chapter describes the research procedure and methods; the researcher employed to obtain data needed for the study. It consists of the following:

- Research design
- Population of the study
- Sample and sampling techniques
- Research instrument
- Validity of instrument
- Reliability of instrument
- Administration of instrument
- Method of data analysis

Research Design

The researcher adopted a descriptive survey design as a means that seeks to ascertain respondent perspectives or experiences on a specified subject in a predetermined structured manner. This study surveys the challenges of teaching Biology in Senior Secondary schools in Egor Local Government Area of Edo State.

Population of the Study

The population for the study consisted of SS2 students in senior secondary schools in Egor local Government Area. There are 5,574 Senior Secondary School students in Egor Local Government Area. (Ministry of Education Source 2018)

Sample and Sampling Technique

The researcher employed the simple random sampling technique in

selecting the respondents for the study. The respondents comprised of SS2 students from the randomly selected schools in the study area. A total of 100 students from four schools were sampled for the study.

Research Instrument

The research instrument used in collecting data from the respondent is the questionnaire. The questionnaire was administered to the students.

The questionnaire consists of two sections (Sections A and B). Ssection A contains the demographic data of the respondent such as the name, name of the school, sex, age etc. while Section B consists of 20 items, which the researcher used to determine the challenges of teaching Biology in senior secondary schools, which the respondents were expected to respond by choosing from the options either: Strongly agree (SA), Agree (A), Strongly Disagree (SD) and Disagree (D) according to the extent of which the statement appealed to them.

Validity of Instrument

The instrument was designed by the researcher and will be subjected to careful scrutiny by the project supervisor to ensure that it measures what it is supposed to measure.

Reliability of Instrument

To ensure the reliability of the instrument, the questionnaire was administered to a group of 30 students who were not part of the main study. After administration, the responses obtained was subjected to Cronbach Alpha and a reliabilty coefficient of 0.85 was obtained.

Administration of the Instrument

The questionnaire was administered personally by the researcher to the respondents that were randomly selected from sample schools. The respondents were assured of confidentiality and were urged them to answer the questions honestly to the best of their knowledge.

Instructions were given to the respondent on how to fill the questionnaire and the questionnaire was collected on the same day to avoid incident of loss.

Method of Data Analysis

The descriptive statistics of mean and simple percentage which were employed to analyze field data from questionnaires to assist interpretation.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION OF RESULTS

The purpose of this chapter is to analyze data collected and to discuss the result of the findings. It deals with the presentation of results. Data collected was analysed using simple percentage.

The results of the findings are discussed below:

SECTION A: PRESENTATION OF RESULTS.

RESEARCH QUESTION ONE: Does lack of well-equipped Biology laboratories constitute the problems to the teaching of Biology in Secondary Schools?

TABLE 1: Availability of Biology Laboratories in the Senior Secondary School

S/N	ITEMS	% SA	% A	% D	% SD	MEAN	DECISION
1	There are no laboratory facilities in my school	21.8%	16.8%	23.8%	35.6%	2.25	Disagreed
2	There are enough laboratory facilities/apparatus in the school which aid teaching of biology	23.8%	27.7%	20.8%	24.8%	2.52	Agree
3	The teachers often take us to the laboratory to conduct experiment where necessary	16.8%	29.7%	24.8%	27.7%	2.36	Disagree
4	The availability and use of	31.7%	26.7%	20.8%	17.8%	2.74	Agree

	laboratory equipment affect students' academic performance						
5	The use of laboratory equipment helps the student have better understanding of what is being taught	58.4%	27.7%	5.9%	6.9%	3.39	Agree
	Aggregate mean score					2.65	Agree

CUT OFF MEAN: 2.50

Table 1 shows that the respondents disagreed that there are no laboratory facilities in their school with a mean score of 2.25. Item 2 shows that the respondents agreed that there are enough laboratory facilities/apparatus in their school which aid teaching of biology with a mean score of 2.52. Item 3 shows that the respondents disagreed that the teachers often take them to the lab to conduct experiment where necessary with a mean score of 2.36. Item 4 states that the respondents agreed that the availability and use of laboratory equipment affects students' academic performance with a mean score of 2.74. Item 5 shows that the respondents agreed that the use of laboratory equipment helps the student have better understanding of what is being taught with a mean score of 3.39.

