FACTORS HINDERING EFFECTIVE TEACHING OF BIOLOGY IN SECONDARY SCHOOLS

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF CURRICULUM OF INSTRUCTIONAL TECHNOLOGY, UNIVERSITY OF BENIN, BENIN CITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc.) DEGREE IN BIOLOGY

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CERTIFICATION

We, the undersigned, certify that this research project was carried out by FAVOUR ESEOSA OWOBU in partial fulfillment of the requirements for the award of Bachelor of Science (B.Sc.) Degree in Biology of the University of Benin, Benin City, Nigeria.

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DEDICATION

This study is dedicated to Almighty God for giving me the wisdom, strength, and resources to complete this work.

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ABSTRACT

This study was intended to examine the factors hindering the effective teaching of biology in the secondary schools in Edo state. This study was guided by the following objectives; to highlight and discuss the relevance of well-equipped laboratory to the teaching of biology in the secondary schools, to identify the impact of regular test/assessments both practical tests and problems-type tests on students' proficiency in biology and to ascertain the effect of the use of professional biology teachers (resources teachers) on the teaching of biology in secondary schools. The study employed the descriptive and explanatory design; questionnaires in addition to library research were applied in order to collect data. Primary and secondary data sources were used and data was analyzed using the chi square statistical tool at 5% level of significance which was presented in frequency tables and percentage. The respondents under the study were 100 staff/teachers in Ovia North-East local Government Area in Edo state, Nigeria. The study findings revealed that there is are problems of teaching biology in senior secondary school in Ovia North-East local Government Area in Edo state; based on the findings from the study, government should equip laboratories while principal should provide biology teachers with fund for consumables.

CHAPTER ONE

INTRODUCTION

Background to the Study

The study of biology is essential for national construction, scientific and technological development. Without solid understanding and a healthy attitude towards biology, the much needed and vouched technological breakthrough may not be achieved. For example, biological knowledge is involved in the manufacturing and processing industry, medicine, food production, and pharmaceuticals among others. Osuafor and Okoro (2013) said that science education is imperative for useful living in any society. It is the center of production of the resources needed for the socio economic, scientific, and technological development of every nation.

From the above, in spite of everything that has been said about the factors that inhibits the effective teaching of biology and has caused a lot of backward and poor academics performances of senior secondary school student in Edo state and Nigeria entirely. The result of this persistent poor performances of students in biology due to many factors have created a larger percentage of them to fail to get good grades that will take them to higher

educational establishment. This posed a problem to well-intentioned Nigerians, parents, governments, researchers and scientific educators.

Researchers in science education in Nigeria continued to look at ways to improve the situation and maximize meaningful learning of biology by students. Biology is described as a science of life and plays vital roles in the life of every human being. It is very broad and contains a number of divisions including zoology, botany, ecology, genetics, morphology anatomy, physiology histology, microbiology, biochemistry evolution and the more advanced cell biology, molecular biology among other. Besides the inter-relationship that exists between these branches, Biology is closely related to other science subject like agricultural science, chemistry, Geography, mathematics and physics. It is not surprising that biology finds application in many specialized fields like medicine, pharmacy, food production and processing industries, biotechnology, genetics engineering, agriculture and horticulture, agriculture and environmental protection, tourism industry among other (Osuafor and Okoro 2013).

Looking at the many branches of Biology and its extensive application in all areas of human activity, one cannot overemphasize the importance of biology in the economic development of nations. It thus becomes very necessary that efforts be directed towards finding a lasting solution to the poor academic performance of students in the field. To this end, a number of factors have been identified by researchers as being responsible for the effective teaching and learning which certainly lead to poor performance. These includes

the following; lack of qualified and experienced teachers, lack of educational instructional materials like textbook, visual and audio visual aids, laboratories, conducive learning environment, over loaded syllabuses, lack of interest on the parts of the students, poor teaching method/interaction pattern on the parts of the teachers, large class size/high teacher, family background (Nwagbo, 2011).

Ncharam (2008) found that student's inability to sit down and study, to understand what the curriculum was about and this was highly correlated with poor performance in external examination. This also results in general backwardness in technological and scientific advancement. Akpan (2009) rightly documented that proper understanding of concepts in Biology related courses contribute to no small measure to better academic achievement of students. He further said, for these students there is therefore no nature of manipulated questions that could be asked to them in that particular concept that they cannot provide solutions to, since they are familiar with and regularly practice the concept in question. This would allow the students the opportunity to think ethically, manage and use available resources in their environment effectively to develop the Nation. This study is finding out if ill-equipped laboratory, shortage of classroom furniture, sex of the teacher, shortage of evaluation materials in secondary schools.

