INFLUENCE OF INFORMATION AND COMMUNICATION TECHNOLOGY ON EFFECTIVE TEACHING AND LEARNING OF BIOLOGY IN SELECTED SECONDARY SCHOOLS IN ILORIN WEST LGA KWARA STATE

BY

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CERTIFICATION

This project has been read and approved as meeting the requirement of the award of Nigeria Certificate Education (NCE) in the Department of Integrated Science / Biology, Kwara State College of Education, Ilorin.

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DEDICATION

I dedicate this project work to Almiighty Allah and to my Parents

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Alhamdulillah, All praise is to Almighty Allah (SWT), The most Gracious the most merciful. I am profoundly grateful to him for granting me the strength, patience and clarity to complete this project truly without his divine guidance and countless blessings, none of this would have been possible.

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ABSTRACT

This research work was conducted to investigate the influence of information and communication technology on effective teaching and learning of biology in selected Secondary Schools in Ilorin West LGA Kwara State.

A sample of fifty (50) students and thirty (30) teachers were randomly selected from ten (10) stratified secondary schools in Ilorin West LGA, Kwara state. The data collected through the administered questionnaires on the sample subject was analyzed through descriptive statistics of frequencies and simple percentage while all hypotheses were tested at 0.5 level of significance through the use of Analysis of Variance (ANOVA) and t test statistics.

The findings of the study revealed that there is significant difference between students taught with information and communication technology and those taught without information and communication technology. Also, there is significant difference between pre-test scores and post–test scores of students taught with information and communication technology. However, there is no significant difference between post–test scores of male and female students taught with information and communication technology.

Based on the findings it was recommended that adequate information and communication technology should be provided for effective teaching and learning, also the government as a matter of policy should recruit more qualified teachers to teach at senior secondary school level most especially Biology.

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CHAPTER ONE

INTRODUCTION

Background to the Study

The utmost importance attached to education in Nigeria was clearly underscored in the National Policy on Education (FGN 2023). The Federal Republic of Nigeria in this policy, adopt education as an instrument par excellence for effecting national development, therefore, schools at various levels are expected to educate future leaders and develop high level of technical and technological capacities needed for economic growth and development (Osokoya, 2020).

Hence, science being the foundation of sustainable development is undeniably and unquestionably the key to national growth and prosperity (Samba, 2018).It is the foundation of scientific and technological breakthrough in any nation of the world. It is in this light that the Federal Government of Nigeria (FGN, 2023) enshrines in the National Policy on Education (NPE, 2023) the promotion of science as a means for technological development. Abimbola and Omosewo (2016) viewed science as a body of knowledge, a way of investigating our method about and a way of thinking in pursuit of an understanding of nature. While Honby (2020) previewed science as knowledge about structure and behavior of a natural and physical mud which is based on fact that one can prove. Ahmed, Abimbola, Omosewo and Akanbi (2014) also stated that the level of scientific reasoning and skills enhance the productive nature of biological knowledge. This had resulted to rapid changes taking place in medicine, industry, communication, and

Biology. Science as an agent of development plays an important role in bringing about these changes through technological advancement, national wealth enhancement, health improvement and industrialization (Validya, 2023), this is why scientific and technological breakthrough is usually the goal of any developing nation like Nigeria (Bello, 2020). Biology being a core science subject serves as basis for which most of these technological advancement is built upon.

The search for efficient and effective delivery of instruction to students has always been a major concern of science educators. This is so as a result of repeated mass failure recorded in West African Senior Secondary School Examination (WASSCE, 2014). Among other factors that could be responsible for this failure, are the information and communication technology which definitely must have a significant role to play in teaching and learning processes. Information and communication technology are defined by different authors though they convey the same meaning when interpreted. Information and communication technology facilities could be explained as devices through which knowledge, skills, attitude, ideas, beliefs and values got transmitted to the learner by the teacher in order to ease teaching–learning process.

The integrated use of ICT in subject curricula and classroom teaching and management, is a complex process, which is usually achieved by following a set of guiding parameters. In this module, there are two complementary activities: the first focuses on the theories and principles that underpin ICT integration in education; and the second is teachers' computer-assisted practice in the use of ICT with support web-based portals.

Adeyemo (2018) has further argued that method of teaching has gone beyond traditional methods and this makes the integration of information technologies very important in science class. Information technology has broken the monopoly, and provided varieties in teaching–learning situation in Biology. This means that information technology should be properly rooted in the senior secondary school curriculum so that the level of literacy will be increased with regard to the use of information technology in teaching Biology.

The teacher alone cannot provide all the needed condition for an effective teaching and learning process, other supporting materials should be provided. The students learn better with the use of appropriate Information and communication technology facilitiess. The use of information and communication technology (ICT) in teaching and learning of Biology has added a new dimension in the positive promotion of the teaching and learning process. It provides the much needed sensory experiences needed by the learners for an effective and meaningful behavioural change. Information and communication technology are meant to improve the quality of education for effective academic performance of students in schools. The performance of the students on the intended learning outcome provide the validation – loop on the success of the interaction and instruction (Bakare, 2020).

Akanbi (2011) defined information and communication technology as materials designed to enrich the teaching and learning processes and hence contribute to better learning. Leohard (2020), conceived information and communication technology as “a

wide range of materials and devices, designed to provide realistic imagery and substitute experiences in order to enrich curricular experiences of many kinds". From the afore mentioned meanings of information and communication technology, the best way of helping students to learn is to bring them face to face with the world which education intends to introduce to them (Mkpa, (2023). He stressed further that one way this can be attained is by using real objects in real life situations for instruction. Where real life situation are not possible, the alternative is for the teacher to use representations of real life situations. These representations are materials, devices and techniques that help the teacher to make realistic approach to his job.

Whether real or substitutes, these representations have a common goal. They help the teacher to convey the intended message effectively and meaningfully to the learners so that the learners receive, understand, retain and apply the experience gained to reach overall educational goals. Some authors have written to classify the types of information and communication technology that may be used in teaching and learning (Ezegbe, (2020), Adjai, (2015) Ukeje, (2016)).

Aromolaran (2015) noted that the lack of material and equipment was a significant problem in the Nigerian education system. The school system is also characterized by the rigidities of centralized curriculum development and a lack of human materials both of which restrict institutions from attempting more innovative and flexible approaches. So as to equip students to succeed at a time of rapid curriculum change in science and

technology, the practice of starving schools of equipment and funds needs to cease (Nwana, 2023).

Statement of Problem

The problems militating against the effective teaching and learning are lack of adequate numbers of qualified teachers, inadequate and lack of information and communication technology library facilities to mentions but few. Almost all the concept of Biology Science are taught without using the appropriate information and communication technology, which would aid effective teaching and learning processes (Uzoagulu, 2018).