RESEARCH QUESTION 2: To what extent are instructional materials made available to biology teachers in senior secondary

TABLE 2: Availability of Instructional Materials to Biology Teachers in Senior Secondary School

S/N	ITEMS	% SA	% A	% D	% SD	MEAN	DECISION

1	Instructional materials are used during all biology lessons by my teacher	12.9%	23.8%	30.7%	29.7%	2.20	Disagree
2	The use of instructional materials/ teaching aid enable me to recall faster during exams	34.7%	45.5%	12.9%	5.0%	3.12	Agree
3	My biology teacher uses different instructional materials during the course of the lesson	13.9%	32.7%	28.7%	23.8%	2.37	Disagree
4	My school has a good supply of instructional materials that my teacher can use	10.9%	33.7%	27.7%	25.7%	2.30	Disagree
5	My teachers knows how to use the different instructional materials available in teaching	21.8%	47.5%	14.9%	14.9%	2.77	Agree

CUT OFF MEAN: 2.50

Table 2 shows that the respondents disagreed that instructional materials are used during all biology lessons by their teacher with a mean score of 2.20. Item 2

shows that the respondents agreed that the use of instructional materials / teaching aids enables them to recall faster during exams with a mean score of 3.12 Item 3 shows that the respondents disagree that their biology teacher uses different instructional materials during the course of the lesson with a mean score of 2.37. Item 4 shows that the respondents disagree that their school has a good supply of instructional materials that their teacher can use with a mean score 2.30. Item 5shows that the respondents agreed that their teachers know how to use the different instructional material available with a mean score of 2.77

RESEARCH QUESTION 3: Does teacher's non-use of instructional materials constitute problems to the teaching of biology in secondary schools in Egor Local Government Area?

TABLE 3: NON-USE OF INSTRUCTIONAL MATERIALS BY TEACHERS

S/N	ITEMS	% SA	% A	% D	% SD	MEAN	DECISION
1	My school has a well-equipped laboratory that makes us see the practical aspects of topics / lessons taught	17.8%	29.7%	22.8%	26.7%	2.41	Disagree
2	There is a laboratory attendant in my school that assists the students with practical needs	19.8%	27.7%	18.8%	32.7%	2.35	Disagree
3	Teachers who use instructional materials are more effective than those who use verbal	41.6%	36.6%	12.9%	7.9%	3.13	Agree

	communication						
4	Availability of instructional materials makes comprehension easy	42.6%	40.6%	6.9%	5.0%	3.27	Agree
5	Instructional materials are readily available for use by the teacher	10.9%	36.6%	25.7%	21.8%	2.38	Disagree

CUT OFF MEAN: 2.50

Table 3 shows that the respondents disagreed that their school has a well-equipped laboratory that makes them see the practical aspect of topics/lessons taught with a mean score of 2.41. Item 2 shows that the respondents disagreed that they have a laboratory assistant in the school which assists the students with practical need with a mean score of 2.35. Item 3 shows that the respondents agreed that teachers' who use instructional materials are more effective than those who use verbal communication with a mean score of 3.13. Item 4 shows that the respondents agreed that availability of instructional materials makes comprehension easy with a mean score of 3.27. Item 5 shows that the respondents disagreed that instructional materials are readily made available for use by the teacher with a mean score of 2.38

RESEARCH QUESTION 4: Does non-conducive class room environment pose as a challenge to the teaching of biology in Senior Secondary Schools?

TABLE 4: Non-conducive environment a challenge to the teaching of biology in senior secondary schools

S/N	ITEMS	% SA	% A	% D	% SD	MEAN	DECISION
1	There is low participation of students in	34.7%	31.7%	13.9%	16.8%	2.86	Agreed

	classrooms due to overpopulation						
2	My classroom is spacious so the teacher can move around easily	29.7%	32.7%	21.8%	14.9%	2.78	Agreed
3	Securing the students attention while teaching is difficult in a large class	42.6%	38.6%	5.0%	12.9%	3.12	Agreed
4	Reduced class size enhances better understanding	45.5%	34.7%	11.9%	5.9%	3.22	Agreed
5	In my classroom all students are properly seated	20.8%	34.7%	19.8%	23.8%	2.53	Agreed

CUT OFF MEAN: 2.50

Table 4 shows that the respondents agreed that there is low participation of students in classrooms due to overpopulation with a mean score of 2.86. Item 2 shows that the respondents agreed that their classroom is spacious so the teacher can move around easily with a mean score of 2.78. Item 3 shows that the respondents agreed that securing the students attention while teaching is difficult in a large class with a mean score of 3.12. Item 4 shows that the respondents agreed that reduced class size enhances better understanding with a mean score of 3.22. Item 5 shows that the respondents agreed that in their classroom all students' are properly seated with a mean score of 2.53.

SECTION B

DISCUSSION OF FINDINGS

This study examined the challenges of teaching Biology in Senior Secondary Schools in Egor Local Government Area. The first research question of this study was to examine if lack of well-equipped Biology laboratories constitute

problems to the teaching of Biology in secondary schools. From the aggregate mean value of 2.65 in table one, it was therefore deduced that lack of well-equipped laboratories does not constitute problems to the teaching of Biology in secondary schools.