Statement of the Problem

The underperformance of secondary school students in biology examinations (such as in SSCE and JAMB examinations had been a matter of concern to parents, government and the Nigerian society in general. This is because Biology is one of the most important subjects of science as it addresses life and living things. Furthermore, a good understanding of Biology will prepare the student for the course of study on such vital courses as medicine, pharmacy, microbiology, nursing and many others. In spite of all the efforts being made by the government in improving the performance of biology students, the problem still remains. Why can't students use the knowledge of Biology to solve problems outside the classroom? The problem of underachievement may be caused by lack of effective teaching. Hence, this study wants to find out if ill-equipped laboratory, shortage of classroom furniture, sex of the teacher, or shortage of evaluation materials hinders effective teaching of Biology in secondary schools in Ovia North-East local Government of Edo state, Nigeria.

Research Questions

This study was guided by the following research questions:

1. What are the factors hindering effective teaching of Biology in secondary schools?

2. Is there a difference in factors hindering effective teaching of Biology between public and private schools?
3. Is there a difference in factors hindering effective teaching of biology between urban and rural schools?
4. Is there a difference in factors hindering effective teaching of Biology between large and small-scale schools?

Purpose of the Study

The purpose of this study is to find out if :

1. The factors hindering effective teaching of Biology in secondary schools.
2. If there is difference in factors hindering effective teaching of Biology between public and private schools.
3. If there is difference in factors hindering effective teaching of Biology between urban and rural schools.
4. If there is difference in factors hindering the effective teaching of Biology between large and small scale schools.

Significance of the Study

The results of this research if implemented will benefit both the teachers and the students in many ways. Firstly, this study will stimulate students understanding on

the subject biology and will enhance their performance in biology examinations. It will also assist teacher educators in developing an effective training programme for the teachers to improve their skills such as workshops, seminars, conferences etc. Secondly, the study will reduce the excessive workload of the teachers and will provide them with more time to effectively access the students' competence.

Scope and Delimitation of the Study

The purpose of this study is on the assessment of factors hindering the effective teaching of biology in the secondary schools. This study used biology teachers of the state owned secondary schools located in Ovia North-East L.G.A. of Edo state.

Definition of terms

The following terms are operationally defined as used in the study:

BIOLOGY: It is the scientific study of life and the structure of plants and animals and their relative environments.

EFFECTIVE TEACHING: A term used to describe the knowledge, strategies and conduct of a successful educator.

LABORATORY: A room or building equipped for experimental study, teaching or analysis.

TEACHER-STUDENT RATIO: It is the number of students who attend a school divided by the number of teachers in the school.

URBAN SCHOOLS: Are schools within Benin city.

RURAL SCHOOLS: Are schools outside Benin city.

LARGE SCHOOLS: Are schools above the population of 500 students.

EVALUATION MATERIALS: A collection of materials that a teacher may use in teaching and learning situations to help achieve desired learning objectives.

SMALL SCHOOLS: Are schools below the population of 500 students.

PUBLIC SCHOOLS: A school supported by public funds.

PRIVATE SCHOOLS: A school supported by a private organization or private individuals.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

A review of related literature is presented under the following headings:

Concept of Biology, effective teaching, Biology laboratory, instructional materials, sex and teaching of Biology.

Concept of Biology

Biology as part of science refers to study of plants and animals. The knowledge of biology as a subject by secondary school students makes them knowledgeable and motivated to assume roles in which the practical and theoretical aspects are used to unravel some basic issues of life (Ude, 2011). But biology curriculum is full of abstract concepts such as photosynthesis, osmoregulation, genetics and osmosis. They cause common problems in conceptual teaching in biology lessons. The Chief Examiners' Report of WAEC and NECO 2013, 2014 and 2015 identify the poor performance of science students, including biology students. This requires urgent consideration if we are to deal with the challenges and rapidly growing wealth of scientific knowledge and sustainable development goals (SDG). We urgently need to innovate in the way we teach. There is need for a renewal of the biology curriculum which will base on constructive learning approach.