Availability and usage of information and communication technology is important to academic performance. Olutola (2019) was categorical in his view noted that the idea of excellence in any school depends on the goals set for itself, but goals in turn, depends on what the teachers are capable of accomplishing in the teaching-learning process that show a permanent change in the behaviour of the students. It is the opinion of this writer that like in any other practical or skilled subject, availability and usage of information and communication technology and other teaching equipment and facilities in Biology as a subject are of great importance if the students' academic performance is to be enhanced.

One of the implications of the foregoing is that if the teaching materials needed for teaching skills subjects are not made available to teachers at affordable prices to students where necessary, the teachers and students would be denied of the requisite exposure to such materials. This study was developed to investigate the effect of information and

communication technology on the teaching and learning of biology in senior secondary schools in Ilorin West LGA Kwara State.

Purpose of Study

The general purpose of this study is to investigate the effect of information and communication technology on the teaching and learning of biology in senior secondary schools in Ilorin West LGA Kwara State. The study will specifically deal with the following;

i. Investigate whether students taught with information and communication technology perform better than those taught without information and communication technology,

ii. examine the significant difference between pre-test scores and post-test scores of student taught with Information and communication technology facilities,

iii. examine the significant difference between the post-test scores of male and female students taught with information and communication technology.

General Questions

1. What is Information and communication technology?
2. What are the relevant of information and communication technology in teaching and learning?

Research Questions

The research questions were designed to investigate the effect of information and communication technology on the teaching and learning of Biology in Senior Secondary Schools in Ilorin West LGA Kwara State. This study will strive to answer the following;

1) Do students taught with information and communication technology perform better than those taught without information and communication technology?
2) Is there any significant difference between pre-test scores and post-test scores of student taught with Information and communication technology facilities?
3) Is there any significant difference between the post-test scores of male and female students taught with information and communication technology?

Research Hypotheses

In addition to the research questions, the following hypotheses were formulated and tested:

1) There is no significant difference between students taught with information and communication technology and those taught without information and communication technology.
2) There is no significant difference between pre-test scores and post–test scores of students taught with information and communication technology.
3) There is no significant difference between post–test scores of male and female students taught with information and communication technology.

Significance of the Study

The findings of this research would be of great importance to the following:- Teachers, school administrators, policy maker and curriculum planners, students, future researchers, among others.

The findings of this research work would be of great benefits for teachers in because the study would provide information on the importance of information and communication technology, as a way of enhancing teachers' access and use of these materials in secondary school. School administrators in secondary schools would benefit from the findings of this study because it would enable them to identify the problems militating against effective teaching and learning of various subject most especially Biology.

The finding has the potential to provide information to the policy makers and curriculum development bodies who are responsible for curriculum planning and development on the relevance of information and communication technology to curriculum implementation in schools. Furthermore, these bodies may provide the necessary support for the provision of audio-visual facilities and equipment in Nigeria secondary schools.

Furthermore, the findings would prepare the minds of teachers on the need to integrate information and communication technology in their teaching and learning. The findings and recommendations of this study would assist the government on the need to provide adequate information and communication technology needed for enhancing teachers' performance in teaching and learning Biology and other subjects in schools.

Overall, the findings of the study would form a reference point for students and future researchers. Since this research is restricted to the availability and teachers use of information and communication technology in teaching and learning in schools, it is hope that the findings and recommendations would make significant improvement in the teaching and learning of Biology in Nigerian schools.

Scope and Delimitation of the Study

The scope of the study includes the availability, teachers access to and use of information and communication technology on teaching and learning of Biology in secondary schools. The study would be limited to 5 Senior Secondary Schools in Ilorin West Local Government Area of Kwara State.

Operational Definition of Terms

The following major terms and variables are clarified as they are used in the study:

Accessibility: Act of describing the existing condition of a thing at a particular time. This would determine teachers' use of information and communication technology for in senior secondary schools.

Experienced Teacher: These are teachers who have been teaching for at least five years and above in secondary schools.

Hardware: Is the appliance, which is the physical component that facilitates the conduct of information from the software

Inexperienced/Less-Experienced Teacher: Teachers who have not taught or teach up to five years in secondary schools.

Information and communication technology: These include the utilization of people, materials, facilities, equipment, and procedures to achieve the desired instructional goals and objectives

Resource Centres: These are space or setting where educational materials, human and non-human materials are found. These materials can be designed, developed utilized, borrowed and stored in the centre for instructional uses.

Resource Material/Information and communication technology: They are information carriers that are used by teachers to present, illustrate and explain what is being taught to the student. These include; video, television, radio, overhead projectors etc.

Secondary Schools: These are schools which provide immaterialist education and prepare students for tertiary education.

Utilization: This refers to the level of application of information and communication technology in teaching and learning of Biology in a classroom setting.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviews the work of the scholars who had conducted researches into relevant issues relating to the present research study.

The literature review will be carried out under the following sub-headings:

- Theoretical Framework
- Meaning, Nature, Functions and Classification of Information and communication technology
- Concept of Biology
- The Roles of Information and communication technology in Teaching and Learning Process
- Availability, Accessibility and Utilization of Information and communication technology
- Challenges in Using Information and communication technology in teaching and learning of Biology
- Summary of the Literature Reviewed

Theoretical Framework

According studies carried out by scholars such us (Mishra, 2022, Villalba and Romiszowsski, 2021) three schools of thought have been widely used in the use of technology to support teaching and learning. These include; behaviorism, cognitive psychology and constructivism. However, (Hung, 2021) points out that constructivist

learning theory has been identified as the most suitable one for the use of information and communication technology in teaching and learning. Constructivist learning theory is based on education psychology. Jean Peaget (1896-1980) was the first theorist who regarded children as “builders of their intellectual structures”. Another soviet psychologist Le Semanovitch Vygotsky (1896-1934) studied how children learn through communication with others (such as parents and peers). He posits that learning takes place by learners completing tasks for which support (scaffolding) is initially required. This support may include a tutor, peer or a technology such as the applications of computers.

This has led to the term computer supported learning. Computer supported learning environments are those in which computers are used to either maintain a learning environment or used to support the student learner in this Vygotskian sense. These educational theories have further been developed by a number of constractivists (Wilson, 2022, Duffy and Jonassen, 2018 Papert, 2017) in the recent years.

According to (Lou, 2015),the rapid development of information and communication technology, especially computer-supported teaching and learning, several teaching models based on the constructivist theory such as Problem Based Learning (PBL) and Case Based Learning (CBL) have widely been adopted. The aim is to create learning environments centered on students as learners and a believe that they learn more from what they do and think about rather than from what they are told.

In comparison with other teaching methodologies, approaches based on constructivist have certain characteristics. These include:

i) Student centered learning: Students have more control on their study.

ii) Group-work: Students are divided into groups when they are learning which in turn can help them improve their communication skills.

iii) During the process of learning, knowledge, the ability to learn is developed; with tables such as; seeking meaning, forming opinions, evaluating information and thinking critically, (Lou, 2015).