The second research question of this study examined if lack of instructional materials constitute problems to the teaching of biology in secondary schools. From the mean values in table two, it was observed that lack of instructional materials constitutes problems to the teaching of Biology in Secondary schools. It agrees with Omosewo (2010) that despite the fact that practical work is a unique source of teaching science, it is widely acknowledged that laboratory equipment are lacking in most schools.

The third research question of this study examined if teachers non-use of instructional materials constitute problems to the teaching of biology in secondary schools. It was revealed that teacher's non-use of instructional material constitute problems to the teaching of biology in secondary schools as observed from the mean values in table three. This agrees with Nwagbo (2008) that lack of equipment has provided excuses for Biology teachers who intentionally neglect the practical aspect which is of greater potential for the development of critical thinking and objective reasoning abilities in students.

The fourth research question of this study examined if non-conducive class room environment pose a problem to the teaching of biology in secondary schools. From the mean values of respondents in table four, it was observed that non-conducive class-room environment poses a problem to the teaching of Biology in secondary school. This agrees with Wabuoba (2011) quoted in Chuma (2012) who observed that overcrowding in classroom environment makes it difficult for pupils to write and the teacher is also unable to move around the class to assist needy students and this affects the teaching-learning process.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

In this chapter, the researcher presents the summary of the study, conclusion as well as recommendations for further research.

The study examined the challenges of teaching Biology in senior secondary schools in Egor Local Government Area. A survey research design which involved the collection of data through the use of questionnaire was adopted to solicit information and four research question were raised to guide the research. The population of the study comprised of students from the public schools in Egor Local Government Area. The sample of study constituted of one hundred (100) students. Simple percentage and mean were used to analyze the data collected to answer the research question and the reliability of these questions stood at 0.85.

Findings

Based on the analysis of the study, the researcher made the following findings

1. Lack of well-equipped biology laboratories does not constitute problems to the teaching of Biology
2. Lack of instructional materials constitutes problems to the teaching of Biology in senior secondary schools
3. Teacher's non-use of instructional materials constitutes problems to the teaching of biology in senior secondary schools
4. Non-conducive environment poses a problem to the teaching of Biology in senior secondary schools.

Conclusion

This study was carried out to determine the challenges of teaching Biology in senior secondary schools in Egor Local Government Area. The result of the study has led to the following conclusions Biology is best taught with the use of instructional materials and equipment. Teachers should source for materials for effective teaching if there are no standard equipment available and should also use instructional materials at every of teaching for maximum learning outcome.

Recommendations

1. The government and all stakeholders in the Ministry of Education should make provision for instructional materials to be available in every public

secondary school laboratory for effective teaching to be carried out by the teachers

2. Teachers should always endeavor to incorporate the use of instructional materials during lesson periods
3. The government and school management should endeavor to create a conducive learning environment as this goes a long way in enhancing the student's learning capacity.
4. The school management should always make sure to put the laboratories in standard conditions.

References

Aggarwal, J.C. (2006) . Teacher and education in a developing society. Fourth edition. New

Aina, J.K. (2010) security challenges in Nigeria; causes and effects on science education, Retrieved from http://www.basearticles.com/Art/932483/39.

Aina, J.K. (200) challenges and prospects of science education in Nigeria. Continental J. Education Research, 5 (2), 32-37.

Angell, C. (2004). Students' attitude to science. A Journal of Science Education. Trvana University, Slovakia, and Institude of Science Education London, UK. 88 (5) 1-24.

Ameh, C.O. (1991). The use of educational technology in teaching. The effective teacher Jos: Matchers Publishing Ltd, Lagos. PP.33-35.

Augustena, J.I. (1998). Study Techniques for Human Biology Retrieved from http//www.ehow.com/into8449055.

A. L, Teachers' perception of the effects and use of learning aids in teaching: A case study of Winneba basic and secondary school., Ife: Institute of education, Obafemi Awolowo University, Ife, Nigeria, 2003.

Ahmed M.A, Personality factors and biology lecturers' assessment of difficulty levels of genetics concepts in Nigeria Colleges of Education., Ilorin: Unpublished Ph.D Thesis Department of Science Education, University of Ilorin, Nigeria, 2007.

Abdurahaman, H.(2009) The Relationship between Laboratory Facilities availability and Students Academic Performance and Attitude in Biology in ManiEducational zone, Kastina State. Unpublished seminar paper, in Science Education. Presented to the Department of Science Education, Ahmadu Bello University, Zaria.