Biology as a distinct science was developed in the nineteenth century when scientists found that organisms shared fundamental traits. Biology is now a standard subject in schools and universities around the world and more than a million papers are published each year in wide array of Biology and medicine journals, (crystyl 2011). Also, Ambuno, Egunyomi and Osakwe, (2008) stated that Biology lies at the foundation of disciplines such as human medicine, veterinary medicine, nursing, Agriculture, forestry, pharmacy, food technology, laboratory science technology, biological weapons and human nutrition

Most of the biological sciences are specialised. Historically, they are grouped according to the type of organism being studied: Botany (the study of plants); Zoology (the study of animals); Microbiology (the study of microorganisms). The domains of Biology are then divided on the basis of the scale at which organisms are studied and the methods employed to study them (Adeniyi, 2004).

1. Biochemistry is concerned with the basic chemistry of life;
2. Molecular biology researches the complex system interactions of biological molecules;
3. Cell biology deals with the basic component of all cell life;
4. Physiology considers the physical and chemical functions of the tissues and organ systems of an organism; and

5. Ecology looks at how diverse organisms and their environment are interrelated.

Biology is a part and parcel of daily life. Any advances in medicine, dealing with environmental issues, or Biotechnology is about understanding living organisms, great, medium, and small (Bichi, 2003; Kalu & Ndokwo 2006).Although our primary objective is simply to ensure the survival of the human species, we still need to be able to understand and support the biosphere. The greenhouse effect and climate change are two threats to our biosphere (Crystyl, 2011). According to Okeke, (2007), it would be absolutely hopeless to attempt to maintain the diversity of life on earth in the future without a decent understanding of Biology. In order to maintain the fragile balance of life on earth, it is first necessary to understand that we are not alone on this plane. We must learn more about the impact we have on our environment and other living creatues. Moreover, the extinction of any species can disrupt the balance of an ecosystem. Consequently, it must be understood that all our actions have an impact on other organisms and on the environment (Crystyl, 2011).

Biological concepts (Physiology, Ecology, molecular Biology, Biochemistry, Chemical Biology among others) require many different method or strategy to teach effectiveness. For example, lecture method can be used in parallel with indoor laboratory teaching strategy in the teaching of Physiology which examines

the physical and chemical functions of the issue and organ systems of an organism. This conception ecology deals with the wisdom of the science between organisms and their environment. Teaching and learning the concept (Ecology) requires a strategy which requires direct measurement, identifying, communicating, predicting, observation of organisms in their natural surroundings, this strategy is called inquiry-based teaching strategy. This investigative teaching strategy can help students use the process skills and study things in their natural environment. As a result, this study examined the effects of inquiry-based instruction in development of process skills, interest and performance in biology among secondary school students.

Biology practical lessons are important for understanding biological concepts. While science teaching aims at improving students understanding of the natural world by students and how it works then the students have to experience and observe the relevant science phenomena. Recent studies advocate for a change in teaching methods so that students participate fully and understand difficult science concepts (Millar, 2010). Students must understand processes and structures; develop skills in handling, processing of science information and conducting scientific investigations. Therefore, the teaching methods like learner design, reciprocal, inclusion, divergent and self-check could enhance the teaching of Biology practical lessons (Capel, Leask & Turner, 2009).

Ormrod (2000) insists that in science education, students are exposed to first-hand experience of the scientific inquiry process as well as constructing conceptual knowledge through a designed student-centred investigative method. As a result, the learning process is generally considered to be more important than the development of evidence-based knowledge in student-centered methods. Discovery learning as a method of inquiry-based learning enables students to actively participate in the study of a subject or issue, obtaining appropriate information, interpreting causes and effects where necessary, and reaching the conclusions or solutions.

However, it has was found that inquiry-based instruction requires the most expert teachers and that it is necessary to prepare novice teachers in several areas of teaching, including pedagogic content knowledge, students' knowledge, and classroom management knowledge. In Zimbabwean secondary schools, most Biology teachers are not experts, they are graduates who have thorough knowledge in content but lack teaching methodology (Mulkeen, 2010).

Instructional Materials

In order for Biological practical lessons to be taught effectively, teachers are advised to use instructional materials. Some of the materials that could be used by teachers include virtual laboratory, realia, models and mock-ups, phenomenal materials and manipulative materials (Kishor, 2003).

Many researchers see virtual reality technology as a source of new knowledge to sustain education. Collaborative learning environment where students are actively engaged in their learning by using animations and simulations for abstract topics offers students opportunities to easily construct and understand challenging concepts (Tüysüz, 2010). By using virtual laboratories or simulation programmes, minimises problems encountered in ordinary laboratory applications and results in achievement of educational objectives. Thus, a study conducted in Turkey by Tüysüz (2010) revealed that use of virtual laboratories has increased students achievement levels and influenced the attitudes of students positively towards science education.

