**A SURVEY ON AVAILABILITY, ACCESSIBILITY AND UTILIZATION OF INSTRUCTIONAL MATERIALS IN TEACHING AND LEARNING BIOLOGY IN SENIOR SECONDARY SCHOOL IN ENUGU SOUTH LOCAL GOVERNMENT OF ENUGU STATE**

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**PROJECT SUPERVISOR:**

**PROF. NKADI ONYEGEGBU**

**JULY, 2018**

**TITLE PAGE**

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**THINKERS CORNER, ENUGU STATE**

**A RESEARCH WORK SUBMITTED TO THE DEPARTMENT OF SCIENCE AND VOCATIONAL EDUCATION, FACULTY OF EDUCATION, GODFREY OKOYE UNIVERSITY, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF SCIENCE IN EDUCATION (B. Sc Ed)**

**PROJECT SUPERVISOR:**

**PROF. NKADI ONYEGEGBU**

**JULY, 2018**

**CERTIFICATION**

Njeze Costelia Chioma a student in the department of science and vocational education (Biology Education) in Faculty of Education with Reg No: U14/EDU/BIO/013 has satisfactory completed the requirement for the award of degree in Bachelor of Science in Education (B.Sc Ed). The work embodied in this project is original and has not, to the best of my knowledge, been submitted or presented elsewhere.

……………………. ………………….

**Njeze Costelia Chioma Date**

…………………. ………………… **Prof. Nkadi Onyegegbu Date**

Supervisor

…………………. …………………

**Prof. Uche Agwaga Date**

Head of Department

**DEDICATION**

This work is dedicated to the Almighty God for his grace and inspiration throughout the period of study.

**ACKNOWLEDGEMENT**

The lord is my light and salvation, whom shall I fear? The lord is the strength of my life; of whom shall I be afraid (Ps. 27:1).

I own special greeting to God with whose care I lived to see this work successfully done.

I also appreciate my supervisor Prof. N. Onyegegbu in a special way whom through her brilliant idea and humble advised made it possible for those project to be a reality.

With heart full of gratitude, I warmly express my unreserved gratitude to my lovely parents, for their parental advice and encouragement during the course of this study.

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I am forever grateful for the unalloyed support and motivation received from my friends Nwankwo Onyinyechi, Chrissy Anyadiegwu and Ani Gloria, thank you both for being there for me. I am forever grateful to many others whose names may not have contained in this piece of write up for their support and assistance. May God remember you all in your times of trouble, Amen.

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**ABSTRACT**

The purpose of the study is to examine the availability, accessibility and utilization of instructional material in teaching and learning of biology in Enugu South Local Government Area of Enugu State. The population of the study consisted of the entire 15 principals and 29 biology teachers, within the 15 public secondary in Enugu South L.G.A. of Enugu State. The estimated population of the principals and biology teachers in the study areas was 44 and therefore, there was no sampling. Three structured research questions were used. The instrument was validated by two specialists in test and measurement, and one specialist in Science and Vocational Education Department of Godfrey Okoye University Enugu. The questionnaires were administered to the principals and biology teachers and were collected by the researcher. The data collected was analyzed using mean, standard deviation, and frequency percentage. The result from the analysis showed that, the availability of instructional materials in these schools is poor, including the most important ones. Biology teachers do not have much access to the available instructional materials. It is also revealed that the extent of use of instructional material for effective teaching and learning of Biology is very low. Some solutions include: the Government /Ministry of Education should provide adequate qualified Biology teachers, and the ministry of education should regularly supervise schools to make sure that they always meet up the appropriate standard. Hence, there is much need for sufficient qualified and competent biology teachers, adequate availability and utilization of instructional materials for effective teaching and learning of Biology in all the secondary schools in Enugu South Local Government Area.

 **CHAPTER ONE**

**INTRODUCTION**

**Background to the study**

It is no longer news that one of the most difficult job in the World today is teaching. The challenges that inform this difficulty are numerous ranging from poor remuneration of teachers, indiscipline among the learners, lack of parental support, attitude of the learners towards learning, the challenges posed by English Language as a second language, availability, accessibility and utilization of instructional materials and other teaching facilities, the ability of the teacher to effectively transmit the needed signal that will bring the expected behavioral change in the learner, these and many more challenges are the factors militating against teaching effectiveness. This research shall place emphasis on accessibility, availability and utilization of instructional materials in teaching and learning of biology in senior secondary school.What then is teaching? How much importance has teaching to the existence of human being and the society? Are there possible ways of combating these numerous challenges bedeviling teaching and its effectiveness? For the purpose of clarity and adequate understanding, teaching is a gradual process of transmitting signals, ideas and information to the learner from the teacher using some technique. Similarly, in the view of Atakpa (2000) teaching is defined as a gradual process of transmitting new ideas from the teacher to the learner through careful and selected techniques. In the view of Enekpa (2010) teaching is said not to taken place unless the content of the phenomenon of interest has been transmitted which in turn is expected to bring the expected behavioral chance which distinguished human being from animals. Furthermore, Abu (2000) opined that without teaching, every action of an individual is ignorance. Teaching is therefore imperative and unavoidable if mankind must live peacefully and maximize fully the real essence of existence.

Biology is a [natural science](https://en.wikipedia.org/wiki/Natural_science) that involves the study of [life](https://en.wikipedia.org/wiki/Life) and living [organisms](https://en.wikipedia.org/wiki/Organism), including their [physical structure](https://en.wikipedia.org/wiki/Structural_biology), [chemical composition](https://en.wikipedia.org/wiki/Biochemistry), [function](https://en.wikipedia.org/wiki/Physiology), [development](https://en.wikipedia.org/wiki/Developmental_biology) and [evolution](https://en.wikipedia.org/wiki/Evolution). Modern biology is a vast field, composed of many [branches](https://en.wikipedia.org/wiki/Biology#Branches). Despite the broad scope and the complexity of the science, there are certain unifying concepts that consolidate it into a single, coherent field. Biology recognizes the [cell](https://en.wikipedia.org/wiki/Cell_%28biology%29) as the basic unit of life, [genes](https://en.wikipedia.org/wiki/Genes) as the basic unit of [heredity](https://en.wikipedia.org/wiki/Heredity), and [evolution](https://en.wikipedia.org/wiki/Evolution) as the engine that propels the creation of new [species](https://en.wikipedia.org/wiki/Species). [Living organisms](https://en.wikipedia.org/wiki/Organism) are [open systems](https://en.wikipedia.org/wiki/Thermodynamic_system) that survive by transforming [energy](https://en.wikipedia.org/wiki/Energy) and decreasing their local [entropy](https://en.wikipedia.org/wiki/Entropy) to maintain a stable and vital condition defined as [homeostasis](https://en.wikipedia.org/wiki/Homeostasis). See [glossary of biology](https://en.wikipedia.org/wiki/Glossary_of_biology).

For effective teaching and learning to be achieved, the teachers must employ many techniques and diplomacy in such a way that the new idea to be learnt is well communicated. One of the techniques in transmitting these signals is through the use of instructional materials, methodologies of teaching, leadership style at the classroom level, personality training and the ability to take care of the individual differences among learning at all levels of learning. The current study shall be particular about the importance of instructional material, its accessibility, availability and utilization and its effects on the academic achievement of the learners in senior secondary schools in biology.

Instructional materials can be described in the view of Ola (2000) as all those instructional aides which can be visual, audio and audio visual provided in the teaching and learning situation (real or improvised) to concretize learning and remove sense of abstraction from learning. Agu (2011) holds a similar view about teaching aid as any arrangement, object, material, real or improvised brought into learning to enhance the understanding of the learner other than the normal expression of the teacher in teaching and learning. Categorically, we have three basic classes of instructional materials namely: audio instructional materials, visual instructional materials and the audio visual instructional materials.

Audio instructional materials are those materials that occur basically the auditory sense. Examples of this type of instructional materials are radio, tape recorder, speaker etc. Visual instructional materials are those materials that occur only to the sight. Example of this type of materials are posters, pictures, real objects etc. the audio visual materials as the name implies are those materials that occur both to the sense of auditory and the sight. Examples of audio visual materials are television, telegram, video etc.

 Instructional materials play a very important role in the teaching and learning process. It enhances the memory level of the students. At this time that education has spread wide and entirely, oral teaching cannot be the key to successful pedagogy; therefore the teacher has to use instructional materials to make teaching and learning process interesting (NIC hulls, 2003; Raw 2006) .

According to Bina (2010), instructional materials are tools locally made or imported that help to facilitate the teaching/learning process. Obanga (2005) view them as materials things which are use to composed ported that could make tremendous enhancement of intellectual use impact the instructional materials. Obanga opined that the use of instructional materials can enhance the learning achievement since it removes the sense of abstract and concretize ideas especially in biology which is more practical oriented. Cronbach (2009) states the important elements ofbehaviour that provides the base for learning theory situation which consists of all the objects, persons and symbols in the learning environment. Experience in situation prepares a person to respond to similar situation in future. Use of instructional materials can appeal to the individual attention by creating interest goal that will help the learner achieve direct effort. Teacher’s problem of motivation is essentially one of arranging situation with instructional materials in which the learner will see goals he want to attain. Brown (2005) summarized the role of instructional materials as follows:

* It promotes meaningful communication and effective learning.
* They ensure better retention, thus making learning more permanent.
* They help to overcome the limited classroom by making the inaccessibleaccessible.
* They provide a common experience upon which late learning can be developed. They stimulate and motivate students to learn.
* They encourage participation especially if students are allowed to manipulate materials used.

Osuala (2010) in his own contribution said it does not only help to motivate and develop interest on the part of the student, but also help to bring about an enhance respect for teachers knowledge of the subject. Instructional materials are also described as concrete or both to the sense organs during teaching (Aginna-Obu 2000).

The nature of the learning and the wide range of student’s abilities in the average classroom necessitate a high degree of teachers and experience in the method of presenting the subject matter. This has been truncated with the unavailability of instructional materials in schools. However, a common goal a teacher carries wherever he is, is to make lesson presentation vitally fresh, stimulating and testing for their students. This will help the teacher to individualize the learning method as well as the content and also working according to the student’s need. This goal can be reached most effectively through the use of instructional materials. The need to emphasis on the use and importance of instructional materials in any learning and teaching environment cannot be underestimated. For any learning to take place, the teacher has to make use of these materials that would enable him to teach effectively.