Abimbola,I.O (1994) A Critical Appraisal of the Role of Laboratory Practical Work in Science Teaching jn Nigeria. Journal of Curriculum and Instruction. 4(1&2) 59-85.

Abimbola. I.O (1997) Fundamental Principles and Practice of Instruction. Ilorin. Belodan (Nigeria) Enterprises abd Tunde Babs Printers.

Aderounmu, A. O. Aworanti. O. A. and Kasali J. A. (2007). Science Technology and Mathematics (STM) Education for sustainable development: Effects of learning resources on students' Performance. 50th Annual Conference Proceeding of Science Teachers Association of Nigeria 52- 57.

Adesina, S. (1990) Educational Management. Enugu; 4th dimension publishing co. ltd.

Adejoh, M. D. and Ityokyaa, F. M. (2012). An Assessment of the Provision of Materials Resources for improvising Biology Programme in Senior Secondary Schools in Benue State. 53rd Annual Conference Proceedings of Science Teachers Association of Nigeria.

Adeyemi, T. O. (2006). Science Laboratories and the quality of output from Secondary School in Ondo state Nigeria. Sokoto Educational Review 8 (1) 81-87 April 2006.

Ahmed, T. M. (2003). Education and National Development in Nigeria. Journal of Studies in Education 10, 35-46.

Ahmed, M.A. (2008). Influence of personality factors on biology lecturer's Assessments of difficulty levels of Genetics concepts in Nigeria Colleges of Education. Unpublish P.hEd thesis, Unlorin.

Ahmed, M. A., Abimbola I.O., Omosewo, E. O. and Akanbi, A. O. (2012). Availability and Utilization of Instructional Resources for Teaching Basic Science and Technology in Secondary Schools in Ilorin, Nigeria. 53rd Annual Conference Proceedings of Science Teachers Association of Nigeria.

Ajayi, D.O (1998). Community Science: Implications for science teachers. 39th Annual Conference Proceeding of Science Teachers Association of Nigeria.

A. S.O., A survey of laboratory maintenance practices in secondary schools in Kwara State., Ilorin: Unpublished M.Ed project, Department of curriculum studies

and Education Technology, University of Ilorin, Ilorin, Nigeria, 1991.
A. I.O, A brief histroy of teaching: In I.O Abimbola & A.O. Abolade (Eds), Ilorin, Nigeria: A publication of department of Science Education, University of Ilorin, Ilorin, Nigeria, 2009.

A. C.N, (2002). Problems of poor performance of secondary school biology students, Nigeria Journal of Curriculum Studies 7(1), pp. 53-55

Adepoju, J.A., 1991. Factors and problems in the Teaching and learning of Mathematics in Nigerian Schools. Paper presented at the National Curriculum Conference organized by the Federal Ministry of Education, Lagos.

American Association for the Advancement of Science (AAAS), 1989. Science for all Americans. Washington: AAAS.

Aminu, J., 1995. Effective management of the Nigerian Educational System (1). Paper presented at the Management Lecture, Nigerian Institute of Management, Lagos.
A. Chapman, Abraham maslow's original hierachy of needs concept 1954: man rich Bassett, 2007.
A. I.O, Fundmental Principles and practice of instruction, Ilorin: A publication of the Department of Science Education, University of Ilorin, Ilorin, Nigeria, 2009.

A. I.O, Philosophy of Science for Degree Students, Osogbo: Osogbo Olatunbosun Publishers P.12, 2006.
A. E.E, "Cognitive correlates of physics achievement of some Nigerian senior secondary students," Journal of the science teachers Association of Nigeria, 38 (1&2), pp. 10-15, 2003.

A. M.O, "A comparative study of textbook readability and students comprehension level in senior secondary school biology," Journal of Education and Social Research 3(1), 2013.
Ball, D.L., McDiarmids, W., 1990. The Subject-Matter Preparation of Teachers. In: Handbook for Research on Teacher Education (Ed.: Houston, W.R.).MacMillian Publishing Company, New York.

Berg, B.L., 1989. Qualitative Research Methods for the Social Sciences. Allyn& Schuster, Needham Heights, Massachusetts.

Bouma, G.D., 2000. The Research Process. Oxford University Press, Oxford, New York.

Braimoh, D.S., Okadeyi, A.S., 2001. Direction of Professional Development for Classroom Teachers in Effective Science, Technology and Mathematics Teaching: Matters Arising. Lagos.

B. J.C, Teaching practice: An imperative in teacher education, Yenagoa, 2010. Ebong, W.E (2008) Challenges of research efforts in biology education paper presented at a conference held in Kano.