Realia such as specimen, exhibits, and cut-away objects have great value in every subject including Biology. Using realia can do a lot to encourage student's interest in life sciences. Realia eliminate distortion in student's knowledge on the topics being taught. Additionally, phenomenal materials such as community engagement, field trips and service learning result in educational benefits by enabling students to interact with community members, exposing students to environments which might be hard or impossible to imitate in the classroom (Tortop, Uzunkavak & Ozek, 2009). One way to increase student engagement is the use of manipulative materials during instruction (Bello, 2015). A study by Ruffato (2012) in United States of America, showed that when students were using practical methods of learning biological processes, they were more involved than with previously used

methods like lecture and following drawings on the board and performed well in short term assessments of knowledge.

Learning Science: Biology

The argument developed in the teaching of biology in particular, the view that a large portion of the scientific knowledge we want to teach in school is commonly agreed and beyond reasonable dispute, might be read as implying a 'transmission' view of teaching and learning – that the goal is to 'transfer' the knowledge in the teacher's mind into those of the students. But this does not work. Where the teaching of abstract ideas is involved, transmission does not work. The learner has to play an active role in the transfer of the new knowledge. He or she must understand the experiences and discourse of the science class and use it to 'construct meaning'. In this constructivist view of learning, however, the knowledge that we want the students to construct is already known to the teacher all through. The teaching laboratory is therefore very different from the research laboratory, as Newman (1982) points out.

Learning science at the school level is not the discovery of ideas that are new and known. Instead, it is making what others already know your own Goethe (2010). The difference, from a cognitive perspective, is like that of solving a puzzle and having the solution explained to you by someone who already knows it. The first has to do with pursuing several lines of reasoning, and there is no

guarantee of eventual success, whereas the second is convergent and with a sure outcome. But there is still cognitive work to be done to understand it, so as to be able to explain it in turn to someone else, or to apply it to new situations.

An implication from this point of view is that practical tasks to develop the scientific knowledge of students should be seen, and judged, as acts of communication and not as opportunities for enquiry. The primary criteria which a practical task of this sort should satisfy is that is an effective way of communicating the idea(s) it is designed to convey. How, we might ask, and how effectively, does it surpass other forms of communication (verbal, graphical, pictorial, symbolic) that teachers might use. By 'communication' here, I do not simply mean acts of 'telling', but the variety of activities that a teacher intends to encourage and support students as they try to construct personal meanings that are more closely aligned with the accepted scientific point of view.

Effective practical work to develop students' scientific knowledge.

The idea of 'effective' practical work was discussed several times previously. It may be useful to clarify what we mean by the term 'effectiveness'.

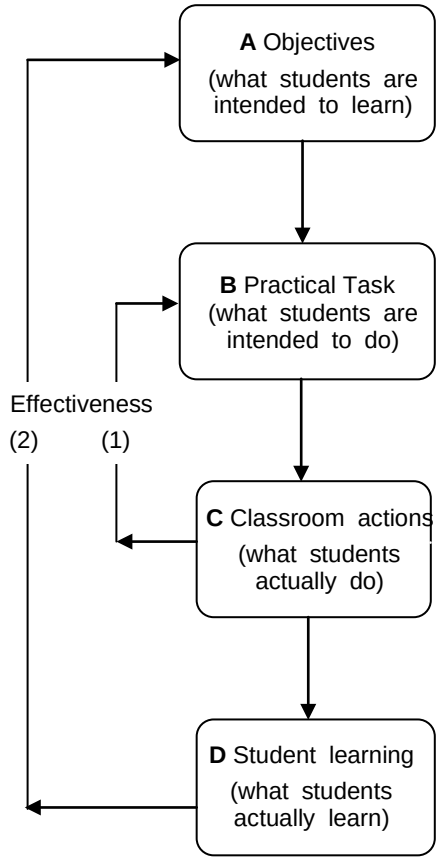

Figure 4 The process of developing and implementing a practical task (from Millar et al., 2002)

Figure 4 shows four stages in the development and implementation of a practical task. 'Effectiveness' refers to the link labelled (2): do students learn what we intended them to learn? But in order to be effective in this sense, a task must first be effective at level (1), that is, the students must do (and be able to do)

the things the task designer intended them to do. A common criticism of practical work in the teaching laboratory is that it becomes 'recipe following', with the students often not bothered about *why* they are doing what they are doing. The provision of well-detailed 'recipes' is a reflection of the teacher's (or task designer's) concern with effectiveness at level (1). Whilst this is an important condition for effectiveness at level (2), it is not a sufficient one. As discussed above, explicit design features are often needed to help students use their observations to draw the intended conclusions.