In a constructivist learning environment, the role of the teacher shifts from being the source of knowledge to facilitating learning. (Khine, 2023) argued that students should not be left to explore alone but teachers should provide support, coaching and modeling the students to make certain learning takes place. Unlike the teacher-centred model in which teachers impart knowledge to students, "knowledge for constructivism cannot be imposed or transferred intact from one knower to the mind of others, (Kargiorgi and Symeou, 2015). Against this theoretical background, it is important to investigate the various applications of information and communication technology in enhancing teaching and learning in secondary schools.

Influence of ICT tool and facilities in teaching and learning in schools

Adeyegbe and Ayo (2023) identified the ICT gadgets and facilities as radio, television, compact discs, satellites, e-mail, internet, overhead projector, micro projector, video machines, computers, camera, etc. Achimugu (2015) expatiating on this list, included telephone, Global System for Mobile Communication (GSM), facsimile (fax) and telex machine. Contributing to this, Ugwu, (2016) identified the following additional

facilities: electronic bulletin Board, teleconferencing, teleprocessing, database, internet optical fibre, white board, etc. The researcher concludes that these selected IT gadgets/facilities facilitate effective teaching and learning when use appropriately for teaching Biology.

Radio is wireless electronic device that transmits audio signals from radio station and are picked up by any radio bands such as frequency modulation (FM), short wave (SW) and amplitude modulation (am) bands. Radio can be used to teach Biology by placing it in the special listening classrooms. Tape Recorder is a modern machine that records the voices of people. There are many models of radio cassette recorders that are now available. They can be used in various ways in teaching Biology. They can be used for playing a pre-recorded cassette for instance, during a field trip, they can also record radio broadcast. For instance on quizzes which can be used for the students – teachers interaction (Asiegbu, 2015).

Television is an audio visual medium and popular electronic mass media of instruction. Television can be used in teaching Biology by watching television programmes like quizzes, puzzles, games, debates, etc, in relation to Biology as a subject. Video Machine: This is a type of machine that is used to project motion picture and the pictures are fashioned for continuous projection at a particular speed. There are different types such as video tape machine, digital video discs (DVD), video compact discs (VCD), etc. It can be recorded in tape or disks. Video is a good IT facility that can be used for

teaching Biology. For instance, one can use slim video tools which contains video lecture, video – simulation, interactive simulation, task review, etc to effectively teach Biology.

Digital Camera is also used to capture picture and it can be used to teach Biology most especially during Biology educational tours such as field trip. Pictures snapped during a field trip or excursion can be reported back to other students who were unable to attend the field trip or excursion (Eze, 2020).

Projector is a device that allows images to be focused on the screen. It can be overhead projector, micro projector, film projector, etc. A Biology teacher can prepare his or her own slide on different topics or can buy commercially prepared slides and systematically use the slides in teaching the students using any of the available projectors. Telephone: This is a telecommunication device that is used to send and receive audio (sound) signals across distances. Telephones can be used to ask presenters questions for better understanding of Biology concepts during a television or radio programmes (Eze, 2020).

Global System for mobile communication (GSM) is a modern portable telephone that connects to a cellular based station used for personal communication over short or long distance. Apart from the traditional role of sending and receiving calls, it has advantages over telephone as it provides other services such as text messages (SMS), E-mail, internet facilities and SMS facility for sending and receiving photos and videos. It can be used to teach Biology in many ways. Computer: This is a modern machine that can be programmed to automatically perform various operations. Information can be created,

stored and transmitted through the computer. Computer can be put to use in various ways in teaching and learning Biology. For instance, information accessed through browsing such as lesson notes, data, diagrams, images, animation, etc (Eze, 2020).

Internet is a global collection of computers linked to each other, sharing available resources and communicating effectively. Internet connectivity provides audio and video information which facilitates Biology classroom lessons. For instance, Biology class teaching, individualized instruction, etc can be downloaded through internet browsing, which can be printed out or saved on computer or copied to CD for later usage in presenting a given topic in an interesting way to the students. E– Mail Address also known as electronic mail is a means of carrying out a computer based communication in which an electronic letter is sent to one or more recipients via the help of the internet. This also can be used in teaching Biology in different ways. For instance, through social network and online charts, Biology teachers can reach and interact with their students in teaching which can help to remove the abstractness of some concepts (Eze, 2020).

World Wide Web (www) is a medium that allow people to get information which is available on the internet. Lesson notes can be downloaded from web sites and used in teaching Biology effectively. Example of such sites is http//www.teachnet.com

The use of information and communication technology in teaching and learning has brought into the system, new and emerging technologies that have come to challenge the traditional methods involved in the teaching and learning processes. While contributing to the importance of ICT Igboegwu, Egolum and Nnoli (2011) point out that ICT have

impacted on quality and quantity of teaching, learning and research education and provides opportunity for students and teachers to communicate with one another more effectively. Brekke and Hogstad (2018) opine that those preparing to become teachers must incorporate technology into the class and that the use of ICT in schools is to increase the effectiveness of teaching and learning.

Some of the obvious importance of integrating Secondary Schools includes the following:

i. ICT increases the scope, knowledge and interaction of Biology teachers, thereby making the task of the teacher simpler.
ii. ICT helps Biology teachers to gain access to current Biology resources and standards.
iii. ICT eliminates the requirements for handling large classrooms and laboratories.
iv. ICT improves Biology teacher's effectiveness by exposing the teachers to knowledge beyond his/her immediate environment.
v. ICT helps students to learn Biology with ease and to retain what they taught for a long period of time.
vi. ICT improves Biology students to participate in classroom activities
vii. ICT enables Biology students exchange ideas with their Biology teachers in and outside the classrooms.
viii. ICT promotes individualized learning in Biology

Speaking on the benefit of ICT, the Federal Government of Nigeria (2023: 27) on its national policy on education stipulated:

> *that "in recognition of the prominent role of Information Technology (IT) in advancing knowledge and skills necessary for effective functioning in a knowledge driven world, government shall provide adequate infrastructure and develop capacity for effective utilization of Information Technology (IT) to enhance the delivery of basic education in Nigeria".*

The major issue of academic concern at this juncture, is whether the aims and objectives of the provision and utilization of IT gadgets/facilities in teaching and learning Biology are being achieved? Answering this question constitute the focus of this research.

Concept of the Need for ICT Integration in Teaching and Learning in secondary Schools

An ICT driven learning environment is important factor in Nigeria educational sector as it support qualitative teaching and learning process. Over the years what dominated the classroom in Nigeria was principally the chalkboard and textbooks. Although radio/television and film have been used for educational purposes in many countries of the world, they have not been common features in the Nigerian classroom. In the areas where they were used, none has impacted on the educational process as the computer. While television and films appeal to the audio-visual faculties of users, the computer is capable of activating the sense of sight, hearing and touch of the user. It has the capacity to provide higher interactive potentials for users to develop their individual

intellectual and creative ability. According to Shavinina (2021) the crux of ICT consists just in the development of human mental resources which allow people to both successfully apply the existing knowledge and produce new knowledge.