D. S. &. Z. O., "Teachers' incentive Mechanism in China," China Ideological & Educational press, 2009, p. 23.

E. G. &. k. I. Edu D.O, "Influence of academic qualification and gender on teachers' perception of difficult concept in primary science in Ikom Educational Zone of Cross River State, Nigeria,"

Fafunwa, A.B. (2004). History of Education in Nigeria. Ibadan: NPS Educational Publisher Ltd.24. Farrant, J.S (2004).Principles and practice of education. Edinburgh: London group limited.
Federal Government of Nigeria. (2004). National policy on education. (4th ed.). Abuja: Nigerian Federal Ministry of Education. (2009). Education Today for Universal Basic Education. Abuja, Education Research and Development Council (NERDC).
Federal Ministry of Education (2007). The national strategic framework for violence free basic education in Nigeria. Abuja: Federal Ministry of Education.
Finn, J. D. and Gerber, S. B. (2005). Small classes in the early grades, academic achievement, and graduating from high school. Journal of Educational Psychology. 97 (2), 214–223, doi: 10.1037/0022- 0663.97.2.214.

F. D. &. K. L, Individual teacher incentives and students' performance Cambridge, MA, National Bureau of Economic Research Inc., 2006.

Gardner, P. L. & Weinburgh M. (1995). Attitudes towards science: A review of the Literature in science education. A journal of science education. ISSN 0950-0963 Print/issn 1464-5289 (c) 2003. Taylor & Frances Ltd. London. http:/www.tandf. Co.uk/journals. Retrieved 10th march, 2015.

Gibson, S. (1997): Changing teacher behaviour through staff development: implementing the teacher and content standards in science. School science and mathematics; 97(6) 302-310

Greener Journal of Educational Research, vol. 2, no. 2, pp. 21-26, 2012. "International Council for Science. ICSU Series on Science from Sustainable Development No: 5 Science Education and Capacity Building for Sustainable Development," [Online]. Available: http://www.icu.org/libraryWSSDRep/Vol 15.pdf.

Heather, M.I. (2007). Engaging People in Sustainability. IUCN, Gland, Switzerland.

H. T, "The Oxford Companion to Philosophy," 2005.
I. O. A. O. E. A. M. U. J. &. Y. L. Abimbola, "Way forward for STEM Education," in Reforms in STEM Proceedings of the 52nd Annual conference of the Science Teachers Association of Nigeria, 2011.
Jaiyeoba, A,O and Atanda, A.I (2005). Quality Substance in Nigeria Educational System: Challenges to Government Deregulating the Provision and Management of Education in Nigeria. Jos, M.P Ginac Concept Ltd 98-103.

Kamar, Y.M (2007). Development of an Instrument for the Assessment of Biology Laboratory Psychomotor Skills of Senior Secondary School Students in Sokoto State. Unpublished Ph.D thesis. Usmanu Danfodiyo University, Sokoto.

Kamar, Y. M. (2009). Lecture note on laboratory Organization and Management for Master in Science Education . Usmanu DanFodiyo University, Sokoto.

Kerlinger, F.N (1973). Foundation of Educational Research. 2nd Edition New York. Published by Holt, Rinehart and Winston Inc. 607 – 610

Kessels, U. & Hannover, B., (2004). Self –to-prototype matching as a strategy for making academic choices. British journal of educational psychology. www.bps.journal.co.uk. 14 (1), 51-55.

Kost-Smith, E. L. (2010). Gender disparity and attitude to Physics: A Journal of Physics Education Research. Department of Physics, Colorado High School

Boulder, Boulder, Colorado.

K. O. S. T. &. M. M. Lilia H, "Trends and Issues of Research on in-service need Assessment of science Teachers: Global US the Maalaysia Context. Faculty of education, Uiversity of Kebangsaan Malaysia 43600, Malaysia," 2006.

Krejcie, R.V and Morgan, D.W (1970). Determining Sample Size for Research Activities. Journal of Educational and Psychological Measurement.

Lewis, R.J (1995). Dream Encyclopedia. www.ebay.com/clg.
Longman (2011). Longman Dictionary of Contemporary English. England. Pearson Education Ltd.

Magna, L.N. (2009). A History of the Life Science Revised and Expanded Lagos CRC.Press, PP. 133-144

Milgwa, D.M (2000). Assessment of the Knowledge and Practice of Safety Measures amongst Welders in Kaduna metropolis. Master in Public Health (M.PH) thesis. Ahmadu Bello University, Zaria.

Mohanty, G. (2007). Essential Facilities for Quality Bioscience Teaching in Secondary School. Retrieved on 20th October 2010.

Muhammed, R, Muhammed, A.U, and Gwandu, A.D (2008). Towards Improving the Quality of Science Teachings: Need for Training, Retraining and Retention of Science, Technology and Mathematics (STM), Teachers. Sokoto Educational Review 10 (2) 153-162

Mustapha, M.T. (2002). Integrated Science Lecturers' Perception of Practical work Assessment Practices in Colleges of Education in Nigeria. Journal of Teacher Education 10(1) 1-12.