Problems Encountered in Learning Biology

The ability to think adaptively and reason about complex problems requires weighing questions and arguments and considering different points of views (Dole & Sinatra, 1998). Adolescents generally have the ability to reason and think critically, but this ability must be encouraged for most students to engage with information in a critical fashion.

Even if a teacher provides the right environment to support critical scientific thinking and reasoning, students often lack the necessary background knowledge to do so effectively. The ability to reason effectively and adapt to different situations requires rich, interconnected, domain specific knowledge. Today's curricula are often characterized as a mile wide and an inch deep (Vogel, 1996). Lack of

sufficient domain specific content knowledge makes the task of thinking very challenging if not impossible.

Asides skills and abilities, and perhaps even more important for the adolescent learner, adaptability requires the willingness to partake in the effortful thinking necessary to consider alternative points of view. Some students are dispositional and in "need for cognition" (Cacioppo, Petty, Feinstein, & Jarvis, 1996). That is, they do not look for nor do they enjoy opportunities to engage in the effortful thinking required to solve complex problems.

Even if students are willing to do the "heavy lifting" required to think deeply about alternative scientific points of view, they must also be willing to have their ideas publically questioned, which can be psychologically uncomfortable for learners of all ages. Public challenges to one's point of view can be particularly difficult for adolescents who are especially sensitive to the way they are perceived by their peer group members (e.g., Brown, 2004; Ladd, Herald-Brown, & Reiser, 2008), and may lead adolescents to develop maladaptive performance avoidance goals (Middleton & Midgley, 1997). Moreover, challenges to one's point of view can be emotionally difficult, and in some cases can even been seen as a threat to one's identity. For example, learners who perceive their world view or religious beliefs as threatened by scientific perspectives may feel that accepting the new point of view is a threat to their identity. That is, they may ask themselves, "If

I accept what the teacher is saying, do I have to change who I am as a person?" (Brem, Ranney, & Schindel, 2003).

Key to understanding that ideas that are the subjects of change, rather than students' personal identities is the development of an appreciation of the nature of scientific argumentation (Dushl & Osborne, 2002, Kuhn, 1993). Students differ in their willingness to partake in argumentation. Nussbaum and Bendixen (2003) demonstrated that less assertive students often actively avoid engaging in arguments. Other students may not see argumentation as an academic exercise because they view arguments through the lens of the more common vernacular of a conflict or an adversarial interaction involving winners and losers (Dushl & Osborne, 2002; Nussbaum & Jacobson, 2004).

Realizing the need to change and the willingness to change one's thinking are hallmarks of adaptability. This requires a view of knowledge as changing and an open minded attitude towards change of knowledge . This can be a challenge for adolescents who are typically just coming out of the absolutist stance towards knowledge (the view that there are certain and simple right answers to problems) and thus experiencing epistemic doubt (Mason, Boldrin, & Zurlo, 2006). That is, they are beginning to doubt the certainty of knowledge and tend to adopt a relativistic view that all knowledge is in doubt. This can be a dangerous perspective which can lead to a view that all opinions are equally valid and no

one knowledge claim is better than any other. This presents difficulties for students' understanding that competing scientific claims must be adjudicated on the base of the superiority of the evidence.

Sex of the Teachers and the Teaching of Biology

Ahmed,A.A (2001) in her own opinion said female students most often drift into or are guided towards areas of study regarded as female field like Teaching, Nursing, Library, Art and Secretarial studies which were considered as female occupations and shy away from areas like Engineering, Medicine etc. She said this result in low participation in Sciences, Technology and Vocational education because these areas are perceived to be exclusively meant for men.

Ajao and Aina (2001) said there is a wide gap between the girl-child and the boy-child going to school. Females' minds are tailored toward less economically viable courses leaving such courses like Engineering, Medicine, Mathematics etc. to men.

Olarewaju (2006) believed that there is different in achievement of boys and girls in science, Bamidele (2001) also said most girls have been found to underestimate their academic ability and believe boys to be more capable of handling difficult subjects in science like mathematics. Amusat and Awoyemi (2006) believed that gender difference has an influence on students' level of achievement in school.

Millar (2004) defined ‘practical work’ as any teaching and learning activity which involves at some point the students in observing or manipulating real objects and materials.