Contributing to this, Eze (2020) noted that education in whatever form it takes is not complete without effective use of ICT and that the significance of ICT in education includes: access to variety of learning resources, immediacy of information, anytime anywhere learning, collaborative learning, multimedia approach to education, authentic and up to date information, access to online libraries, distance learning, individualization of instruction, reduce time on many routine task, access to the source of information, teaching science subjects made interesting, etc. Agommuoh (2015) further observed that the use of ICT in teaching science subjects will make learning more real, relevant and experimental as large amount of data and materials on any topic can be brought to the classroom from all over the world thereby, greatly facilitating the acquisition and absorption of knowledge and offering students unprecedented opportunities to enhance their learning. From the foregoing, ICT is rapidly transforming the world into a global village and Biology education is one of one of the beneficiaries of this global revolution in teaching and learning process using ICT. In line with competitiveness and emphasise of the use of ICT in teaching and learning, government of various levels and non-governmental organisations i.e. *old boys Association* have continued to intensify efforts to supply ICT facilities to senior secondary schools in Nigeria. But evidence in literature tends to show that the available ICT facilities in our schools are underutilized. (Ojaleye

2022, Ugwu 2016, and Okoye 2014). In the same vein, Nwagbo and Ugwanyi (2020) have argued that despite aforementioned impact of ICT in teaching and learning science, effective utilization of it is being impeded by some challenges like lack of confidence, resistance to change, negative attitudes, lack of technical support, insufficiency in the school timetable, etc.

This implies that ICT facilities when available have not been utilized in Nigerian secondary schools because of some problems. It is against this background that the researcher deemed it necessary to investigate the perception of Biology teachers on the factors affecting effective utilization of ICT in teaching and learning Biology. Therefore, the problem of the study is: what factors affect effective utilization of ICT in teaching and learning Biology from the views of Biology teachers? Research reports on the influence of teachers' gender on the level utilization of ICT in teaching, had been well documented, but most often the reports contradict themselves. For instance, while Ahmed, Abimbola, Omosewo & Akanbi (2020) found that gender had influence on the level of utilization of available multimedia instructional resources in favour of male teachers, Onwuachu (2011) reported that there is no significant difference between the mean ratings of male and female teachers on their ability to utilize the available material resources including ICT facilities in teaching.

Most employers of labour today make the acquisition of ICT skills as a prerequisite for employment in their establishments. Various establishments, institutions and organizations find it expedient to train and retrain their staff to acquire or improve on their

ICT knowledge and usage of ICT facilities (Adomi and Anie, 2016, cited in Adomi and Kpangban 2018). It therefore becomes necessary to introduce them to the basic ICT skills early to enable them eternalize them for future use.

Integration of ICTs in secondary school will definitely improve Nigerian education system there by giving students a better education that can enable them to compete favorably with products of other education systems all over the world. This will lead to the creation of a technologically advanced work force with the potential to improve military technology, telecommunication, media communication and skilled ICT professionals who will be well-equipped to solve ICT related problems where ever they find themselves (Goshit, 2016) Integration of ICT in teaching at this level invariably will give rise to new instructional techniques. This makes the students to engage themselves in individualized learning. A situation that gives them access to tools that adjusts to their attention span and provides valuable and immediate feedback to literacy enhancement, which is currently not fully implemented in the Nigerian school system (Enuku, and Enuku, 2000).

Concept and Nature of Biology in Secondary School

Biology is a subject that spreads across every aspect of human life, from the day of conception till death. Biology does not only serve as fundamental or requirement for further science study ,but helps an individual to understand himself and the natural things in his environment. According to Adegbite (2015), Biology is defined as the basic science that deals with the study of living things.

Biology is a natural science that deals with the living world, that is, how the world is structured, how it functions, what these functions are, how it develops, how living things came into existence, and how they react to one another and with their environment (Umar, 2011).It is a prerequisite subject for many fields of learning that contributes immensely to the technological growth of the nation (Ahmed, 2018). This includes medicines, pharmacy, nursing, Biology, forestry, biotechnology, nanotechnology, and many other areas (Ahmed & Abimbola, 2011).

Biology is introduced to students at senior secondary school level as a preparatory ground for human development, where career abilities are groomed, and potentials and talents discovered and energized (Federal Republic of Nigeria, 2019). The quality and quantity of science education received by secondary school students are geared towards developing future scientists, technologists, engineers and related professionals (Kareem, 2023). Biology as a science subject is a foundation for pursuit of careers such as medicine, food science, zoology, botany, pharmacy, and even Biology among others in the tertiary institutions.

Ahmed and Abimbola (2011) submitted that biology is beneficial to human being in many ways which include promoting understanding of relationships between humans and their physical environment, stimulating interest in biology based hobbies and many more. In a study by Oluode (2018), various reasons were given for the need to study plants and animals The reasons are that plants and animals are useful to us as human in many ways .These ways include feeding, medicine (various kinds of herbs gotten from plants

serve the purpose of performing one curative function or the other, in the body when taken in different forms), shelter, furniture, nutrition and health, hide and skin. Also biology revealed the fact that carbon dioxide is needed to be excreted or expelled out for the human body to carry out day to day living activities. Hence, the importance of biology are too numerous to be mentions.

Based on the submission of different researchers such as Mwirigi (2011, Muraya and Githui (2011), Inyega (2015) noted that biology plays a key role in industrialization and other sectors of the economy and shows that biology is an important area of study, as it is those areas that has revealed facts and has contributed immensely to the technological development and advancement in Nigeria. All successes recorded in other fields of study is dependent on the fact revealed by the studies carried out in the field of biology ,hence when there's no biology there's no world Adeyemi (2015).

Studies have shown that secondary school students are exhibiting low interest in Biology (Esiobu, 2015). This low interest of students in biology has been traced to poor achievement in examinations. In our match towards scientific and technological advancement and need nothing short of good achievement in biology at all levels of schooling. Unfortunately, achievement of students in biology at the end of the secondary school has not improved in the last decade (Umoinyang, 1999). Folorunso (2020) has linked poor achievement trend in biology particularly to the lack of instructional resources in schools due to poor funding of schools. The poor funding of schools has hindered the principals from providing the teachers with adequate instructional resources.

The Roles of Information and communication technology in Teaching and Learning Process

Materials is plural word for medium which has attracted many definitions from different authors. According to Adegbija (2015), materials is the totality of materials we put together to carry information. This means that, a medium or materials is or more vehicle through which information are moved from the sender to the receiver. However, a medium becomes instructional or educational, when it is used for the purpose of instructional or for educational purpose. This made Salami (2016) to submit that, resource materials are integrated into the classroom instruction as aid to teaching and learning for organized presentation of instruction and sequentially appeal to human sensory organs to increase perceptual ability and stimulate human reasoning.