Mankilik, M. (2005). How to answer physics theory examination questions in West African Examination Council and National Examinatiom council. Universdity of Jos, journal of education studies, 11 (1), 77-81.
Morakinwa, I. (2003). Poor academic performance in science, in technical college

of education. Causes and implications. Unpublished PGDE dissertation. Unibadan, Ibadan, Nigeria
Nathaniel, S, (2006). Gender Difference and Academic Performance of Senior Secondary Physics Students in Hong Local Government Area of Adamawa State. Unpublished M.Ed Thesis, Tafawa Balewa University of Technology Bauchi. Bauchi, Nigeria.

Nzewi, A. W. (2003). Predicting academic performance in college. New York: The free press
Nakpodia, E. D., (2011). Philosophy as a tool for sustainable development: A contemporary issue in Nigerian educational system. African Journal of Social Sciences, 1(1) 65-74. Retrieved from, http://ssrn.com/abstract=1782004
National School Climate Council (2007). The school climate challenge: Narrowing the gap between school climate research and school. Climate policy, practice guidelines and teacher education policy: Retrieved from, http://nscc.csee.net/ or http://www.ecs.org/school- climate.

National Policy on Education (2004). 4th Edition, Abuja. National Education Research Development Council Press

Nnorom, R. N. (2012).Availability and Usability of the Basic Science Laboratory Facilities for Teaching Basic Science in Upper Basic Secondary Schools. Annual53rd Conference Proceedings of Science Teachers Association of Nigeria 183-189.
Nwagbo, C.R. (2005) Attainment of Professionalism in Science Education: Competencies and Skills needed by Biology Teachers. 46th Annaul Proceeding of Science Teachers Association of Nigeria PP 183-189.NCCE, (2008). Minimum Standard for NCE Teachers, NNCE, Abuja.

Nwosu, A.A. (1991). The Effect of Teacher Sensitization on level of Acquisition of Science Process Skills, among SS I Biology Students in Enugu State, Unpublished Ph.D Thesis, University of Nigeria Nsukka.
Nwagbo, C. (2008). Science Technology and Mathematics Curriculum Development: Focus on Problems and Prospect of Biology Curriculum Delivery. 49th Proceedings of Science Teachers Association of Nigeria 77-81.

Nworgu, L.N. (1999). Diagnosis of Students' Difficulties in Biology Practical. 40th Annual Conference Proceedings of Science Teachers Association of Nigeria.

Nwagbo, C. R., 2006.Effects of two teaching methods on the Achievement and attitude to Biology of students of Different levels of Scientifics literacy.international Journal of Educational Research.45, 216 – 229.

Nwagwu, C. C.(2008).With effective management all students can learn: No excuse or exeption.inaugural lecture series.93.University of Benin.

Okopi, F.O. (2011).Risk behaviours and early warning signals for ODL dropout students in Nigeria: implications for counselling. International Journal of Psychology and Counselling, 3(3), 40-47.

Ogunleye, B. O., 2002.Evaluation of the Environmental Aspect of the senior Secondary School Chemistry curriculum Ibadan Nigeria.Unpublished Ph. D Thesis University of Ibadan. Nigeria.

Ogunkola J. B and Bilesanmi – Awoderu., 2000.Effects of Laboratory and lecture methods on students' Achievement in Biology.African Journal of Education, 5, (2): 247-260.

Okeke E. A. C., 2007.Making Science Education Accessible to all. 23rd inaugural Lecture series University of Nigeria,Nsukka

Obasanya, S.A. Omosewo, E.O.(2010). Effect of Improvised and Instructional Materials on Secondary School Students. Singapore Journal of Scientific Research. 1. 68-76.

Oboh, F.O. (2008). The Need of Improvised Teaching Aid for Effective Teaching –Learning of Biology. Bichi journal Education 8 (1) 64-69.

Oghogho, B.K. and Audu, U.D. (2007). The Relevance of Learning Resources in the Effective Teaching of Science, Technology and Mathematics. 50th Anniversary conference proceedings 73-76.

Ogunkola, B.J. and Olatoye R.A.(2004) Student Gender Self-Concept and Attitude Towards Science as Predictors of Performance in Practical Biology Tasks. Sokoto Educational Review 7:124-125.

Ogunleye, A.O.(1999). Science Education in Nigeria .Historical Development Curriculum Reforms and Research. Sunshine International Publications (Nig) Ltd..
Oguntona, O. A. (2001). Enriching Students Learning of Integrated Science through the Use of Local Materials: A Multidisciplinary Journal. Published by Ila Orangun. 8.pp 44.