Jimoh (2000) believed that laboratory experience promote manipulative skills, cognitive abilities like critical thinking, problem solving etc. It improves positive attitude toward science such as curiosity, interest, risk taking etc. It helps to achieve better understanding of the nature of science. According to Millar (2004) practical work is important for giving students a ‘feel’ for the problematic of measurement, and an appreciation of the everpresence of uncertainty (or measurement error).It is also an essentialt tool for teaching about experimental design. Millar et al. (2004).in Millar (2004). said the role of practical work in the teaching and learning of science content is to assist students to make links between two ‘domains’ of knowledge: the domain of objects and observable properties and events on the one hand, and the domain of ideas on the other.

Practical work is an integral part of the study of physics; it will initially be assessed through the medium of the written examination paper. An element of practical assessment may be included in the overall assessment at a later stage National Council for Curriculum Association (1990).

Bello (2002). opined that laboratory method in science is designed to assist students acquire some basic scientific skills and techniques to develop problem

solving ability. Kallats (2001) sees practical works as a means of verifying a science principle, or theory already known to the students, a means of determining the relationship between cause and effect and a means of obtaining and learning scientific information. Tiberghien, A, Veilard, L,Marchal,J.F & Buty, C. (2001) said that practical work is an important part of teaching Physics in most countries around the world.

Summary of Reviewed Literature

This study examined the concept of Biology as a science subject, the importance of biology practical lessons, instructional materials, sex and teaching of Biology.

Biology is a natural science concerned with the study of life and living organisms. It is a part of daily life. It encompasses diverse field including botany, conservation, ecology, evolution, microbiology, molecular biology, physiology and zoology.

Development of practical skills, gaining first-hand experience of materials, organisms and processes may increase students understanding of Biology and help retention of knowledge. In order for biology practical lessons to be taught effectively, teachers are advised to use instructional materials. The teaching of biology without instructional materials may certainly result in poor academic achievement.

In subjects like Biology, sex of the teacher seems to influence students' academic performance generally. The teaching process in biology can vary greatly in terms of teaching approaches and strategies.

Male teachers teach differently from female teachers, It is believed that the female teachers are better at teaching subjects like Biology while the male teachers are better at subjects like mathematics, physics or other engineering related subject. Olarewaju(2006) believed that there is a difference in achievement of boys and girls in science. Most girls have been found to underestimate their academic ability in while boys are believed to be more capable of handling difficult subjects in science like mathematics. Over the years, most female students drift into areas of study that is considered feminine like Teaching, Nursing, Library arts while courses like engineering medicine and mathematics are left to the men.

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

Research methodology is organized under the following sub-headings ; Research design, population if the study, sample and sampling technique.

Research Design

For this study, a descriptive design was used. The design choice was guided by the purpose of the study as outlined in chapter one. This research design provides a quick and accurate way to evaluate information about a population of interest. It intends to study the factors hindering the effective teaching of biology in the secondary schools in Ovia North-East local government area in Edo state. The study will be conducted in Edo state.

Population of the Study

The population for this study were biology teachers in Ovia North-East local Government Area in Edo state, Nigeria. A total of 134 biology teachers form the population of the study.

Sample and Sampling Techniques

100 biology teachers were randomly selected from the population of 134 biology teachers. The reason was due to financial challenges and time limitation.

Simple sampling technique (balloting) was used to select the samples from the population.

100 teachers was randomly selected from a total of 134 teachers, each teacher had a very high chance of being selected. A list of all the population members were listed out and marked with a specific number, the researcher chose 100 teachers using the balloting method.

The researcher draws out numbers from the box randomly to choose samples. Data collected through this sampling method is well informed and it allowed the researcher to provide each member with a unique number and it is not bias. This sampling method also helped researcher to avoid repetition for each teacher.

Research Instrument

Research instrument used was biology teacher's questionnaire which was designed to elicit information on the factors hindering the effective teaching of biology in the secondary schools in Ovia North-East local government area in Edo state. The questionnaire was used as an assessment tool to gather biology teachers opinion on how biology laboratory, classroom furniture, teacher-student ratio, evaluation materials and teacher quality hinders the effective teaching of biology in secondary

schools. Questions that address the research objectives were created. The secondary source of data collections were textbooks, journals and scholarly materials.

Validity of Instrument

The instrument was subjected to face validation. In subjecting the instrument for face validation, copies of the initial draft of the questionnaire will be validated by supervisor and two lecturers in the department. The supervisor will critically examine the items of the instrument with specific objectives of the study and make useful suggestions to improve the quality of the instrument. Based on his recommendations, the instrument will be adjusted and re-adjusted before being administered for the study.