Equipment and other instructional materials to some extent determine the method the teacher uses in teaching biology. The method adopted could be demonstration, experimental, discussion etc. It is generally agreed by both teachers and school administrator that apart from the chalkboard and textbooks which are often available for the teacher to use, there are other materials that aid or are capable of complementing the teacher’s effort in teaching/learning process. Those materials are commonly called “instructional materials”. One of the reasons why students in our secondary schools sometime find it difficult to comprehend immediately what is being taught by the teacher is the non availability of instructional materials that can easily convey the message of the lesson to the learners.

Orji (2000) asserts that instructional material is “the guidance of learning activities” that “a teacher uses to motivate and arouse student’s desire to learn” From the fore-going statement, it can be agreed that for effective learning to take place, a student need to be properly guided by the teacher by way of employing various method and means through which his teaching could be meaningful.

It is however noticed regrettably, that in the Nigerian system of education, little or no instructional material is made available. In rare cases when they are available, they are not accessible, when they are accessible; they are not properly utilized to best achieve the most desired goal of the teacher which has to do with the academic achievement of the learner at any point in time. This noticeable problems to the best of the knowledge of the researcher has not been properly researched especially in Enugu South L.G.A of Enugu State, hence the decision of the researcher to embark on the current study.

**Statement of the Problem**

In spite of the importance of instructional materials to academic performance of students, it is observed that most students complain of being taught principles that seem to be abstract in nature. It was the Indian axiom that says ‘’What I hear, I may forget, what I see I may forget but what I see, hear and touch I will never forget’’ the great problem and question in the Nigerian educational system is, to what extent are instructional materials made available? In cases where there are available, are there sufficient and accessible? In situation where they are sufficient, are they properly utilized? Report has proved severally from the results of WAEC, NECO and other professional examination bodies on high rate of failure of students in different subjects especially in the sciences and this again posed many questions on the heart of the researcher as whether the teachers lack proper skills and training in teaching or are instructional materials not available enough? To what extent are the teachers using the available ones? To what extent are they accessible? It is on the strength of the above problems and questions, that the researcher deems it necessary to investigate the current study to provide solutions to whatever problems that might be associated instructional materials in teaching and learning of biology in senior secondary schools in Enugu South L.G.A of Enugu State.

**Purpose of the study**

The main purpose of the study was to examine the availability, accessibility and utilization of instructional material in teaching and learning of biology in Enugu South Local Government Area of Enugu State. Specifically, the study will determine the following:

1. To examine the extent to which instructional materials are made available to biology teachers in secondary school.
2. To find out the extent to which teachers have access to instructional materials in teaching of biology.
3. To ascertain the extent of utilization of instructional materials in teaching and learning of biology by the teachers.

**The Significance of the study**

The study has both theoretical and practical significance. Theoretically, it can provide support and insight into the current cognitive theory of teaching and learning in schools. Here the theory of Jean Piaget which states that learning takes place in stages. Teachers can sequentially from simple to complex use instructional materials suitable for each stage of learning for the students.

For the practical significance, the findings of this study will benefit the followings: the school, students, biology teachers, government, biology text book writers, and curriculum planners.

The school shall use the findings of this study in making decisions on the importance of making available and accessible of teaching aids in the teaching and learning of biology in secondary school. The reason why the result of these findings will be advantageous to the school is because the school is the centre of learning that houses both the teachers, the students and other academic activities.

The result of this study shall expose the students to the need of learning with instructional materials and invest more effort in acquiring them when need be. The students shall be exposed to the need of seeing, touching and hearing practically the knowledge that is to be learnt to remove sense of abstraction.

The biology teachers shall be more exposed to the reasons why they should use teaching aids in dispensing their knowledge. The teacher shall read from the result of the research the needs to employ instructional material as it tends to reduce stress and energy spent on explanation of an abstract phenomenon.

The government shall use the findings of this study to make an informed decision on the types of instructional materials to be supplied to schools at various levels, the amount of money that should be allotted to education in the budget owing to the fact that huge amount of money is required for the procurement of these instructional material. It will also help the government to set up supervisory/monitoring team to ensure that teachers implement what has been planned in the curriculum.

The authors who write books in education shall use the result of this research to as a proper guide to bring in instructional materials as a veritable tool that will enhance proper understanding of what is to be learnt. Most teachers depends greatly on textbooks for their research and preparation before going to the classrooms, instructional materials at that point will help the teacher to easily understand the phenomenon of interest.

The curriculum planners shall greatly benefit from the findings of this research as it will help them in the planning of the curriculum on the instructional materials that should be fixed, how it should be used and who uses it. It shall also exposed the curriculum planners to effectively help the teachers as teaching is only but the implementation of what has already been written in the curriculum.

**Scope of the study**

This study shall cover the availability and accessibility and extent of utilization of instructional materials in teaching and learning of biology in senior secondary schools in Enugu South Local Government Area of Enugu state. The scope of this study will alsoexamine the instructional materials used in teaching and learning in biology classrooms.

**Research Question**

The following research questions guided the study:

1. To what extent are instructional materials made available to biology teachers in secondary schools?
2. To what extent do teachers have access to the instructional materials in teaching of biologyin secondary schools?
3. To what extent do teachers utilize the instructional materials in teaching and learning of biologyin secondary schools?

**CHAPTER TWO**

**REVIEW OF LITERATURE**

The literature under this chapter is reviewed and organized under the following subheadings:Conceptual framework, Theoretical framework,

Empirical studies and Summary of literature review.

**Conceptual Framework**

* **The concept of Biology**
* **Instructional materials**
* **Availability**
* **Accessibility**
* **Utilization**

**Theoretical Framework**

Janet Piaget Cognitive Development

Jerome Bruner’s Learning Theory

**Empirical Studies**

 Related empirical studies

**Summary of Review of Literature**

**Conceptual Framework**

**The Concept of Biology**

**Biology** is a [natural science](https://en.wikipedia.org/wiki/Natural_science) that involves the study of [life](https://en.wikipedia.org/wiki/Life) and living [organisms](https://en.wikipedia.org/wiki/Organism), including their [physical structure](https://en.wikipedia.org/wiki/Structural_biology), [chemical composition](https://en.wikipedia.org/wiki/Biochemistry), [function](https://en.wikipedia.org/wiki/Physiology), [development](https://en.wikipedia.org/wiki/Developmental_biology) and [evolution](https://en.wikipedia.org/wiki/Evolution). Modern biology is a vast field, composed of many [branches](https://en.wikipedia.org/wiki/Biology#Branches). Despite the broad scope and the complexity of the science, there are certain unifying concepts that consolidate it into a single, coherent field. Biology recognizes the [cell](https://en.wikipedia.org/wiki/Cell_%28biology%29) as the basic unit of life, [genes](https://en.wikipedia.org/wiki/Genes) as the basic unit of [heredity](https://en.wikipedia.org/wiki/Heredity), and [evolution](https://en.wikipedia.org/wiki/Evolution) as the engine that propels the creation of new [species](https://en.wikipedia.org/wiki/Species). [Living organisms](https://en.wikipedia.org/wiki/Organism) are [open systems](https://en.wikipedia.org/wiki/Thermodynamic_system) that survive by transforming [energy](https://en.wikipedia.org/wiki/Energy) and decreasing their local [entropy](https://en.wikipedia.org/wiki/Entropy) to maintain a stable and vital condition defined as [homeostasis](https://en.wikipedia.org/wiki/Homeostasis). See [glossary of biology](https://en.wikipedia.org/wiki/Glossary_of_biology).

Sub-disciplines of biology are defined by the scale at which life is studied, the kinds of organisms studied, and the methods used to study them: [biochemistry](https://en.wikipedia.org/wiki/Biochemistry) examines the rudimentary chemistry of life; [molecular biology](https://en.wikipedia.org/wiki/Molecular_biology) studies the complex interactions among biological [molecules](https://en.wikipedia.org/wiki/Molecule); [cellular biology](https://en.wikipedia.org/wiki/Cellular_biology) examines the basic building-block of all life, the [cell](https://en.wikipedia.org/wiki/Cell_%28biology%29); [physiology](https://en.wikipedia.org/wiki/Physiology) examines the physical and chemical functions of [tissues](https://en.wikipedia.org/wiki/Tissue_%28biology%29), [organs](https://en.wikipedia.org/wiki/Organ_%28anatomy%29), and [organ systems](https://en.wikipedia.org/wiki/Organ_system); [ecology](https://en.wikipedia.org/wiki/Ecology) examines how organisms interact in their [environment](https://en.wikipedia.org/wiki/Environment_%28biophysical%29); and [evolutionary biology](https://en.wikipedia.org/wiki/Evolutionary_biology) examines the processes that produced the diversity of life.

According to Britannica Encyclopedia of learning (2004) The term [*biology*](https://en.wiktionary.org/wiki/biology) is derived from the [Greek](https://en.wikipedia.org/wiki/Greek_Language) word [βίος](https://en.wiktionary.org/wiki/%CE%B2%CE%AF%CE%BF%CF%82), *bios*, "[life](https://en.wikipedia.org/wiki/Life)" and the suffix [-λογία](https://en.wiktionary.org/wiki/-%CE%BB%CE%BF%CE%B3%CE%AF%CE%B1), *-logia*, "study of."The Latin-language form of the term first appeared in 1736 when Swedish scientist [Carl Linnaeus](https://en.wikipedia.org/wiki/Carl_Linnaeus) (Carl von Linné) used *biologi* in his *Bibliotheca botanica*. It was used again in 1766 in a work entitled *Philosophiaenaturalissivephysicae: tomus III, continensgeologian, biologian, phytologiangeneralis*, by [Michael ChristophHanov](https://en.wikipedia.org/wiki/Michael_Christoph_Hanow), a disciple of [Christian Wolff](https://en.wikipedia.org/wiki/Christian_Wolff_%28philosopher%29). The first German use, *Biologie*, was in a 1771 translation of Linnaeus' work. In 1797, Theodor Georg August Roose used the term in the preface of a book, *GrundzügederLehre van derLebenskraft*. [Karl Friedrich Burdach](https://en.wikipedia.org/wiki/Karl_Friedrich_Burdach) used the term in 1800 in a more restricted sense of the study of human beings from a morphological, physiological and psychological perspective (*PropädeutikzumStudiendergesammtenHeilkunst*). The term came into its modern usage with the six-volume treatise *Biologie, oderPhilosophiederlebendenNatur* (1802–22) by [Gottfried Reinhold Treviranus](https://en.wikipedia.org/wiki/Gottfried_Reinhold_Treviranus), who announced:

The objects of our research will be the different forms and manifestations of life, the conditions and laws under which these phenomena occur, and the causes through which they have been effected. The science that concerns itself with these objects we will indicate by the name biology [Biologie] or the doctrine of life [Lebenslehre].