Based on the above reasons, any medium to be used for instruction or as an educational medium must possess some required qualities or attributes if not, such a medium or materials will not be appropriate for use as instructional medium, attributes required of a medium to make it qualify as information and communication technology include capital of such medium to show objects in motion, in colour and in three dimensional forms. It can also be related to the provision of printed works, spoken words, visual and auditing stimuli to psychological response. In his own categorization, Yusuf (2018) mentioned information and communication technology to include, print, chalk and chalkboard, graphic materials, realia, still pictures, mode and multi-materials presentation.

He explained further that, a print material is the oldest materials in educational which are useful for information or motivation purpose.

Examples of such print materials are textbooks, periodicals, encyclopedia, newspapers and magazine etc.

However, chalk and chalkboard are used to present instructional content as indicate sketch book and they are essentially temporary for delineating idea, information and communication technology has diverse of contribution role in the process of teaching and learning, the importance according to Salami (2016) are highlighted as follows:

- It provides many instructional techniques to solve teaching and learning problems.
- It helps to provide a rational method of selection of information and communication technology which facilitate effective and functional teaching and learning this enhance development and effective management of education.
- Materials motivate the learners to learn with relatively easy.
- It facilitate easy learning and recall and enhances the standard of perform of the teacher through effective materials integration in the classroom instruction.
- It collaborates and enhances cooperative learning and provides scaffolding to support higher level thinking, and increase learner independence.

Since teaching learning are usually an attempt at problem solving, it is therefore required that consideration should be given to factors of interaction, conditions and constraints, materials and efforts, person and personnel, people and procedure, essential to fulfill and facilitate the achievement of the desirable educational outcomes. It is therefore

very essential, that the objective to be achieved is un-ambiguously specified and analyzed. Materials to be used are appropriately itemized and logically and sequentially planned and utilized.

It is equally important that teachers are aware of the role and relevance of the information and communication technology to instruction. Westnya and Adegbija (2007) summarized the relevance of information and communication technology to education as follow:

1. Development of counting thought in learning.
2. Making learning more permanent
3. They appeal to all categories of learners
4. Arouse of both interest and attention of learners
5. Provision of concrete basis for conceptual thinking for learners.
6. Contribution to the growth of meaning
7. Offering of reality of experience and contribution to efficiency, depth and variety of learning.
8. They are unbiased and do not discriminate with regard to age, status, ethnicity, religion etc.

It is however very important that despite the fact that the number of information and communication technology that can be used to enrich construction are in exhaustive, select for enriching their instruction match their instructional objectives and that such

"medium will equally be appropriate and convenient for the teachers to operate (Westnya, 2007).

Availability, Accessibility and Utilization of Information and communication technology

In teaching and learning of situation, it is agreed that information and communication technology are important because they help teachers to enhance the quality of instructions. Availability of suitable instruction materials in good supply and in rich variety and range is essential in education and especially for the achievement of curriculum objectives Ibitoye (2021) noted some of the advantage of instruction materials in heighten motivation for learning provide freshness and variety, appeal to students varied abilities, encourage active participation, give needed reinforcement and widen the range students experienced. Dale (2000), Ofoefuda (1996), Ocho (2023) noted that some Information and communication technology facilities used in schools are:

a) The Chalk Board: The chalk board is Information and communication technology facilities. It can be adopted for large group instruction, both inside the class room and outside the classroom. It can be use all the subjects at all level of our system.

b) The Bulletin Board: This is simply a medium of passing information to the students. It is a valuable teaching tool, it is use in the classroom to motivate and supplement lesson and the basic principle of using this board is to:

i) Locate the bulletin board at a strategic position

ii) Good lighting of the display is essential

iii) Provide artificial lighting where natural light is inadequate

iv) Avoid clouding the board with too many materials

v) Have a variety of materials to maintain internally

vi) Use brief clear caption and good lettering through illustration presents.

vii) Relate the materials to class discussion and Chart.

According to Ocho (2020) charts are combination of such picture: graphic, numerical verbal materials, which together are most likely to present clear visual summaries of important process or relationships. The term chart can be applied to several different types, they may be classified according to use, functions or similarities of constructions. Specific charts can be designed for special purpose, for instance, a reading chart to assist readers to associate words with pictures a word reading charts to motivate group pictures into reading and to assist in developing eye-fixation of movement skills.

Purpose of Chart: Eya (2000) highlighted the following purpose of chart

(I) To show relationship by means of pictures facts, figures. Or statistics

(II) To represent materials symbolically

(III) To summarize information

(IV) To show continuity in progress.

(V) To presents abstract ideas in a visual form

(VI) To show the development of structures

(VII) To encourage the use of other information and communication technology.

(VIII) To create problems and stimulate thinking.

The position now however is that most secondary schools do not have information and communication technology. Apart from the sad situation, most teachers were not trained in the use of available materials.

Eze (2023) note that the federal government has recognized the importance of information and communication technology and this informed the establishment of education technology centre at Kaduna. A good Biology Science teacher should be able to teach the subject in a likely and stimulating manner.

In a bid to find alternative of making information and communication technology available for use, Dike (2020) observed that a creative teacher can construct some of the needed information and communication technology and a well teach students how to construct these materials. Okpala (2019) noted that if audio-visual materials are properly utilized, they will enable the teachers to achieve the following:

(a) Reduce verbalization.

(b) Humanized and utilized the subject matter.

(c) Stimulate self-activity, make new topics interesting

(d) Supply concrete basic conceptual thinking.

(e) Increase ability of retention

(f) Develop keen observation

(g) Foster creative imagination

(h) Lessen the burden of teaching/supporting view.

Most secondary schools do not have information and communication technology. Apart from this state of affairs, most teachers were not trained in the use such material. It is therefore, logical to believe that even the teacher training colleges, the materials do not exist or that the ones they have are outdated and obsolete. In a study on effective utilization visual aids in Biology Science, Bridge (2007) pointed out that teachers need to increase the knowledge in the field of Audio- Visual material and use them to make their lessons attractive and interesting to students.

Hence, in the selection and use of instructional resources in teaching process of Biology Science in the Nigerian secondary school, the above factors should be at the back of the mind of the teachers in order to avoid himself with advantages of using appropriate resources at his disposal in selecting the needs of the students.