Reliability of Instrument

The coefficient of 0.81 was considered a reliability coefficient because according to Etuk (1990), a test-retest coefficient of 0.5 will be enough to justify the use of a research instrument. The reliability of instrument was assessed by calculating correlation between the scores of two sets of questionnaire, through test-retest reliability technique.

Method of Data Collection

There were six steps used in administering the questionnaire that was used in Ovia North-East Local Government.

The first step is determining the research objectives or purpose of study; questions were created based the purpose of the study

The second step is determining the question format. Dichotomous question format was used because it is the simplest form closed-ended questions and are less difficult to edit.

The third step is writing clear questions, Using simple words and proper grammar.

The fourth step is designing the question flow, The researcher devoted considerable thought towards the logical flow of questions.

The fifth step is evaluation of questionnaire, The researcher focused this evaluation on three questions.

1. Are the questions necessary?
2. Is the questionnaire too long?
3. Will the questionnaire provide all the needed information?

The last step is the preparation of final questionnaire. At this stage, the researcher reviewed and revised the questionnaire

Method of Data Analysis

Data collected was analyzed using content analyzed using mean and percentage score analysis.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

This chapter focuses on presentation of results and discussion of findings.

RESEARCH QUESTION 1:

TABLE 1: Percentage analysis of factors hindering effective teaching of Biology.

FACTORS	N	PERCENTAGE(%)	REMARK
Ill-equipped Biology laboratory	42	42%	Very high
Classroom/furniture	32	32%	High
Teacher-student ratio	10	10%	Very low

Evaluation materials	45	45%	Very high
Teacher characteristics	15	15%	Low

Table 1 above shows the percentage analysis of factors hindering effective teaching of Biology in secondary schools. A total of 42 respondents representing 42% strongly agree that ill-equipped Biology laboratory affects the teaching and learning of Biology. 32 of the respondents representing 32% agree s that classroom/furniture affects teaching and learning of Biology.

10 of the respondents representing 10% slightly agree that teacher -student ratio affects the teaching of Biology. 45 of the respondents representing 45% strongly agree that Evaluation materials affects the teaching of Biology. 15 of the respondents representing 15% agrees that Teacher-Characteristics affects teaching and learning of Biology.

RESEARCH QUESTION 2:

TABLE 2: Percentage analysis of the difference in factors hindering effective teaching of Biology between public and private schools.

VARIABLE	N	PERCENTAGE(%)	REMARK
Public schools	55	55%	Very high
Private schools	45	45%	High

Table 2 shows the percentage analysis of the difference in factors hindering effective teaching of Biology between public and private schools. 55 of the respondents representing 55% for the public schools and 45 respondents representing 45% for the private schools. This shows that there is a significant difference in factors hindering effective teaching of Biology in public and private schools.

RESEARCH QUESTION 3:

TABLE 3: Percentage analysis of the difference in factors hindering effective teaching of Biology between Rural and Urban schools.

VARIABLE	N	PERCENTAGE(%)	REMARK
Rural schools	25	25%	Low
Urban schools	75	75%	Very high

Table 3 shows the percentage analysis of the difference in factors hindering effective teaching of Biology between Rural and Urban schools. 25 of the respondents representing 25% in Rural schools and 75 of the respondents representing 75% in Urban schools. This implies that The Rural schools have a higher percentage in factors hindering effective teaching of Biology.

RESEARCH QUESTION 4:

TABLE 4: Percentage analysis of the difference in factors hindering effective teaching of Biology between Large schools and small schools.

VARIABLE	N	PERCENTAGE(%)	REMARK
Large schools	25	25%	Low
Small schools	75	75%	Very high

Table 4 shows the percentage analysis of the difference in factors hindering effective teaching of Biology between large and small schools. The large schools have a total of 25 respondents representing 25%, while the Small schools have a total of 75 respondents representing 75%. This implies that the Small schools have a higher percentage in factors hindering effective teaching of Biology in secondary schools.

Discussion of Findings

According to our findings, we see that a higher percentage of respondents strongly agreed that ill-equipped laboratory hinders effective teaching of Biology in secondary schools. Hence, we can say that provision of Biology laboratory equipment will improve the teaching of Biology.

Also, most of the respondents agree that shortage of classroom furniture have an effect on the poor performance of Biology students. Therefore, availability of classroom furniture will improve the teaching of Biology in secondary school students.