Although modern biology is a relatively recent development, sciences related to and included within it have been studied since ancient times. [Natural philosophy](https://en.wikipedia.org/wiki/Natural_philosophy) was studied as early as the ancient civilizations of [Mesopotamia](https://en.wikipedia.org/wiki/Mesopotamia), [Egypt](https://en.wikipedia.org/wiki/Egypt), the [Indian subcontinent](https://en.wikipedia.org/wiki/Indian_subcontinent), and [China](https://en.wikipedia.org/wiki/China). However, the origins of modern biology and its approach to the study of nature are most often traced back to [ancient Greece](https://en.wikipedia.org/wiki/Ancient_Greece). While the formal study of [medicine](https://en.wikipedia.org/wiki/Medicine) dates back to [Hippocrates](https://en.wikipedia.org/wiki/Hippocrates) (ca. 460–370 BC), it was [Aristotle](https://en.wikipedia.org/wiki/Aristotle) (384–322 BC) who contributed most extensively to the development of biology. Especially important are his [*History of Animals*](https://en.wikipedia.org/wiki/History_of_Animals) and other works where he showed naturalist leanings, and later more empirical works that focused on biological causation and the diversity of life. Aristotle's successor at the [Lyceum](https://en.wikipedia.org/wiki/Lyceum), [Theophrastus](https://en.wikipedia.org/wiki/Theophrastus), wrote a series of books on [botany](https://en.wikipedia.org/wiki/Botany) that survived as the most important contribution of antiquity to the plant sciences, even into the [Middle Ages](https://en.wikipedia.org/wiki/Middle_Ages).

Scholars of the [medieval Islamic world](https://en.wikipedia.org/wiki/Science_in_the_medieval_Islamic_world) who wrote on biology included [al-Jahiz](https://en.wikipedia.org/wiki/Al-Jahiz) (781–869), [Al-Dīnawarī](https://en.wikipedia.org/wiki/Al-D%C4%ABnawar%C4%AB) (828–896), who wrote on botany, and [Rhazes](https://en.wikipedia.org/wiki/Muhammad_ibn_Zakar%C4%ABya_R%C4%81zi) (865–925) who wrote on [anatomy](https://en.wikipedia.org/wiki/Anatomy) and [physiology](https://en.wikipedia.org/wiki/Physiology). [Medicine](https://en.wikipedia.org/wiki/Medicine) was especially well studied by Islamic scholars working in Greek philosopher traditions, while natural history drew heavily on Aristotelian thought, especially in upholding a fixed hierarchy of life.

Biology began to quickly develop and grow with [Anton van Leeuwenhoek](https://en.wikipedia.org/wiki/Anton_van_Leeuwenhoek)'s dramatic improvement of the [microscope](https://en.wikipedia.org/wiki/Microscope). It was then that scholars discovered [spermatozoa](https://en.wikipedia.org/wiki/Spermatozoa), [bacteria](https://en.wikipedia.org/wiki/Bacteria), [infusoria](https://en.wikipedia.org/wiki/Infusoria) and the diversity of microscopic life. Investigations by [Jan Swammerdam](https://en.wikipedia.org/wiki/Jan_Swammerdam) led to new interest in [entomology](https://en.wikipedia.org/wiki/Entomology) and helped to develop the basic techniques of microscopic [dissection](https://en.wikipedia.org/wiki/Dissection) and [staining](https://en.wikipedia.org/wiki/Staining).

**Reasons why students study biology in school**

### Biology helps us understand the big picture

The study of biology connects us to the world we are living in and reminds us of our interconnectedness with all other life forms. It develops awareness of the significance of New Zealand's unique fauna and flora and distinctive ecosystems. It provides opportunities to learn about the processes of all living things. What students learn is directly relevant to our species and environment.

### Biology is at the heart of many social and economic issues

By studying biology, students learn to make more informed decisions about their own health and about significant biological issues such as genetically modified crops, the use of antibiotics, and the eradication of invasive species. Biology helps students to recognise the importance of agriculture and horticulture for New Zealand, and, potentially, to contribute to its future.

Biologists help New Zealand maintain its position as a leading breeder of new varieties and more efficient/productive plants and animals. Biologists contribute to medical and biotechnological advances.

### Biology is at the forefront of ecological issues

Biologists are also at the cutting edge of ecological conservation research. By studying biology, students become much more aware of ecological issues, and better able to debate situations where exploitation of the environment (for example, for farming, mining, or energy production purposes) clashes with conservation objectives, or where we need to develop more sustainable ways of using our natural resources (for example, soil, land, or water).

### Learning in biology opens up career opportunities

The following non-exhaustive list suggests the diversity of careers into which graduates in biological science go:

Agronomist, animal behaviour scientist, animal welfare officer, biochemist, biotechnologist, cheese production supervisor, conservation biologist, environmental analyst, environmental ecologist, environmental manager, environmental officer, fisheries scientist, food and drink technologist, forestry technician, genetics technician, marine biologist, meat biochemist, medical sciences technician, nursery grower, plant pathologist, plant physiologist, quarantine officer, research manager, secondary school science teacher, zoologist.

**Instructional Materials**

Instructional materials have borne several nomenclatures from the colonial concepts of apparatus to teaching aids, teaching aid to educational media, educational media to instructional technology, instructional technology to curriculum materials, curriculum materials to its modern nomenclature-instructional materials. Each of these conceptional stages depicts the scope of its usage and application in the classroom. But according to Eya (2005), the general acceptable nomenclature by professionals of education is the term “Instructional materials.”

Effiong and Igiri (2015) described instructional materials as print and non-print items that are rested to impact information to students in the educational process. Instructional materials include items such as: kits, textbooks, magazines, newspapers, pictures, recording videos etc. Instructional materials play a very important role in the teaching and learning process. It enhances the memory level of the students. At this time that education has spread wide and entirely, oral teaching cannot be the key to successful pedagogy; therefore the teacher has to use instructional materials to make teaching and learning process interesting, NIC hulls, (2003); Raw (2006) .

According to Abdullahhi (2010), instructional materials are tools locally made or imported that help to facilitate the teaching/learning process. Instructional materials are indispensable in the teaching and learning process at all levels of educational system. They are referred to as a veritable channel through which instructions can be impacted in the classroom. Koffar (1999) identified these instructional materials to include audio-visual material of various types, pictures, or charts, books, radio, television, type writing machine, computer, chalkboard, and projectors. Okorie (1986) defined instructional material as that branch of pedagogy which treats the production, selection and utilization of instructional materials that do not depend solely on printed words but instructional technologies employing both materials and devices used in learning situation to supplement the written or spoken word with transmission of knowledge, attitude, and ideas. Offorma (1994) see instructional material as materials that facilitate teaching and learning activities and consequently the attainment of lesson objectives. Hence one can rightly say that instructional materials are those items which the teacher uses in teaching in order to make his teaching and illustrations real and meaningful. Infact, anything a teacher uses to achieve instructional objectives. As tedious as teaching primary school pupils is, one must have to admit that its effectiveness compulsorily requires the use of instructional materials. This is because these materials help to bring about variety which arouses and maintains the interest of the pupils/learners.

Instructional materials can also be seen as instructional media. This simply refers to some of the devices which both teachers and learners can use to enhance the quality of instruction, Offoefuna; Eya (999) used it to refer to all those materials that the teacher needs to incorporate in the teaching –learning experience. These materials include all forms of information carriers that can be used to promote and encourage effective teaching –learning exercise.

**Types of Instructional Materials**

Adelabi (2000) classified instructional material as, audio-media, visual media and audio-visual media. He defined audio media as teaching and learning devices that mostly appeal to the sense of hearing. Examples are public address system, tape recorder, taking drum. According to Adelabi (2000), visual media are teaching and learning devices that mostly appeal to the sense of seeing only, which can be further divided into projected and non-projected visuals, examples are films slides (projected) and postures, regalia, globes and pictures (non-projected). He referred to those instructional materials which provide the learners with the opportunity of seeing and equally learning at same time as audiovisual. Examples are educational television, videos and film.

Umo (2005:131-132) did an elaborate classification and description of instructional materials. He classified instructional materials into six groups, viz:

* Visual materials – these are materials which appeal to the sense of seeing only, examples are pictures, diagrams, flannel boards, chalkboard, building, graphs, charts made by teacher himself.
* Audio-materials – these refer to those materials that appeal to the sense of hearing; examples are tape recorders, cassette cartridges, radio, discs, language labs, and such like.
* Audio-visual materials – these are those materials that appeal to the sense of hearing and seeing. These produce both sound and visuals. Examples, television, motion pictures with sound, slide and film strip projectors with sound accompaniment.
* Software – these include graphic materials, printed materials, slides, films and strips, overhead transparencies, cassette tape. Hardwares- These are the devices used in presenting materials. For example, board, chalkboards, tape recorders, projectors, and video recorders. While video tape is a material the video recorder is the equipment.
* Projected materials: include those materials, which require projections viewing. There are two types of transparent and nontransparent (opaque) projections. Examples of non-projected materials are books, models, mock-ups graphic materials, bulletins chalkboards, simulation.