Challenges in Using Information and Communication Technology

Oyedele (2014) emphasized that in everywhere, teachers need to make the fullest use of materials. She noted that one of the reasons why available materials are not used before, many teachers in schools and colleges is that the teachers lack the necessary skills to operate them. They therefore, agreed that training is also necessary in this area. Obi (2016) highlighted the problems of lack of time in the school time table for effective utilization of information and communication technology she pointed out that the present practice of 35 minutes and two periods in a week does not augur well for business subjects. She also opined that for effectiveness and efficiency in classroom and thorough supervision to be achieved the number students in class should be fifteen. Time has always

been a major constraint in the effective utilization of information and communication technology most of these materials consume a lot of time to set up and dismantle within the allowed time on the time table.

There are many challenges in using information and communication technology. These challenges include:

a. **Funds*:*** Ocho (2015) observed that "to create suitable environment for teaching and learning and produce the materials and equipment for teaching, financial outlay is a necessity". Ukeje (2011) highlighted the centrality of financial provision in the advancement of educational objectives, when he observed that the "issue of educational financing is clearly the central pivot". This is so because the vital issue of the nature, quantity, quality and efficacy of educational system largely depend on the level as well as the appropriateness and management of the financial provision.

b. **Lack of Accurate Statistical Data of the Teaching Materials*:*** Accurate statistical data of teaching materials are very important in the educational sector. Proper records of teaching materials (human and material) will help in effective management utilization and achievement of educational objectives. Some administrators fail to provide accurate and reliable data on the number of staff, learners enrolled and even materials available. These militate against effective management and utilization of teaching materials. Unreliable information on the number of teachers, learners and materials available affect planning and decision making.

c. **Poor Maintenance Culture*:*** Facilities and information and communication technology are not adequately maintained. Some administrators prefer building new classroom instead of maintaining the old ones. Laboratories and their equipment are allowed to waste, text books and other information and communication technology are allowed to rot away in the cartons, instead of displaying them on the shelves for easy retrieval and usage. The management and utilization of these teaching materials are not encouraging. There is need to re-dress the situation for effective learning to take place.

d. **Policy on Maintenance, Management and Utilization of Teaching Materials*:*** Policy provides guidelines on the type of action to be taken on any issue. Where there is no policy, administrators will act without a guide. Ehiametalor (2011) noted that "in Nigeria, there has not been a clearly defined policy on maintenance culture, either in educational infrastructural facilities or information and communication technology". This implies interlay, that lack of policy on maintenance; management and utilization of teaching materials affect the achievement of educational goals and objectives.

e. **Inadequate Facilities and Information and communication technology*:*** Students learn better when the facilities like buildings, comfortable seats for teachers and students, equipment, electricity and good water supply and information and communication technology like good libraries with books, visual and audio-visual materials are available. When these facilities are lacking, learners cannot learn well and these affect the achievement of educational objectives. The available teaching materials should be managed and utilized properly.

f. **Capacity of Teachers to manage and use Teaching Materials*:*** Most teachers are unable to update their knowledge through exposure to conferences, workshops and seminars. They do not have access to current journals, textbooks, internet facilities. They, therefore, rely on their old textbooks, notes and materials. This lack of exposure on the part of the teacher affects his/her management and utilization of teaching materials. He/she impacts outdated knowledge to the learners. The teacher should be capable of managing and using teaching materials for effective learning to take place.

g. **Allocated Time*:*** This is a big challenge in the utilization of teaching materials. In the school time table, the time given for teaching and utilization of teaching materials are very short. In fact, the teacher concentrates on the theoretical aspects and pays less attention to practical aspects. This affects the performance of the learners. The teaching-learning processes will be teacher centered instead of learners centered as stipulated in Federal Republic of Nigeria's (2014), National Policy on Education that "educational activities shall be centered on the learners for maximum self-development and self-fulfillment".

h. **Overcrowded Curriculum*:*** When the curriculum is overcrowded with topics, management and utilization of teaching materials become difficult. The teacher will be rushing to cover the topics in the curriculum and no attention will be given to teaching materials in the class. According to Ivowi (2015), the consent of the curriculum is satisfactory though overloaded. The issue is not the large content presented to the learners but the availability of time and materials for the coverage of the content. This implies that,

when the curriculum is overloaded, management and utilization of teaching materials become ineffective.

Appraisal of the Reviewed Literature

In the review, the types of information and communication technology were identified and these included printed and references materials, graphic materials, display materials, project materials, audio and other visual and community resources. The characteristics of information and communication technology were also identified as including the following appeal to senses (sound and sight), attract and hold attention, flexibility, simplicity, visibility, clarity, accuracy, sufficiency, purposefulness etc. (Yusuf, 2018). Also, the importance and uses of information and communication technology in our educational setting were treated. This is because, they are of prime importance to both dull and bright students as they aid learning by aiding the sense of seeing, hearing etc., making lesson more interesting, directing teaching to its goals, arousing students interest and motivating them to learn and develop the sense of imagination and comparison.

The factors affecting the information and communication technology usage were discussed. Among which included number of learners or students involved, the space of time available, facilities and materials available, interest and ability of Biology teachers and effectiveness of information and communication technology. Also, the problems militating against effective use of Biology information and communication technology were equally treated which included emotion and feelings, self concepts or personal or audience perception, educational level of the learners or students' cultural background,

motivation, etc.(Uwosu, 2018; Oluwatomi, 2018; Olaitan 2019 & Abimbola, 2018). Some of the criteria for selecting and evaluating information and communication technology were treated as seen or observed in our secondary schools or as related to the materials which included purpose, availability and durability, appropriateness and cost effectiveness.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter discusses the method and procedures employed in execution of the study. It analyse the sources and techniques used in the collection of data. Specifically, it discussed the following sub-headings:

- Research Design,
- Population of the Study
- Sample and Sampling Techniques,
- Research Instrument,
- Validation of the Instrument,
- Reliability of the Instrument,
- Procedure for Data Collection, and
- Data Analysis Techniques.

Research Design

Quasi-experimental research designed was adopted for the study. A quasi-experimental design tries to establish the effect of observable variable on moderating variables through the use of experimentation and describe the situation of things or events the way they are. Hence, this study intends to conduct a survey study on the effect of information and communication technology on the teaching and learning Biology in Senior Secondary Schools in Ilorin West LGA Kwara State.

Population of the Study

The target population for this study was all Senior Secondary Schools teachers and students in Ilorin West Local Government Area of Kwara State. The population size of Biology teachers in Senior Secondary School in Ilorin West Local Government Area of Kwara State fifty six (56), from 17 secondary school, with student population of three thousand eight hundred and eighty nine (3889) Senior Secondary Schools (KWTSCOM, 2016).

Sample and Sampling Techniques

A sample is listed number of elements selected from a population as a representation of the population (Ndagi, 2020). Therefore, the sample of this study comprises of ten (10) Senior Secondary Schools selected randomly from the existing seventeen (17) schools. A total of twenty (20) teachers, two (2) from each of the sample schools will be selected through stratified random sampling techniques. Also simple random sampling technique will be use to select three hundred (50) students, thirty (5) from each of the sample school. In all a total of 100 respondents made up the sample of the study.