Ogunleye, A. O. (1993). Strategies for teaching physics for learning' gain in the senior secondary school: A guide to teachers Journal of Science Teachers Association of Nigeria, 28 (1&2), 151-156.

Okoronka, A. U. & Wada,Z. B. (2014). Effect of Anology Instrucctional Strategy, Cognitive Style and Gender on Senior Secondary School Students Achievement in Some Physics Concepts in Mubi Metropolis, Nigeria. American Journal of Educational Research. Vol.2. No. 9, 788-792

Okpala, N. P. & Onocha, C. O. (1985). Faqmily and environmental correlates of science achievement of pupil in primary school. Journal of Science Teachers Association of Nigeria (STAN). (23) 17 – 25.

Omosewo, E. O. (1994). Relevance of physics education programmes of Nigerian higher education institutions to the teaching of senior secondary physics. Ilorin Journal of Eduication 14 (1) 67-72.

Osangy, M. O. (1995). Relationship between female students' attitude to physics and academic performance in physics. A Study of Holy Trinity Girls College Ibadan. Oyo State. Unpublished M.Ed Dissertation University of Ibadan. Nigeria.
Roberts,C. B. (2000). Learning theory. 2nd Edition, University of Washington, Rinehart and Winston Ltd. New York

Okeke, D. C. (2012). Impart of Material Resource in Facilitating Students' Interest and Academic Achievement in Agricultural Science. Annual 53rd Conference Proceedings of Science Teachers Association of Nigeria. 163-168.
Okoboh,M.O, Ajere and Eule, F.O (2001). A Study of Gender Ratio in Science, Technology, and Mathematics Education: A Case Study of Federal College of Education. Pankshin. Women in Science, Technology and Mathematics Education

in Nigeria. STAN 42ND Annual Conference Proceedings 255- 259.
Olatunde, Y. P. (2010). Adequacy of Resources Materials and Students' Mathematics Achievement of Senior Secondary Schools in Southwestern Nigeria. The social science year 5(2) 103-197.

Olayiwola, M. A. (2005). Training and Developing Teachers for Chemistry Teaching in Nigeria Teacher Secondary Schools. Nigeria Journal of Teacher Education and Teaching 1 (1) 42-46.
Olubor, R. O. (1998). Problems of Learning in Public Secondary Schools: Implication for Homes and Schools in Nigerian. Journal of Teacher Education, Kaduna. NCCE 6(1) 222-226.
Olubor, R.O and Unyimadu,S (2001) Management Demand for Universal Basic Education Programme in Current Issues in Educational Management in Nigeria Association for Educational Administration and Planning (NAEAP) 48 – 59.
Omosewo, E.O. (2010a). Preparation and Conduct of Practical Lessons in Science, Technology and Mathematics (STM) Subjects: Some fundamental steps. www.new.unilorin.edu.ng. Retrieved 15th August,2010.
Omosewo, E.O.(2010b). Science Laboratory Management in Some Selected Secondary Schools of Moro LGA of Osun State pp 8. www.new.unilorin.edu.ng. Retrieved on 18th August 2010.
Onah, G.U. and Ugwu, E. I. (2010) Factors which Predict Performances in Secondary School Physics in Ebonyi North Educational Zone of Ebonyi State, Nigeria. Advanced in Applied Science Research, 1 (3) 255-258.
Onawola, M.O. (1982). Some Science Resources in Some Selected Secondary Schools in Kwara State. Unpublished Bachelor Degree Research Project. Department of SET, University of Ilorin.
Onwuachu, W.C. (2011). Biology Teachers Perceptions on the Utilization of Material Resources As a way forward for effective Biology Education.
Oyebola, J. O. (2008) Teachers' Assessment of the Availability and Use of Instructional Materials for the Teaching and Learning of Vocational Subjects. Sokoto Educational Review 10 (1) 13-20.
Oyedokun, M. R. (2002). Identification of Difficult Topics in the Senior Secondary Certificate Biology Syllabus as Perceived by Students. The Nigerian Teacher 10 (1) 110-120.
Oyetunde, A.A (2008). School Size and Facilities as Correlate of Junior Secondary School Student's Performance in Oyo state. Nigeria. Pakistan Journal of social sciences 5 (8) 836 – 840.

O. P.A.O, "The state of science Education in Nigeria," Paper presented at the ELLSA- British Council Primary Science Forum, Kaduna, Nigeria, Kaduna, 1997.

O. E. Abimbola I.O, History of Science for degree students, Ilorin: Oyinwola press, 2006.

Olaleye, E.O., 2002. New training and teaching technique: Issues, problems and prospects for teacher education programme in Nigeria. J. Sci. Movemen. 4, 38-49.