Azikiwe (1994) classifies instructional materials into groups, human and material resources. According to her, human resources consist of the teacher/resource persons, the learners and the entire tutorial and nontutorial (supporting) staff. The material resources are grouped into tangible resources and intangible resources. She classified the tangible resources into three main groups: visual, rural and audio-visual aids. She further identified six types of visual aids, namely:

* projected aids
* non-projected aids – chalkboard, bullets board and flannel board
* pictorial instructional materials such as wall charts, still pictures, (photographs), graphs, maps, posters and manuals.
* three dimensional aids – these, include realia (real objects) models and specimen.
* mobiles – laboratory equipments, apparatus and chemicals.
* Books

However, for the purpose of classification, learning materials for teaching Biology science can be classified as follows:

1. Printed and reference materials: Textbooks, newspapers, magazines, government documents, teachers’ guide, duplicated materials, journals, hand book, bulletins, pictures, work books, pamphlets, leaflets.
2. Graphic materials: Graphs, charts, diagrams, maps, globes.
3. Display materials: Chalkboard, bulletin boards, flat pictures, magnet boards and flannel board.
4. Projected materials – television, video tape, overhead projector, slides and slide projector and transparencies.
5. Audio and other visual materials: Radio, model, computer, tape recording etc.

**The Importance of Instructional Materials to Teaching Biology**

The role of instructional materials in teaching and learning Biology cannot be over emphasized. The World Book Encyclopedia Americana indicated that one of the principles teachers have to continually bear in mind is that man learns through his senses. Some learn better by one or more senses, to some seeing is believing, to others, the sense of hearing, touch, smell and taste dominate in acquiring knowledge. Hence for the intended learning to take place, the teacher must communicate effectively with the learner. Instructional materials such as television, motion pictures, carefully prepared tape sequence, helps the teacher in extending his learners‟ horizon of experience. They also help the teacher in providing meaningful information to the learner. When learners make use of resources in the school library, educational technology center, laboratories and in their community environment, they get meaningful information that will help them solve their problems. Their interaction with primary visual sources (real objects) will also provide them with useful information.

In order to achieve effectiveness and efficiency during instructional process between the teacher and the pupils, the classroom teacher must try as much as possible to illustrate the subject matter with appropriate instructional materials to the learner. This is done by using real things to represent real life situation. In view of this, Onwuka (2008) maintain that common sense taught us that in the present phase of development the child will be faced with insurmountable difficulties if left to learn unaided. Besides there is much to learn in so little time that utmost economy should be practiced in effect the learning. Instructional material stimulate learners‟ interest. It is to be noted that when the child‟s interest is stimulated, the teacher has to sustain such interest. The teacher needs to seek better, more life long realistic functional and significant problem solving activities for learners to sustain their aroused zeal and interest. For instance, when a classroom teacher takes her pupil out for field work, their interest will likely be stimulated. Instructional materials are used as checks to the teacher‟s knowledge and means of transmission.

Instructional materials help both the teacher and the learner to overcome physical limitation during the presentation of subject matter. For example the use of films, television, slide, tape and programs in presenting information help greatly in overcoming physical difficulties. Nwoji (2002) asserted that instructional materials assist a teacher to transmit to a learner the facts, skills, attitude and knowledge that aid the understanding and appreciation of concepts. Instructional material serves as diagnostic and remedial tools for the teacher. When instruction becomes individualized and practical, teachers are placed in a better position to observe, analyze learning process and learning outcome. Hence he discovers that every learner needs one assistance or another. The teachers‟ role will shift from presentation role to that of diagnostics, testing, research and remedial work. Thus, the learners weakness are corrected and their strong points enhanced and sustained.

Globally, effort is being made in the field of academic towards making teaching – learning process more effective and permanent in the minds of learners through the use of instructional materials. This was affirmed by Barton (2001) who stated that the use of aids in teaching and learning are germane to good teachings. Individual differences exist amongst learners of varying categories. Every learner is disable in one way or the other. Some do not hear clearly, some do not see very well while some are too slow in understanding. Hence the use of instructional materials helps him in discovering some or all the above in his learners and equally knows how to manage the materials to make learning process to be more effective and interesting.

Instructional materials like audio-visual materials (television, video, slides films and film strips, multimedia) heighten motivation for learning through its concreteness and interest, provides freshness and variety in teaching learning process. This is because these appeal to the students or pupils at variety of abilities. A systematic use of audio-visual materials can make the subject matter clearer and appealing to the pupils of diversified background and different abilities. Thus, audio-visual materials can foster effective learning not only for the child who reads and writes easily but also for the pupil who is not verbally gifted. Audiovisual materials encourage active participation, give needed reinforcement, widen the range of pupils experiences, ensure order and continuity of thought and also improve the effectiveness of other materials.

Visual materials like, diagram, charts, realia, photographs, slides, amongst others present more realistic approach in education and equally provide opportunity for class participation in groups or individually and when used, many senses are appealed to which will result to increase in the learner‟s performance. Some of these instructional materials are very good for the preservation of records and other documents. They enrich learning and make it more pleasurable.

The use of instructional materials is an eye opener to the teacher and promotes their better planning and scheduling. It gives the teacher enough guidance, co-ordination, supervision and more time for correction. Oyeyemi (2000) discussed the inherent advantages of improvisation and use of instructional materials. Thus, it makes lessons real, useful for the ever teeming population of pupils/students in our schools. He stated that when materials used are easily available within the environment, the teacher plans, uses and evaluates the materials and such materials can easily be improved upon and can be used efficiently and effectively since they are designed to meet specific instructional objectives.

Instructional material brightens the classroom and brings variety in the class lesson. They aid the slow learn to brighten up and bright students/pupils learn faster. They are very effective in establishing sense or spirit of team work among learners. For example the use of computer during instructional process. Cook (1995) noted that with the computer relevant aspects of the target communicative situation can be modeled and the pupils can take in that which they are likely to meet latter. He equally recognized that adding a computer component to arts, science, language instruction introduces variety to the resources and learning styles used. Learning, especially Biology becomes fun and the learners can be divided into small groups or pairs to work on the projects either collaboratively or competitively. Instructional materials spur learners to learn and develop better and effective skills. The last but not the least, instructional materials help to promote the understanding of teaching and learning process, among others, Okpalaoka (2009).

In summary, Oladipo (2001) asserted that instructional materials are important tools for enriching, visualizing, simplifying, transmitting and accelerating the teaching and learning processes, thus enhance students’ academic performance in Biology. He further said that, effective instruction with instructional materials in the classroom requires careful planning by the Biology teacher. This implies that Biology teacher should take time to apply special knowledge and skill with respect to selecting, producing and using different kinds of instructional materials.

**Factors Affecting The Use of Instructional Materials**

In determining the instructional materials to be used for the conveyance of information in Biology science, the followings were the factors affecting the use of instructional materials. Bakare (1986) outlined the following factors:

1. **Nature of the subject matter and the objectives to be attained:** If the subject matter is such that is diversified, it may involve the use of more than one type of instructional material to achieve its objective.
2. **Number of learners/students involved:** If the number of learners to be taught are up to one hundred (100), it would be more logical and efficient to use microphone for the presentation of information.
3. **The space of time available:** Time is always limited and has its effect upon the kind of instructional materials used. If there is ample time, the Biology teacher is more likely to use the chalkboard and other techniques that encourage maximum participation. But when time becomes a limiting factor, the chalk and talk would be preferred.
4. **Facilities and materials available:** The kind and extent of physical facilities and the instructional material available, including community resources, affect the choice of instructional materials that can be used.
5. **Interests and ability of Biology teacher**: Most teachers have personal preferences and more security conscious in using selected instructional materials. Other things being equal, the teacher should use the methods that he/she likes or uses best. This does not mean that he/she should not be sensitive to other development that supplement or improve upon the instructional materials he/she frequently uses.
6. **Effectiveness of instructional materials:** All Biology science teachers should evaluate instructional materials used in terms of the objectives to be accomplished, and the situation at hand, and choose the one that will best meet the goals of the programme.

Umaru (2011) further asserted that that school environment as the physical and material resources otherwise known as infrastructural facilities available to teachers and students to facilitate their teaching and learning. If the school environment is not conducive and thus affect student academic performance.Abdulkareem (1992): “resources – human and material resources are not equitably distributed among schools in Nigeria” Fakomogbon (2000) observed that one of the causes of failure in Nigerian Secondary Schools is inadequate school resources. He further explained that it cannot be over-emphasized that the provision of adequate resources is a prerequisite for adequate performance in schools. Most of our schools lack necessary infrastructural facilities required for effective learning.

Other factors affecting the effective use of instructional materials include:

1. ***Emotion and Feelings:*** The way a communicator reacts spontaneously and negatively will affect his/her message and such may lead to distortions of the message during presentation.
2. ***Self-concept or personal or Audience Perception:*** This is a psychological term which refers to the learners self-worth, perception of self and interpretation of other people’s perception or individuals. Learners have their various levels of understanding of how they use things, or how any of the parties involved in communication achieve a message, goes a long way towards affecting the truth about it. The learners feeling of adequacy, its expectancy level and aspiration level in learning are largely determined by sense of positive self worth.
3. ***Motivation:*** motivation is a very important factor or problem militating against effective use of Biology instructional materials in school learning. According to Makinde (1987), motivation is often described as the drive to action; hence school psychologists, guidance and counselling specialists as well as educators are concerned with motivation factors in school learning. Whenever motivation is absent in the process of learning, effective learning will not take place. Most students studying various subjects in secondary schools in present day Nigeria, have no interest in the subjects they are studying. For instance, most Biology science students have apathy to the subject because of its practical aspect.

**Theoretical Framework**

This study was guided by the following learning theories:

**Piaget’s Theory of learning**

Piaget’s cognitive theory of learning refers to the stage theory of cognitive development. According to Piaget, children develop knowledge by inventing or constructing reality out of experience and thus mix their observation with their ideas about how the world works. Piaget observed that people of the same age level (especially children) have a similar line of reasoning. This indicates that cognition develops stage by stage. Piaget used the terms ‘Assimilation’ and ‘Accommodation’ to explain his views.

Assimilation: Assimilation means a process of interpreting actions or events in relation to one’s schemas. This refers to a means of fitting reality into one’s existing structures of knowledge. The term ‘schemas’, for Piaget, refers to a well defined sequence of physical and mental actions.

Accommodation**:** This is the modification of existing schemas to fit reality. The organism is capable of learning when it can modify its schemas. As the organism continues to accommodate, it continues to learn. Piaget believes that cognition develops from age to age and from level to level. According to him, the driving force for cognitive development is equilibration. By equilibration, Piaget means balancing assimilation and accommodation to adapt to the demands of the environment. He believes that for people to learn, they must assimilate and accommodate. Piaget also opined that at each stage of development, people use a distinctive underlying logic or structure of reasoning to guide their thinking. Piaget identified four stages of cognitive development – sensorimotor, pre-operational, concrete operational and formal operational to explain cognitive development from infancy to adolescence. However, we should be concerned with the ‘formal operational stage’. This stage occurs within the adolescence stage.