Research Instrument

The research instrument used for this study consisted of Biology Achievement Test (BAT) and a well structured questionnaire. This BAT contained 30–multiple choice items with option A – D designed for the students. While the questionnaire was designed for

Biology Teachers. A reliability co-efficient of 0.82 was obtained for the questionnaire by using Test-retest method. This was administered to students in the experimental and control groups before and after treatment. That is, pre–test and post-test were administered to these two groups of students.

Validity of the Instrument

The research instrument was validated by the researcher's supervisor and three other experts in the Biology Department, Kwara State College of Education Ilorin. The supervisor and the experts help to established both face and content validity of the instrument.

Reliability of the Instrument

The reliability of the instrument used for the study was established by the use of test re-test method. Twenty copies of the instrument were administered twice within an interval of two weeks to respondents that was part of the final administration as a pilot test.

The scores from the pilot test were correlated using Pearson Product Moment Correlation Statistics and a reliability coefficient between 0.69 was found which was considered reliable for the study.

Procedure for Data Collection

The researcher visited the selected schools and sought the permission from the school principals or vice-principals of the selected schools as well as Head of Department Sciences and the cooperation of the Biology teachers in the schools before administering the questionnaire.

Data Analysis Techniques

The mean score, standard deviation and t-test distribution were used to compute the data collected from the selected sample. All hypotheses were tested at 0.05 level of significance or 95% certainty of prediction.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

This chapter aims at analyzing and discussing the major findings that come into being from the data collected from the field through the use of questionnaire.

Data Analysis

The following table showed the distribution of respondents.

Table 1: Distribution of Respondents by Gender (Teachers).

Gender	Frequency (No)	Percentage (%)
Male	12	60.0
Female	8	40.0
Total	**20**	**100**

Result in table 1 show that 12 (60.0%) of male teachers participated in the study while 8 (40.0%) are the female teachers sampled.

Table 2: Distribution of Respondents by Gender (Students).

Gender	Frequency (No)	Percentage (%)
Male	15	45.0
Female	35	55.0
Total	**50**	**100**

Result in table 2 show that 135 (45.3%) of male teachers participated in the study while 165 (55.0%) are the female teachers sampled.

Table 3: Distribution of Respondents by Qualification (Teachers).

Qualification	Frequency (No)	Percentage (%)
B.ED/B.SC	10	50.0
HND	2	10.0
NCE	8	40.0
OND	-	-
Total	**20**	**100**

From table 3, it shows that the teachers with qualification there NCE qualification there 8(40.0%) while 10(50.0%) have B.ED/B.SC, 2(10.0%) unit HND and none of teacher with Ordinary National Diploma (OND) certificate.

Table 4: Distribution of Respondents by Working Experience.

Working Experience	Frequency (No)	Percentage (%)
0–3 years	4	20.0
4–5 years	8	40.0
6–10 years	4	20.0
10 years and above	4	20.0
Total	**20**	**100**

Table 4 shows that 4(20.0%) of the teachers have spent 0–3 years in service, 8 (40.0%) with the highest with 4 -5 years teaching experience while 4(20.0%) and 4(20. 0%) have spent 6–10 years and 10years and above in service respectively.

Test of Research Hypotheses

Table 5 shows t-test statistics of significant difference between the academic performance of students taught with Information and communication technology facilities and those taught without Information and communication technology facilities.

Table 5: t-test statistics of Significant Difference in the Academic Performance of student taught with information and communication technology and those taught without information and communication technology

Category of students	**Mean**	**Standard Deviation**	**Calculated t-value**	**Critical t-value**
Students taught with Information and communication technology facilities	34.25	5.92	3.94	2.02
Students taught without Information and communication technology facilities	27.8	4.30	-	-

d.f=38levelof significant: 0.05

Table 5 Shows t-test statistics of significant differences between the academic performance of students taught with Information and communication technology facilities and those taught without Information and communication technology facilities. From the

table shows that calculated t-value (3.94) is greater than critical–t value (2.02). This implies that there is significant difference between academic performances of students taught with information and communication technology compared with those taught without information and communication technology. The significant difference shown by the experimental group over the control group could be directly linked to the application of information and communication technology which facilitated learning among students constituting the group.

Table 6 shows t-test statistics of significant difference between pre-test and post test score of students taught with information and communication technology.

Table 6: t-test Statistics of Significant Difference Between Pre-Test and Post-Test Scores of students taught with information and communication technology

Type of test score	**Mean**	**Standard deviation**	**Calculated t-value**	**Critical t-value**
Pre t-test	28.15	7.85	-2.79	2.02
Post t-test scores	34.25	5.3	-	-

d.f =38 level of significant: 0.05

Table 6 shows that there is no significant difference between the pre-test and post–test scores of students taught with information and communication technology facilities. The hypothesis was accepted on the fact that the use of information and communication technology had further enhanced the acquisition of knowledge imparted the students.

The mean scores of post test score (34.25) of these students taught with Information and communication technology facilities was higher compared with their pre test scores (28.15); though no significant differences was recorded between both scores (i.e pre-test and post–test scores).

Table 7: t-test statistics significant difference between pre-test and post-test scores of male and female students

Gender post test score	**Mean**	**Standard Deviation**	**Calculated t-value**	**Critical t-value**
Male	35.8	4.90	-	-
Female students	32.7	5.48	1.33	2.10

d.f =18 level of significant: 0.05

With regard to gender, the result got from analyzed data indicated no significance in the achievement of male and female students in Biology, when taught with information and communication technology (Table 7), calculated–t value (2.10) > critical–t value (1.33). This finding is similar to the findings that had shown causal links between instructional strategies and achievement in science and Biology (Danmole and Adeoye (2015), Danmole and Adebayo, (2016), Zywica and Gomez, (2007), Lameed, (2018).

Discussion of Findings

Table 5 shows that calculated t-value (3.94) is greater than critical–t value (2.02). This implies that there is significant difference between academic performances of students taught with information and communication technology compared with those taught

without information and communication technology. The significant difference shown by the experimental group over the control group could be directly linked to the application of information and communication technology which facilitated learning among students constituting the group. The result of the study was similar to the view held by MKpa (2023) in which he referred to information and communication technology as devices that help the teacher to convey the intended message effectively and meaningfully to the learners so that the learners receive, understand, retain and apply the experience gained to reach overall educational goals.

Hence, the experimental group performed better than the control group. The control group was not exposed information and communication technology during teaching–learning process, has also proven by Danmole and Lameed (2014).

Table 6 shows that there is no significant difference between the pre-test and post–test scores of students taught with information and communication technology. The hypothesis was accepted on the fact that the use of information and communication technology had further enhanced the acquisition of knowledge imparted the students.