Oriahi, C.I., Uhumuaavbi, P.O., Aguele, I.I., 2010. Choice of science and technology subjects among secondary school students. J. Soc. Sci. 22(3), 191-198.
Osborne, J., Collins, S., 2000. Pupils' and Parents' Views of the School Science Curriculum. Kings College, London.

Obiaga, T.I (1997). Nigerian University Education and Improvement of Indigenous Technology. Problems and Prospects. In Ejiogu A & K. Ajayi. Emergent issues in Nigerian Education.

O. P.O, "Senior secondary school chemistry teachers' perception of their needs in Ondo State, Nigeria," Research Education, no. 73, pp. 87-98, 2011.

O. M.M, "A factor-analytic study of some Nigeria science teachers' needs assesment," Research in Education 73, 2005, pp. 87-98.

Okenyi, C.I. (2012). Science and Technology Education for Entrepreneurship Development, Proceeding of the 7th National Conference of Schools of Sciences FCEE PP. 15-19.

Proeter, P. (1995). Cambridge International Dictionary of English. London. Cambridge University Press.

Sambo, A.A.(2008). Research Methods in Education. Ibadan. Published by stirling Horden (Nig) Ltd.

Suleiman, M.C. (1993). The Relationship between Resource Allocation and Students Academic Achievement in Science; A Study of Schools in Sokoto Metropolis. Unpublished Master thesis. Usmanu Dan Fodiyo University, Sokoto

Philias, Y. O. (2009). Relationship between Teachers' Attitude and Students' Academic Achievement in mathematics in some selected secondary schools in South Western Nigeria. An European Journal of social sciences, 11 (3).

http://www.eurojournals.com/ejss. retrieved 11th march, 2010.

Pogge, A. F. (1986). The attitudes towards scvience and science technology of the teachers and students at Baldwin International School, Quency, Illois Doctoral Dissertation, University of Iowa, 1986). Dissertation Abstracts International, 17, 07a.

R. T.S, Modern Biology for Senior Secondary Scools. Ibadan: Africana First Publisher Plc. , 2010.

Ream, R. K. and Rumberger, R.W. (2008). Student engagement, peer social capital, and school dropout among Mexican American and non- Latino white students. Sociology of Education, 81, 109-139, doi, 10.1177/003804070808100201.

Salau, M.O., 1996. The effect of class size in the achievement of different ability groups in mathematics. J. Sci. Teach. Assoc. Nigeria 31(1 & 2), 55-61.

Singal, N. and Swann, M. (2011). Children's perceptions of themselves as learner inside and outside school. Research Papersin Education, 26(4), 469-484, doi.org/10.1080/02671520903281617.

Smith, E. (2010). Underachievement, failing youth and moral panics. Evaluation & Research in Education, 23(1), 37-49, http://dx.doi.org/10.1080/

Thomas, H, Bosley,J, Santos, A.D, Gray,R, Hong,Y.Y and Hoh, J (2007) Technology Use and Teaching of Mathematics in the Secondary Schools. Retrieved on 24/2/2012. www.tiri.org.nz/pdfs/9225

Timilehin, E.H. (2010). Administering Secondary Schools in Nigeria for Quality Output in the 21st Century; The Principals' Challenge. European Journal of Educational Studies 2 (3).

Tuckman, B.W (1975). Conducting Educational Research 2nd Ed. Harcourt Brace Jovanovich, Inc. Atlanta.

Tella, A., 2007. The impact of motivation on student's academic achievement and learning outcomes in mathematics among secondary school students in Nigeria.

Ugbaja, J.N and Egbuonu, R.N (2008). Curriculum Development and the Implementation; Utilizing Selected Ecological Concepts. Science Teachers

Association of Nigeria 49th Annual Conference Proceedings 93 – 96.

Ughamadu, K.A. (1992). Curriculum Concept Developments and Implementation. Onitsha, Nigeria. Emba Publishing Company Limited.

Ukaegbu, C. N (2006) Science Education in Nigeria: Historical Development, Reforms and Research. Sunshine International Publications (Nig) Limited.
Wikipedia (2011) Education Reform.
http://en.wikipedia.org/wiki.education-reform

Yusuf, M.O and Afolabi, A.O (2010). Effects of Computer Assisted Instruction (CAI) on Secondary Schools Students' Performance in Biology. The Turkish online Journal of Educational Technology (TOJET) 9 (1) 62

Yusuf, M.O., Afolabi, A.O., 2010. Effects of computer assisted instruction (CAI) on secondary school students' performance in biology. Turk. Online J. Educat. Technol. 9(1), 62-69.