At this stage, the young individual can start to think more abstractly. This stage of cognitive learning is characterized by ability to manipulate abstract as well as concrete objects, ideas, and events. At formal operational stage, the young individual acquires more ability to deal with abstractions and may engage in hypothetical reasoning based on logic. At the adolescence stage, individuals can easily carry out practical experiments and demonstrations. Formal operational stage offers the ability for the individual to use abstract symbols for representational purposes. For instance, the individual, if taught, could understand that H2O is water and may abstractly understand why it represents water. Piaget’s theory of intellectual development holds that cognitive development takes place from active interaction of the child with his environment. This means that the basis of learning is the child’s own ability as he interacts with his physical and social environment.

Piaget is of the opinion that a child must act on the objects in his environment for him to learn. This means that he should be actively involved not be passive. The active involvement of the child may be in form of direct manipulation, visual observation or through mental or internal transportation or change. Piaget believed that mental activity, which is involved in cognitive organization, is a process of adaptation, which is divided into two opposing but inseparable processes of assimilation and accommodation. Accommodation means to modify self to fit the new materials, while assimilation means to modify the materials to fit the self.

The Piagetian theory places the child as the principal agent in the teaching/ learning situation. This being the case, the teacher’s job is to provide the individual with situations that encourage experimentation and manipulation of objects and symbols. The theory has direct implication on the researcher’s study: effect of students’ produced improvised instructional materials on academic achievement of students in Biology.

In the first place, the Piagetian theory of intellectual development holds that cognitive development takes place from active interaction of the child with his environment. This is why the researcher advocates the use of students’ produced improvised instructional materials, because it is a student- centered, activity oriented- teaching strategy in which theteacher acts as a facilitator of learning, guiding the students through a series of activities and problems, which will enhance achievement by learners.

Secondly, Piaget’s theory emphasized active participation of the child which students’ produced improvised instructional materials encourages. This is because when students are allowed to produce their own instructional resources, the students may likely understand the subject matter better as they pass from the known to the unknown and in an increasing order of difficulty. A child must master a step before proceeding to the next one and in doing so, the learner is actively involved in the learning process. Moreover, there are a lot of activities which the learner is expected to carry out by himself, making the learner very active in the learning process.

**Jerome Bruner’s Learning Theory**

Bruner introduced the concept of learning by discovery. Bruner is of the view that learning is effectively engaged in if the learner is giving the opportunity to discover facts by him/herself. Bruner argued that mere presentation of information will not enhance effective solution of a problem. The theory stresses cognitive effectiveness. Because of this, some referred to Bruner’s theory of learning as Bruner’s theory of cognitive development. Bruner believed that learning by discovery begins when science teacher purposefully (i.e. intentionally) create (present) a problem and present it to the students by introducing some inconsistencies (i.e. contradictions) among source of information which are giving in theprocess of instruction. According to Bruner, such inconsistencies lead to intellectual discomfort that will stimulate (i.e. motivate) the students to initiate individual discoveries through cognitive restructuring (i.e. internal reorganization).

The intellectual discomfort created by the inconsistencies makes the learner to attempt to bring order out of this confusion by engaging in mental processes i.e. discovery activities which involve observation, hypothesizing, measuring, stating problem, data collection, classifying, inferring, etc. Through mental processes, the student can generate facts from his/her desperate experiences. Experiences gained during the mental processes enable the students to sense the disparity.

According to Bruner there are two forms of discovery processes which are:

Assimilation**:** This occurs when a student recognizes a new situation that is familiar to one of the elements in the existing structure of knowledge (i.e. cognitive structure) and he/she easily assimilates it.

Accommodation**:** This occurs when a new situation (i.e. a new knowledge) is incompatible to the existing structure of knowledge (i.e. cognitive structure) the learner first restructures (i.e. reorganizes) his/her cognitive framework (i.e. cognitive structure) in order to be able to accommodate the new knowledge.

Bruner believes that the students should find out information on their own using mental processes. Discovery learning, when encouraged in science instruction also aids problem solving because learning by discovery starts with problem solving (Aknmoyewa, 1992). Discovery learning also stimulates creativity in the student, which is one of the major objectives of science teaching/learning.

Application of Jerome Bruner’s Theory of Learning to Science Teaching/Learning: The science teacher should intentionally create or present problems to students either in form of apparent contradiction or inconsistency among sources of information which are giving in the process of instruction. Encouraging discovery learning in science class by science teachers will result into aiding problem solving. One of the major objectives of science teaching is creativity. Therefore, discovery learning encourages creativity. Students should be taught concepts in such a way that they have applicability beyond the situation in which they were learned. Retention of science concepts are aided by knowledge acquired through discovery learning. Bruner advocated the fundamental structure of curriculum to begin with simple contents and later graduated to complex contents. That means that learning should proceed from simple to complex, from concrete to abstract, and from specific to general. Teaching should be inductive.

Bruner’s Constructivist Theory asserts that learning is an active process in which learners construct new ideas based upon their current knowledge. Instruction can be made more efficient by providing a careful sequencing of materials to allow learners to build upon what they already know and go beyond the information they have been given to discover the key principles by themselves.

In relation to the present study: The extent of use of instructional materials for effective teaching and learning of biology in senior secondary schools, the application of Bruner’s constructivist theory to learning will help the students to have a focused attention on the principles they learn and also increase and sustain students’ attitude to learning environment.

Secondly, Bruner’s theory of learning by discovery and his theory of cognitive development suggested that instructions at all level should be geared towards the learning maturational development or cognitive operation.

**Empirical Review**

Arum Joseph Nnadi (2015) carried out his study on Availability and utilization of instructional materials for the implementation of the new biology curriculum in senior secondary schools in Lagos, Nigeria. According to him, the curriculum innovation is a welcome development, but the major issue is whether the curriculum content will be implemented as planned bearing in mind that adequate instructional materials may either be unavailable or underutilized. This research work seeks to determine whether the available instructional materials and their level of utilization for the teaching of Biology in Senior Secondary Schools in Lagos State, Nigeria, are adequate for effective implementation of the new Biology curriculum. Survey research design, proportionate random sampling, and research instrument like Teachers’ Assessment Questionnaire were used. For data analysis, mean, frequency count, chart, and percentages were used. The study revealed that Biology curriculum was not implemented as envisaged. Almost complete absence of technology, over reliance on obsolete instructional materials, and poor method of teaching were the obstacles. The study recommended provision of modern instructional materials, regular supervision, trainings, seminars, and workshops for Biology teachers.

There is a strong connection between this study (Arum Joseph Nnadi, 2015) and the current study which is accessibility, availability and utilization of instructional materials in teaching and learning of biology in secondary schools in Enugu South L.G.A, Enugu State, Nigeria. His studycovers only the availability and utilization of instructional materials, but the current study will further examine the accessibility, availability and utilization of instructional materials. Similarly, his work also focused on the implementation of the new Biology curriculum which the current work will not overlook, since teaching and learning processes deal with curriculum.

Nwafor. C.E. &Eze, S.O. (2014) researched on Availability and utilization of instructional materials inteaching basic science in selected secondary schools inAbakaliki education zone of ebonyi state, Nigeria.This studyfocused on the availability and utilization of instructional material in teaching and learning of Basic Science inselected junior secondary school in Abakaliki education zone of Ebonyi State-Nigeria. The survey research design wasused for the study; population of the study was 92,414. The sample for this study comprised of one hundred students fromten selected junior secondary schools.Structured questionnaire was the instrument used for data collection, and theinstrument was face validatedby three experts. Three research questions guided the study. The data were analyzed usingpercentages. The result revealed that onlytwo dimensional instructional materials are available in schools. Otherinstructional materials e.g. Audio materials, Audio-visual materials are lacking in most schools. The study also revealedthat teachers do not improvise instructional materials to facilitate theirteaching. The researchers therefore recommend thatteachers should be givenorientations/workshops from time to time on the improvisation and utilization of instructionalmaterials and that the government should also assist in the provision and supply of these instructional materials for use inschools.

The current research will not deal withBasic Science in selected junior secondary schools inAbakaliki education zone of ebonyi state, Nigeria; but with Biology in senior secondary schools in Enugu South L.G.A of Enugu, Nigeria. It will also cover more than just the availability and utilization of instructional materials.

Okpalaoka (2009) conducted a study on management of instructional materials for effective implementation of the Universal Basic Education (UBE) programme in Enugu Metropolis. Four research questions were posed and two null hypotheses were formulated to guide the study. A 23-item research questionnaire was developed and administered to 114, 340 and 546 primary school teachers in Enugu-East, Enugu-North and Enugu-South respectively in Enugu metropolis. The analysis of the data shows that teachers (administrators and classroom teachers) procure instructional materials majorly by improvisation. Other sources include, donation, gifts, from philanthropists, spirited people and international organizations. Teachers utilize instructional material to demonstrate learning concepts in the classroom.The findings of the study have some educational implications on the current study among which are, the availability of these instructional materials in schools does not really mean that these materials are effectively managed and cared for to bring about effective implementation of UBE programme; some classroom teachers were not using instructional materials to bring about effective learning in the classroom because of fear of damaging them. This simply proves that these teachers still adopt the traditional system of teaching. The school administrators divert funds meant for acquisition and maintenance of instructional materials revealed certain level of inadequacy and low maintenance of instructional materials for teaching and learning process in State owned primary schools.

This work is applicable since it dealt with the availability, utilization, inadequacy and low maintenance of instructional materials; even though it focused on theUBE programme. But the current study will focus on secondary schools and will further examine the accessibility, availability and utilization of instructional materials in teaching and learning of biology in secondary school. However, studies on accessibility, availability and utilization of instructional materials in teaching and learning in secondary school, and related issues have been done. More studies on Biology are still in progress.

**Summary of Literature Review**

In this chapter, the concepts of instructional materials and Biology were highlighted. Also the types and importance of instructional materials together with Biology as a subject were reviewed.