It is also shown that teacher-student ratio has an effect on the teaching of Biology in secondary schools. Therefore, availability of more Biology teachers will improve the teaching of Biology in secondary schools.

It was also found that shortage of evaluation materials hinders effective teaching of Biology in secondary schools. Hence, adequate provision of evaluation materials will improve the teaching of Biology in secondary schools. Sex of the teacher can have a significant effect on the effective teaching of Biology in secondary schools. Therefore, having more female biology teachers will improve the teaching of Biology in secondary schools.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary of Findings

The study was designed to assess the factors hindering the effective teaching of biology in the secondary schools in Ovia North-East local Government Area in Edo state.

The objectives of the study were to;

i. Ill-equipped laboratory hinders effective teaching of Biology in the secondary schools.
ii. Shortage of classroom/furniture hinders effective teaching of Biology in secondary schools.
iii. Teacher-student ratio hinders effective teaching of biology in secondary schools.
iv. Shortage of evaluation materials hinders effective teaching of Biology in secondary schools.
v. Sex of the teacher hinders effective teaching of Biology in secondary schools.

Conclusion

The results of the study shows that significant difference exist between experimental and control group which suggests that students in the experimental group performed better than those taught without practical activities.

The following conclusions were made.

1. Practical activity method enhanced the acquisition of science process skills more than the lecture method.
2. Practical activity method improves the acquisition of process skills in both male and female students.
3. There was significant interaction effect between teaching methods and gender of the subjects, in acquisition of science process skills as measured by science process skill acquisition test (SPSAT).

Recommendations

Science students should be exposed to practical activities to improve their academic achievement. Teachers should encourage students to develop interest in practical

activities by engaging them in practicals and providing instructional materials that will challenge them to be involved actively during practical activities.

Biology teachers should also train the science students on the use and proper handling of instructional materials to enhance the process of transferring knowledge, ideas and skills in biology practical activities.

Government should equip laboratories while principals should provide biology teachers with fund for consumables. They should also sponsor biology teachers for STAN workshops/conferences

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Appendix

QUESTIONNAIRE ON ASESSMENT OF FACTORS HINDERING THE EFFECTIVE TEACHING OF BIOLOGY IN SECONDARY SCHOOLS

INSTRUCTIONS: Please endeavor to complete the questionnaire by ticking the correct answer from the option or supply the information where necessary. The

information gathered is strictly for research purpose and shall be confidentially kept.

SECTION A:

Demographic data

1. School evolvement
   Below 500 students ☐ Above 500 students ☐

2. School ownership
   Private ☐ Public ☐

3. School location
   Urban ☐ Rural ☐

SECTION B:

Instruction: Please indicate your level of agreement or disagreement with each of the statement by placing a ☑ in the box of your answer.

SA: Strongly agree

A: Agree

D: Disagree

SD: Strongly disagree

S/N	**ITEMS**				

		SA	A	D	SD
A	BIOLOGY LABORATORY				
1	Biology practical has an effect on academic performance of students.				
2	Biology laboratories are well equipped with necessary apparatus				
3	Poor academic performance in biology practical are caused by lack of well equipped laboratory				

4	Students are not adequately involved in biology practical				
B	CLASSROOM / FURNITURE				
5	Lack of proper classroom facilities limits the ability of a student to achieve various learning and extracurricular activities				
6	An unconducive classroom may cause students to perform poorly in biology				
7	The right student chairs and tables can help teachers develop their students into proactive learners.				
8	Good furniture helps students focus more and complete tasks faster				
C	TEACHER-STUDENT RATIO				
9	The ideal teacher-student ratio in secondary schools is 1:40				
10	Teacher-student ratio reflects the teachers workload and how they are able to offer care to their students				
11	The lower the number of students, the better educational process and learning				
12	Increase in teacher-student ratio cause congestion in classroom				
D	EVALUATION MATERIALS				
13	Availability of exam specimen in the laboratory promotes retention in students				

14	Non-availability of suitable exam question papers and ICT equipment may lead to poor performance of biology students				
15	Essay tests are a suitable form of assessment in biology				
16	Biology practical requires sufficient evaluation time				
E	TEACHER CHARACTERISTICS				
17	Inadequate/unqualified teachers are one of the problems of teaching biology				
18	Male teachers are better than female teachers in teaching biology				
19	Poor method of teaching is one of the deficiencies of biology teachers				
20	Professional biology teachers have an educational certificate				