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This finding is also similar that of Bassey (2015), who also found that there was no significant effect of gender on students' achievement in Biology. The result revealed by this study, implies that both male and female students achieved equally under the same condition during learning and teaching process, since achievement has to do with mental and intellectual ability and not gender, it could be deduced that there was no significant interaction effect of treatment (information and communication technology) and gender on student achievement in Biology.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

This research was a survey work on the availability and use of information and communication technology in teaching and learning of Biology Science in Ilorin West Local Government Area.

From the finding, it was revealed that student taught with information and communication technology perform better than those taught without information and communication technology there for there is a significant difference in the performance student taught with information and communication technology and those taught without information and communication technology in Biology in senior secondary school in Ilorin West LGA, Kwara State.

Similarly there is a significant difference between pre-test scores and post-test scores of student taught with Information and communication technology facilities, this implies that statistical differences in the pretest and post test scores of student in Biology as a result of utilization of Information and communication technology facilities. This lead to the rejection of the corresponding hypotheses (HO_2). Thus, there is significant difference between pre-test scores and post–test scores of students taught with information and communication technology.

The findings also revealed that there is no significant difference between the post-test scores of male and female students taught with information and communication

technology, this implies that there is no significant difference between the post test and pre test score of student in Biology on basis of gender (male and female).

Conclusion

Based on the finding and analysis of this research work, it was concluded that;

- There is significance difference in the opinion of respondents regarding availability and usage of information and communication technology for teaching and learning of Biology in senior secondary school.
- There is significance difference in the opinion of respondents regarding availability and accessibility of information and communication technology for teaching and learning of Biology Science at senior secondary school.
- There is significance difference in the opinion of respondents regarding challenges and utilization of information and communication technology in senior secondary school.

Implications of the Study

The findings of this research could have implications both for understanding teachers' perceptions and attitudes towards the utilization of Information and communication technology facilities in teaching and learning process, the different aspects, roles, tasks and components of their profession and for supporting teachers to develop positive perceptions and attitudes of their profession. This fact could be a starting point to develop and implement of strategic actions focused on how teachers can be more engaged

and retained in their job, and can be implied to participate to their continuous professional development to become more efficient, competent and professional teachers.

Recommendations

Information and communication technology are important materials needed for the realization of instructional objectives and education goals, thus the level of use of these resources in teaching and learning should be improved upon in view of the conclusion drawn. However, it was recommended that;

1. Curriculum planners and implementation and educational policy makers in should sanitize the school and teachers on the need to put more emphasis on utilization and improvising of resources materials in teaching and learning of Biology subjects.
2. The Kwara State Government as a matter of policy should recruit more qualified graduate teachers to teach at senior secondary school level most especially Biology Science.
3. Information and communication technology are important materials needed for the realization of instructional objective and education goals, thus the level of use of information and communication technology should be improved upon in view of the data analysis.
4. Adequate information and communication technology should be provided for effective teaching and learning process. The government as a matter of policy should recruit more qualified graduate teachers and retained of materials teachers to

help teaching effectively, information and communication technology to make teaching more effective in secondary schools, most especially in Biology Science.

5. Criteria for information and communication technology selection should be based on it suitability to function for the purpose it is designed for.
6. The existing education materials centre in all the state should be reactivated, well equipped and made easily accessible to the students and teachers for effective usage.

Limitations of the Study

The major limitation of the study is confinement to selected secondary school in Ilorin West LGA, Kwara State, out of six geopolitical zones in Nigeria, as a result of financial and time constraints. The researcher would have wanted to know what is applicable in other secondary schools. Hence, other secondary school would be considered applicable to other zones but with caution.

Suggestions for Further Studies

The research for further studies could be carried out in the following area:-

Effect of the use of information and communication technology on the students' academic performance in primary and secondary schools should be compared.

The place of information and communication technology on the quality of instructional delivery in Biology Science teaching and learning in selected secondary schools in Ilorin West LGA, Kwara State.

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QUESTIONNAIRE

INFLUENCE OF INFORMATION AND COMMUNICATION TECHNOLOGY ON EFFECTIVE TEACHING AND LEARNING OF BIOLOGY IN SELECTED SECONDARY SCHOOLS IN ILORIN WEST LGA KWARA STATE

Dear Respondents,

I am conducting a research work on influence of information and communication technology on effective teaching and learning of Biology in selected Secondary Schools in Ilorin West LGA Kwara State.

It will be highly appreciated if this questionnaire is completed as requested. Information given by you on this questionnaire is meant for research purpose and will be treated as strictly confidential.

Please respond to the items honestly as possible.

Yours faithfully,

SECTION A

PERSONAL DATA

Instruction: Please kindly tick (√) the appropriate answer in the space provided below:

1. Class Taught: (a) SSI ( ) (b) SSII ( ) (c) SSIII ( )
2. Sex: (a) male ( ) (b) female ( )
3. Qualification (a) B.ED ( ) (b) B.SC (ED) ( )
4. Teaching Experience (a) 0 -5 years ( ) (b) 6-10 ( ) (c) 10 years above ( )

SECTION B

Instruction: Please respond to the questionnaire as honest as possible by ticking (√) the suitable answer as applicable to you. Use the key below.

SA- Strongly Agreed, A - Agreed, SD - Strongly disagreed, D- Disagreed.

S/N	ITEMS/STATEMENTS	SA	A	SD	D
	Availability and Usage of Information and communication technology facilities				
1.	The school provides adequate and relevant materials for teaching of Biology Science.				
2	Information and communication technology facilities such as; chalkboard, bulletin board are available.				
3.	There are resource centres in the school which support the use of materials for teaching, learning processes.				
4.	Most information and communication technology available in the school were obsolete and not relevant in teaching of Biology Science.				
5.	Uses of information and communication technology provide effective focus for student in Biology Science.				
6.	Most information and communication technology available were not properly utilized by teachers in the school.				

	Accessibility of Information and communication technology facilities				
7.	Information and communication technology provided by the schools were constantly accessed and utilized by Biology Science teachers.				
8.	Teachers' lack the skill to use the available Information and communication technology facilities.				
9.	Lack of awareness on the availability of information and communication technology prevents their usage for instructional purposes in Biology Science.				
10.	Teachers become more effective when they use appropriate materials.				
11.	Flexibility of Information and communication technology facilities promotes teacher's access and utilization.				
12.	Accessibility and utilization of Information and communication technology facilities encourage student to offer the subject and make lesson delivery easier.				
	Challenges in utilizing information and communication technology				
13.	Teachers do not have basic knowledge and skill for effective utilization of the information and communication				

	technology.				
14.	Time has always been a major constraint in the utilization of information and communication technology.				
15.	Poor funding for the maintenance and acquiring more up-to-date equipment.				
16.	Lack of accurate statistical data on available Information and communication technology facilities creates some challenges to level of utilization.				
17.	Most information and communication technology available are obsolete.				
18	Lack of building and other support facilities for the use of information and communication technology make learning difficult.				