It was established from the literature reviewed that instruction materials are essential and significant tools needed for teaching and learning of school subjects to promote teachers’ efficiency and improve students’ performance. They make learning more interesting, practical, realistic and appealing. They also enable both the teachers and students to participate actively and effectively in lesson sessions. They give room for acquisition of skills and knowledge and development of self- confidence and self- actualization.

It was established that **Biology** is the [natural science](https://en.wikipedia.org/wiki/Natural_science) that involves the study of [life](https://en.wikipedia.org/wiki/Life) and living [organisms](https://en.wikipedia.org/wiki/Organism), including their [physical structure](https://en.wikipedia.org/wiki/Structural_biology), [chemical composition](https://en.wikipedia.org/wiki/Biochemistry), [function](https://en.wikipedia.org/wiki/Physiology), [development](https://en.wikipedia.org/wiki/Developmental_biology) and [evolution](https://en.wikipedia.org/wiki/Evolution). Modern biology is a vast field, composed of many [branches](https://en.wikipedia.org/wiki/Biology#Branches). Despite the broad scope and the complexity of the science, there are certain unifying concepts that consolidate it into a single, coherent field. Biology recognizes the [cell](https://en.wikipedia.org/wiki/Cell_%28biology%29) as the basic unit of life, [genes](https://en.wikipedia.org/wiki/Genes) as the basic unit of [heredity](https://en.wikipedia.org/wiki/Heredity), and [evolution](https://en.wikipedia.org/wiki/Evolution) as the engine that propels the creation of new [species](https://en.wikipedia.org/wiki/Species). [Living organisms](https://en.wikipedia.org/wiki/Organism) are [open systems](https://en.wikipedia.org/wiki/Thermodynamic_system) that survive by transforming [energy](https://en.wikipedia.org/wiki/Energy) and decreasing their local [entropy](https://en.wikipedia.org/wiki/Entropy) to maintain a stable and vital condition defined as [homeostasis](https://en.wikipedia.org/wiki/Homeostasis).

The review of literature also pointed out the reasons why it is necessary for the students at secondary school level to study biology.It was established that instructional materials are very vital to the teaching of Biology in Nigeria secondary schools. Some specific roles of instructional materials to the teaching of Biology highlighted in this work include: that instructional materials such as television, motion pictures, carefully prepared tape sequence, helps the teacher in extending his learners‟ horizon of experience. They also help the teacher in providing meaningful information to the learner; instructional materials promote better planning for teachers of biology; instructional materials are important tools for enriching, visualizing, simplifying, transmitting and accelerating the teaching and learning processes, thus enhance students’ academic performance in Biology.

Piaget’s Theory of learningand Jerome Bruner’s Learning Theorywere reviewed as the theoretical background for this study, and existing works on related subject were also highlighted. The findings of this research tend to bring solution to the unavailability, inaccessibility and underutilization of instructional materials in teaching and learning of biology.

Arum Joseph Nnadi (2015), Nwafor C.E. &Eze S.O. (2014), and Okpalaoka (2009) were reviewed as the empirical framework. Their works were applicable in this study since they covered the availability and utilization of instructional materials.

**CHAPTER THREE**

**RESEARCH METHOD**

This chapter presents some information on the research method. It covers the design of the study, area of study, population of the study, sample and sampling techniques, instrument for data collection, validity of the instruments reliability of the instrument, method of data collection and method of data analysis.

**Design of the Study**

The design of the study was a descriptive survey research design. It is a design which aimed at finding out and describing the availability, accessibility and utilization of instructional materials in teaching and learning of biology in secondary schools. This design is a useful way of obtaining information about peoples’ opinions, attitudes, preferences and experiences simply by asking questions. This was used for this study since a group of people have to be studied systematically by collecting and analyzing there data

**Area of the Study**

This study was carried out in all the secondary schools within Enugu South L.G.A of Enugu State. Enugu South is located in South East geopolitical zone of Nigeria. In fifteen secondary schools in Enugu South. Enugu South can also be located at Agbani.

**Population of the Study**

The population of the study consisted of the entire 15 principals and 29 biology teachers, within the 15 public secondary in Enugu South L.G.A. of Enugu State. The estimated population of the principals and biology teachers in the study areas was 44.

**Sample and Sampling Techniques**

The entire 15 principals and 29 biology teachers were used in the study, which makes the total of 44 as research respondents. Therefore there was no sampling.

**Instrument for Date Collection**

The instrument on the availability, accessibility and utilization of instructional material in teaching and learning of biology for data collection was developed by the researcher. A structured questionnaire that has the total number of 60 listed items, and a check list were used.Available, Not available, Accessible, Not accessible, highly utilized, fairly utilized, poorly utilized and not utilized were used as the response mode.

**Validation of Instrument**

The instrument was face and content validated by two experts in test and measurement, and one specialist in Science and Vocational Education Department of Godfrey Okoye University Enugu. It was constructed from the research questions and was consisted of 57 question items with alternative answers. Their corrections and suggestions were used to complete the final draft of the instrument.

**Reliability of the Instrument**

In testing for the reliability, Cronbach’s alpha (α) was used. The score were used to calculate the variances. The coefficient of reliability was 0.99. This was used in order to determine the internal consistency of the instrument.

**Method of Data Collection**

The instrument was collected from the respondents personally by the researcher. The researcher was around to explain all forms of ambiguity that may serve as a problem to the respondents.

**Method of Data Analysis**

The data collected in the study were analyzed with mean, standard deviation and frequency percentage. The responses from the respondents were compared, classified to the number of items in the questionnaire for each research question.

Formula for mean: $\sum\_{}^{}\frac{FX}{N}$

Where Ʃ = sum of

 F = frequency

 X = Nominal value

 N = Total number of respondent

Formula for standard deviation

 SD = $\sqrt{\sum\_{}^{}\frac{x^{2}-nx^{2}}{n-1}}$

Where Ʃ = sum of

 x = Nominal value

 n = Total number of respondents

Formula for frequency percentage (f%)

F% = frequencyX 100
total number of values

The mean was calculated by adding the nominal values of response mode thus

**Scale** **Nominal value**

Very high/highly utilized 4

High/fairly utilized 3

Low/poorly utilized 2

Very low/not utilized 1

Total 10

Average mean **2.5**

**Decision rule**

The decision rule was based on the values of the calculated mean of the response options numerical values. The decision rule was that any item with a mean score of 2.5 and above was interpreted as strongly agreed, while mean score below 2.5 were interpreted as strongly disagreed.

**CHAPTER FOUR**

**PRESENTATION OF RESULTS**

In this chapter, the results were presented in tables according to the research questions.

**Research question 1:**

To what extent are instructional materials made available to biology teachers in secondary schools?

**Table 1:** Frequency percentage on the extent instructional materials made available to biology teachers in secondary schools.

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | ITEMS | Available | Not available |
| F | % | F | % |
| 1 | Microscope | 25 | 56.8 | 19 | 43.2 |
| 2 | Magnetic compass needle | 8 | 18.2 | 36 | 81.8 |
| 3 | Preserved plant and animal specimens | 26 | 59.1 | 18 | 40.9 |
| 4 | Skeletal models of animal bone | 11 | 25 | 33 | 75 |
| 5 | Live insects and arachnids | 32 | 72.7 | 12 | 27.3 |
| 6 | Aquarium | 3 | 6.8 | 41 | 93.2 |
| 7 | Samples of different types of soil | 35 | 79.5 | 9 | 20.5 |
| 8 | Potted plants | 15 | 34.1 | 29 | 65.9 |
| 9 | Experimental chemicals | 12 | 27.3 | 32 | 72.7 |
| 10 | Refrigerator | 2 | 4.5 | 42 | 95.5 |
| 11 | Bunsen burner | 24 | 54.5 | 20 | 45.5 |
| 12 | Prepared slides | 2 | 4.5 | 42 | 95.5 |
| 13 | Test tube | 30 | 68.2 | 14 | 31.8 |
| 14 | Conical flask | 23 | 52.3 | 21 | 47.7 |
| 15 | Measuring cylinder | 26 | 59.1 | 18 | 40.9 |
| 16 | Thermometer | 30 | 68.2 | 14 | 31.8 |
| 17 | Hand lens | 27 | 61.4 | 17 | 38.6 |
| 18 | Indicator | 23 | 52.3 | 21 | 47.7 |
| 19 | Computer | 1 | 2.3 | 43 | 97.7 |
| 20 | Projector | 0 | 0 | 44 | 100 |

Data in table 1 shows that high frequency percentage were obtained for eleven out of the twenty listed items that direct on the availability of instructional materials for teaching and learning of biology, in the public secondary schools within Enugu South local government area.
Specifically, items 1, 3, 5, 7, 11, 13, 14, 15, 16, 17 and 18 had frequency percentage of 56.8, 59.1, 72.7, 79.5, 54.5, 68.2, 52.3, 59.1,68.2, 61.4 and 52.3 respectively. The values were up to the average and above which was interpreted as agreed, and therefore indicate that microscope,preserved plant and animalspecimens, live insects and arachnids, samples of different types of soil, Bunsen burner, test tubes, conical flask, measuring cylinder, thermometer,hand lens and indicator, are the available instructional materials.
On the other hand, highfrequency percentage of 81.8, 75, 93.2, 65.9, 72.7, 95.5, 95.5, 97.7 and 100 were obtained for items 2, 4, 6, 8, 9, 10, 12, 19 and 20 respectively. The values indicate that magnetic compass needle, skeletal models of animal bone, aquarium, potted plants, experimental chemicals, refrigerator, prepared slides, computer and projector are not available.

**Research question 2:**

To what extent do teachers have access to the instructional materials in teaching of biology in secondary schools?

**Table 2:** Frequency percentages on the extent teachers have access to the instructional materials in teaching of biology in secondary schools.

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | ITEMS | Accessible | Not accessible |
| F | % | F | % |
| 1 | Microscope | 16 | 36.4 | 28 | 63.6 |
| 2 | Magnetic compass needle | 7 | 15.9 | 37 | 84.1 |
| 3 | Preserved plant and animal specimens | 26 | 59.1 | 18 | 40.9 |
| 4 | Skeletal models of animal bone | 10 | 22.7 | 34 | 77.3 |
| 5 | Live insects and arachnids | 40 | 90.9 | 4 | 9.1 |
| 6 | Aquarium | 5 | 11.4 | 39 | 88.6 |
| 7 | Samples of different types of soil | 31 | 70.5 | 13 | 29.5 |
| 8 | Potted plants | 25 | 56.8 | 19 | 43.2 |
| 9 | Experimental chemicals | 6 | 13.6 | 38 | 86.4 |
| 10 | Refrigerator | 0 | 0 | 44 | 100 |
| 11 | Bunsen burner | 28 | 63.6 | 16 | 36.4 |
| 12 | Prepared slides | 17 | 38.6 | 27 | 61.4 |
| 13 | Test tube | 34 | 77.3 | 10 | 22.7 |
| 14 | Conical flask | 31 | 70.5 | 13 | 29.5 |
| 15 | Measuring cylinder | 26 | 59.1 | 18 | 40.9 |
| 16 | Thermometer | 15 | 34.1 | 29 | 65.9 |
| 17 | Hand lens | 24 | 54.5 | 20 | 45.5 |
| 18 | Indicator | 31 | 70.5 | 13 | 29.5 |
| 19 | Computer | 1 | 2.3 | 43 | 97.7 |
| 20 | Projector | 0 | 0 | 44 | 100 |

Data in table 2 shows that high frequency percentage were obtained for ten out of the twenty listed items that direct on theteachers’ access to instructional materials in teaching of biology in the public secondary schools within Enugu South local government area.

Specifically, items 3, 5, 7,8, 11, 13, 14, 15, 17 and 18 had frequency percentage of 59.1, 90.9, 70.5, 56.8, 63.6, 77.3, 70.5, 59.1, 54.5 and 70.5 respectively. The values were up to the average and above which was interpreted as agreed, and therefore indicate that preserved plant and animalspecimens, live insects and arachnids, samples of different types of soil, potted plant, Bunsen burner, test tubes, conical flask, measuring cylinder,hand lens and indicator, are the accessible instructional materials.
On the other hand, highfrequency percentage of 63.6, 84.1, 77.3, 88.6, 86.4, 100, 61.4, 65.9, 97.7 and 100 were obtained for items 1, 2, 4, 6, 9, 10, 12, 16,19 and 20 respectively. The values indicate that microscope, magnetic compass needle, skeletal models of animal bone, aquarium, experimental chemicals, refrigerator, prepared slides, thermometer, computer and projector are not accessible.

**Research question 3:**

To what extent do teachers utilize the instructional materials in teaching and learning of biologyin secondary schools?

**Table 3:** Mean scores on the extent teachers utilize the instructional materials in teaching and learning of biologyin secondary schools.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S/N | ITEMS | HU(4) | FU(3) | PU(2) | NU(1) |  **\_** **X** | SD | DECISSION |
| 1 | Microscope | 312 | 1442 | 2040 | 77 | 2.29 | 0.12 | Disagreed |
| 2 | Magnetic compass needle | 00 | 26 | 3366 | 99 | 1.84 | 0.10 | Disagreed |
| 3 | Preserved plant and animal specimens | 00 | 26 | 3366 | 99 | 1.79 | 0.10 | Disagreed |
| 4 | Skeletal models of animal bone | 312 | 1442 | 2040 | 77 | 2.29 | 0.12 | Disagreed |
| 5 | Live insects and arachnids | 2080 | 2163 | 36 | 00 | 3.38 | 0.10 | Agreed |
| 6 | Aquarium | 00 | 00 | 1326 | 3131 | 1.29 | 0.11 | Disagreed |
| 7 | Samples of different types of soil | 832 | 2266 | 1428 | 00 | 2.86 | 0.10 | Agreed |
| 8 | Potted plants | 28 | 1030 | 2040 | 1212 | 2.04 | 0.12 | Disagreed |
| 9 | Experimental chemicals | 14 | 1236 | 1938 | 1212 | 2.04 | 0.12 | Disagreed |
| 10 | Refrigerator | 00 | 00 | 2550 | 1919 | 1.56 | 0.10 | Disagreed |
| 11 | Bunsen burner | 0 | 1 | 22 | 21 | 1.54 | 0.10 | Disagreed |
| 12 | Prepared slides | 00 | 13 | 2244 | 2121 | 1.54 | 0.10 | Disagreed |
| 13 | Test tube | 1456 | 3090 | 00 | 00 | 3.31 | 0.10 | Agreed |
| 14 | Conical flask | 00 | 00 | 1326 | 3131 | 1.30 | 0.11 | Disagreed |
| 15 | Measuring cylinder | 520 | 2781 | 816 | 44 | 2.75 | 0.12 | Agreed |
| 16 | Thermometer | 624 | 3090 | 714 | 11 | 2.93 | 0.10 | Agreed |
| 17 | Hand lens | 1560 | 2266 | 24 | 55 | 3.06 | 0.14 | Agreed |
| 18 | Indicator | 1560 | 2266 | 24 | 55 | 3.06 | 0.14 | Agreed |
| 19 | Computer | 28 | 1030 | 2040 | 1212 | 2.04 | 0.12 | Disagreed |
| 20 | Projector | 00 | 00 | 1326 | 3131 | 1.29 | 0.11 | Disagreed |

Data from table 3 shows that high mean scores were obtained for seven out of twenty listed items. Specifically, items 5, 7,13, 15, 16, 17 and 18 had the mean values of 3.38, 2.86, 3.31, 2.75, 2.93, 3.06 and 3.06 respectively. The values were up to 2.5 and above which were interpreted as agreed, and therefore indicate that live insects and arachnids, sample of different types of soil, test tubes, measuring cylinder, thermometer, hand lens, and indicator, are being utilized by the teachers.
On the other hand, low mean scores of 2.29,1.84, 1.79, 2.29, 1.29, 2.04, 2.04, 1.56,1.60, 1.54, 1.30, 2.04 and 1.29 were obtained for items 1,2, 3, 4, 6, 8, 9, 10, 11,12, 14, 19 and 20 respectively. The values were below 2.5, which indicate that microscope, magnetic compass needle, preserved plant and animal specimens, skeletal models of animal bone, aquarium, potted plants, experimental chemicals, refrigerator,Bunsen burner, prepared slides, conical flask,computer and projector are not utilized by the teachers, even though some like samples of different types of soil, potted plants and Bunsen burner are available.

**CHAPTER FIVE**

**DISCUSSION, CONCLUSIONS, RECOMMENDATION AND SUMMARY**

In this chapter, the researcher discussed the results of findings, conclusion, implication of the study, recommendations of the study, limitations of the study, suggestions for further studies, and summary.

**Discussion of the study**

The three research questions that guided this study were the themes around which the major findings of the study were organized and discussed.

**Research question 1:**To what extent are instructional materials made available to biology teachers in secondary schools?

The result shows that few instructional materials were available, such as microscopes, preserved animal and plant specimens, test tubes, indicators etc. this makes it difficult for students to identify them especially during external examination. The poor performance in biology at secondary school level is as a result of insufficiency and ineffective use of instructional materials and laboratory facilities in the teaching of biology in secondary schools (Aduba, 1990). Consequently, Akudolu (2002) submitted that ICT tools are not always available to teachers in secondary schools. While Mmaka (2002) stated that for teaching of biology to be more meaningful and effective, there should be modern technology. The low or poor availability of instructional materials will create room for abstract lesson rather than concrete lesson in biology.

**Research question 2:**To what extent do teachers have access to the instructional materials in teaching of biology in secondary schools?

The findings show that teachers’ access to instructional materials is not adequate enough. It is true that the available instructional materials are not sufficient, but still, teachers do not have full access to some of the available ones. For instance, microscopes and thermometers are available but not accessible by teachers. Some factors like; Poor security, Principals’ and teachers’ attitude, Incompetent teachers, Insufficient qualified teachers, Poor maintenance, and Inadequate time assigned for biology lessons,can deny biology teachers access to instructional materials. This will negatively affect the academic performance of biology students. It is because of this that Chike-Okoli (1997) in line with Ikediashi (2002) have pointed out that poor teaching experience, inadequate or poor physical infrastructure, unsatisfactory building design are likely to cause some physical discomfort for the students and are therefore bound to influence their academic achievement.

**Research question 3:**To what extent do teachers utilize the instructional materials in teaching and learning of biologyin secondary schools?

According to the result, the utilization of the available instructional materials in teaching and learning of biology is very low; only seven out of twenty listed items were utilized by teachers. Teachers do not have interest in using the available instructional materials because of incompetency, or it is often “time consuming”. This is not a healthy development because it does not make the teaching of biology real, effective and productive. Similarly, Igwe (2005) asserted that passive learning through lectures and textbook reading may not provide a long lasting interest or understanding in any field of study. This problem can be attributed to insufficient qualified teachers, poor funding, inadequate time assigned for biology lessons, lack of power supply, and lack of seminars/workshops for teachers are the factors that militate against the use of instructional materials. Thus, is then important that the school authority and curriculum planners should map out adequate time for especially biology practical.

Non-utilization of biology instructional materials will not make learning permanent, provide concrete and realistic experiences, stimulate imaginations, develop a continuity of thought, promote longer retention of factual knowledge as well as not stimulate the students’ interest in the learning of biology. Therefore, for effective teaching and learning of biology to take place, the resourceful biology teachers should utilize properly the available instructional materials in biology, together with the necessary skills.

**Conclusion**

The purpose of the study is to examine the availability, accessibility and utilization of instructional material in teaching and learning of biology in Enugu South Local Government Area of Enugu State.

Findings made from the analysis showed that the availability of instructional materials in these schools is poor, including the most important ones.

Biology teachers do not have much access to the available instructional materials.

It is also revealed that the extent of use of instructional material for effective teaching and learning of Biology is very low.

However, the causative factors were narrowed to incompetent teachers, poor supervision, poor funding, inadequate time assigned for Biology lessons, lack of power supply, and lack of seminars/workshops for teachers.The government /ministry of education should also provide adequate qualified Biology teachers, regularly supervise schools to make sure that they always meet up the appropriate standard, provide fund for schools in order to create conducive environment for effective teaching and learning, and there should be goodmaintenance of available school facilities in all secondary schools, especially in Enugu South Local Government Area.

**Implication of the study**

The result of this study has obvious implications to the teaching and learning of Biology in secondary schools.

It is recognized that there is need to make the instructional materials available and effectively utilized in all the secondary schools within Enugu South Local Government Area of Enugu State, so as to enhance effective teaching and learning of Biology. The acquisition of the knowledge for effective mastery can only take place when teachers combine theoretical knowledge with practical especially for some Biology concepts which are abstract in nature.

The irregular supervision of most Biology teachers by the education board has led to most teachers neglecting their duties such as improvisation of some instructional materials that are readily available in the school.

It has been observed that there is an increased rate of poor academic performance of biology students in secondary schools, together with some responsible factors.
It implies that there should be competent teachers, sufficient qualified teachers, funding, adequate time assigned for biology lessons, parents/guardians support, and seminars/workshops for teachers.
Therefore, it is very necessary that regular supervision of secondary schools (especially Biology Teachers) should be carried out by the relevant school inspectors to make sure that they always meet up the appropriate standard in Enugu South.

**Recommendations of the study**

The following recommendations were made in line with the results of the study:

1. The government /ministry of education should provide more adequate qualified Biology teachers to all the public secondary schools in Enugu South Local Government Area.

2. The Biology teachers in public secondary schools in Enugu South should be sponsored to attend workshops where they will be taught how to improve and upgrade their competency in improvisation and utilization of Biology instructional materials. Such workshops could be held by the state government in collaboration with the state branch of Science Teachers Association of Nigeria (STAN).

3. The government should provide fund for schools so as to enable them procure the relevant resources for effective teaching and learning of Biology.

4. Considering the high cost of some institutional materials, appropriate management techniques should be adopted for good maintenance of available school facilities.

5. Finally, the ministry of education should regularly supervise schools to make sure that they always meet up the appropriate standard.

**Limitations of the study**

The limitations of the study include: some teachers were adamant and felt reluctant to respond to the questionnaire items, transportation to most of the schools posed limitation to the study, regarding to the road congestion, complex routes and expenses.

**Suggestions for further studies**

This is a small-scale study; a countrywide study with a larger population is suggested. It is believed that such a study could better inform practitioners, teachers, educators and policy makers about the phenomenon.

Also, other researchers should carry out this study in other geographical or institutional settings.

**Summary**

The main purpose of the study is to examine the availability, accessibility and utilization of instructional material in teaching and learning of biology in Enugu South Local Government Area of Enugu State.

The population of the study consisted of the entire 15 principals and 29 biology teachers, within the 15 public secondary in Enugu South L.G.A. of Enugu State. The estimated population of the principals and biology teachers in the study areas was 44 and therefore, there was no sampling.

Three structured research questions were used. The instrument was validated by two experts in test and measurement, and one specialist in Science and Vocational Education Department of Godfrey Okoye University Enugu. The questionnaires were administered to the principals and biology teachers and were collected by the researcher. The data collected was analyzed using mean, standard deviation, and frequency percentage.

The result from the analysis showed that, the availability of instructional materials in these schools is poor, including the most important ones. Biology teachers do not have much access to the available instructional materials. It is also revealed that the extent of use of instructional material for effective teaching and learning of Biology is very low.

Some solutions include: the government /ministry of education should provide adequate qualified Biology teachers, and the ministry of education should regularly supervise schools to make sure that they always meet up the appropriate standard.
Hence, there is much need for sufficient qualified and competent biology teachers, adequate availability and utilization of instructional materials for effective teaching and learning of Biology in all the secondary schools in Enugu South Local Government Area.

According to Ajao (2001), the quality of education not only depends on the teachers as reflected in the performance of their duties, but also in the effective coordination of the school environment. The Federal Republic of Nigeria in the National Policy on Education (FRN, 2006) also recognized the importance of teachers by stating that no nation’s education system can be greater than the standard of their teachers.

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**APPENDIX**

**A CHECK LIST**

Observational check list on the accessibility, availability and utilization of instructional materials in teaching and learning of biology in secondary schools in Enugu South L. G. A, Enugu State. It was recorded according to the 15 public secondary schools in Enugu South.

**INSTRUCTION:** Please tick in the option that best represent your opinion on the items provided.

The study uses two (2) point rating scale:

A = Available

NA =Not available

**Research question 1:**

To what extent are instructional materials made available to biology teachers in secondary schools?

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Items** | Available | Not available |
| 1 | Microscope | 9 | 6 |
| 2 | Magnetic compass needle | 4 | 11 |
| 3 | Preserved plant and animal specimens | 11 | 4 |
| 4 | Skeletal models of animal bone | 5 | 10 |
| 5 | Live insects and arachnids | 12 | 3 |
| 6 | Aquarium | 2 | 13 |
| 7 | Samples of different types of soil | 13 | 2 |
| 8 | Potted plants | 7 | 8 |
| 9 | Experimental chemicals | 6 | 9 |
| 10 | Refrigerator | 0 | 15 |
| 11 | Bunsen burner | 8 | 7 |
| 12 | Prepared slides |  |  |
| 13 | Test tube | 10 | 5 |
| 14 | Conical flask | 11 | 4 |
| 15 | Measuring cylinder | 7 | 8 |
| 16 | Thermometer | 9 | 6 |
| 17 | Hand lens | 10 | 5 |
| 18 | Indicator | 6 | 9 |
| 19 | Computer | 1 | 14 |
| 20 | Projector | 0 | 15 |

**QUESTIONNAIRE**

Department of science and vocational
Education, Godfrey Okoye University Enugu,18th April, 2018.

Dear respondent,

The researcher is an undergraduate student of the above named university, who is conducting a research on the accessibility, availability and utilization of instructional materials in teaching and learning of biology in secondary schools in Enugu South L. G. A, Enugu State.

The research is purely an academic exercise, and any information given by you will be treated confidentially and will only be for the purpose of this study.

Please try to respond correctly to the items, as your co-operation will be highly appreciated.

 Yours sincerely

 **CHIOMA NJEZE**

**RESEARCH QUESTIONNAIRE**

Questionnaires for principals and biology teachers on the accessibility, availability and utilization of instructional materials in teaching and learning of biology in secondary schools in Enugu South L. G. A, Enugu State.

**SECTION A:** **Respondents personal data.**Please tick in the space provided appropriately.

Sex: male female

School: ………………………………………………………………………………………

Class: ………………………………………………………

Educational qualification

B. Ed

H.N.D

O.N.D

N.C.E

T.C II

O’ Level

None

**SECTION B:**

INSTRUCTION: Please tick in the option that best represent your opinion on the items provided.

The response options below are coded as follow:

A = Available

NA =Not available

A = Accessible

NA = Not accessible

HU = Highly utilized

FU = Fairly utilized

PU = Poorly utilized

NU = Not utilized

**Research question 1:**

To what extent are instructional materials made available to biology teachers in secondary schools?

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Items** | Available | Not available |
| 1 | Microscope |  |  |
| 2 | Magnetic compass needle |  |  |
| 3 | Preserved plant and animal specimens |  |  |
| 4 | Skeletal models of animal bone |  |  |
| 5 | Live insects and arachnids |  |  |
| 6 | Aquarium |  |  |
| 7 | Samples of different types of soil |  |  |
| 8 | Potted plants |  |  |
| 9 | Experimental chemicals |  |  |
| 10 | Refrigerator |  |  |
| 11 | Bunsen burner |  |  |
| 12 | Prepared slides |  |  |
| 13 | Test tube |  |  |
| 14 | Conical flask |  |  |
| 15 | Measuring cylinder |  |  |
| 16 | Thermometer |  |  |
| 17 | Hand lens |  |  |
| 18 | Indicator |  |  |
| 19 | Computer |  |  |
| 20 | Projector |  |  |

**Research question 2:**

To what extent do teachers have access to the instructional materials in teaching of biology in secondary schools?

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Items** | Available | Not available |
| 1 | Microscope |  |  |
| 2 | Magnetic compass needle |  |  |
| 3 | Preserved plant and animal specimens |  |  |
| 4 | Skeletal models of animal bone |  |  |
| 5 | Live insects and arachnids |  |  |
| 6 | Aquarium |  |  |
| 7 | Samples of different types of soil |  |  |
| 8 | Potted plants |  |  |
| 9 | Experimental chemicals |  |  |
| 10 | Refrigerator |  |  |
| 11 | Bunsen burner |  |  |
| 12 | Prepared slides |  |  |
| 13 | Test tube |  |  |
| 14 | Conical flask |  |  |
| 15 | Measuring cylinder |  |  |
| 16 | Thermometer |  |  |
| 17 | Hand lens |  |  |
| 18 | Indicator |  |  |
| 19 | Computer |  |  |
| 20 | Projector |  |  |

**Research question 3:**

To what extent do teachers utilize the instructional materials in teaching and learning of biology in secondary schools?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S/N** | **Items** | Highly utilized | Fairly utilized | Poorly utilized | Not utilized |
| 1 | Microscope |  |  |  |  |
| 2 | Magnetic compass needle |  |  |  |  |
| 3 | Preserved plant and animal specimens |  |  |  |  |
| 4 | Skeletal models of animal bone |  |  |  |  |
| 5 | Live insects and arachnids |  |  |  |  |
| 6 | Aquarium |  |  |  |  |
| 7 | Samples of different types of soil |  |  |  |  |
| 8 | Potted plants |  |  |  |  |
| 9 | Experimental chemicals |  |  |  |  |
| 10 | Refrigerator |  |  |  |  |
| 11 | Bunsen burner |  |  |  |  |
| 12 | Prepared slides |  |  |  |  |
| 13 | Test tube |  |  |  |  |
| 14 | Conical flask |  |  |  |  |
| 15 | Measuring cylinder |  |  |  |  |
| 16 | Thermometer |  |  |  |  |
| 17 | Hand lens |  |  |  |  |
| 18 | Indicator |  |  |  |  |
| 19 | Computer |  |  |  |  |
| 20 | Projector |  |  |  |  |

**Cronbach’s Alpha (α) Formular for Reliability**

Α = $\frac{N\overbar{C}}{\overbar{V} \left(N-1\right)\overbar{C}}$

N = 60

$\overbar{V}$ = 0.12

$\overbar{C}$ = 0.11

= $\frac{60(0.11)}{0.12+\left(20-1\right)(0.11)}$

= $\frac{2.2}{0.12+2.09}$

= $\frac{2.2}{2.21}$

= 0.99