

**ASSESSMENT OF UTILIZATION OF LABORATORY INSTRUCTIONAL
MATERIALS FOR BIOLOGY LEARNING IN SECONDARY SCHOOL IN EGOR
LOCAL GOVERNMENT AREA**

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DEPARTMENT OF CURRICULUM INSTRUCTIONAL AND TECHNOLOGY

FACULTY OF EDUCATION

UNIVERSITY OF BENIN

BENIN CITY

DECEMBER 2025

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**A PROJECT SUBMITTED TO THE DEPARTMENT OF CURRICULUM
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CERTIFICATION

This is to certify that this project work was carried out by **ABOKHA FESTUS OSIGBEME** with matriculation number **EDU2101987** in the department of CURRICULUM INSTRUCTIONAL AND TECHNOLOGY, FACULTY OF EDUCATION, UNIVERSITY OF BENIN, BENIN CITY, in partial fulfillment for the award of Bachelor of Science Education Degree in Biology Education.

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DEDICATION

This research work is dedicated to Almighty God for His grace, mercies, strength, guidance, provision, and protection throughout my academic pursuits.

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ABSTRACT

This study examined the utilization of laboratory instructional materials in the teaching and learning of Biology across different school types. A descriptive survey design was adopted, and data were collected from 80 randomly selected students using a validated and reliable questionnaire. Descriptive statistics such as frequency counts, percentages, and mean scores (with 2.50 as the decision benchmark) were used to analyze the data. Findings revealed that essential laboratory tools—including microscopes, specimen jars, laboratory charts, prepared slides, cover slips, and basic reagents—are commonly utilized for biology learning. The study further found significant differences in the use of laboratory instructional materials across schools. Private schools made greater use of laboratory materials due to better funding, availability of resources, and well-trained teachers. Urban schools demonstrated higher access to laboratory equipment, easier replacement of damaged tools, and more frequent hands-on activities compared to rural schools, which often rely on improvised materials. Similarly, big schools utilized laboratory resources more effectively than small schools because of better staffing, resources, and infrastructure. The study concluded that disparities in funding, accessibility, and teacher competence strongly influence the degree of laboratory material utilization in biology learning. It recommended improved funding, provision of additional laboratory tools, continuous teacher training, timely replacement of outdated equipment, and strong partnerships with NGOs and private organizations to ensure equitable access to quality science education.

CHAPTER ONE

INTRODUCTION

Background to the Study

Biology, as a branch of science, is central to understanding living organisms and life processes. It holds a vital place in secondary school science education in Nigeria, being a compulsory subject for science students and a requirement for numerous tertiary-level courses. Effective teaching and learning of Biology depend heavily on the availability and proper utilization of laboratory instructional materials. The importance of laboratory instructional materials in biology learning cannot be overstated. Biology, as a scientific discipline, relies heavily on practical experiences and hands-on activities to foster deeper understanding and retention of concepts. These materials, which include models, preserved specimens, microscopes, dissection kits, charts, and slides, enable students to engage in direct observation and experimentation, which are crucial for meaningful science learning (Okebukola, 2002).

The National Policy on Education (Federal Republic of Nigeria [FRN], 2004) emphasizes the importance of practical-based learning and recommends that science subjects, including Biology, should be taught through laboratory activities that promote observation, inquiry, and experimentation. Laboratory instructional materials provide opportunities for students to develop scientific skills, such as critical thinking, problem-solving, and the ability to

formulate and test hypotheses (Afolabi & Akinbobola, 2009). Unfortunately, in many Nigerian secondary schools, there is a consistent gap between policy and practice.

Inadequate utilization of laboratory materials has been identified as a contributing factor to the persistent poor performance of students in Biology at the secondary school level (WAEC, 2013). Several studies have shown that while some schools may possess laboratory equipment, these materials are either unused or used ineffectively due to factors such as overcrowded classrooms, insufficient teacher training, lack of instructional time, and poor maintenance culture (Ogunniyi, 1986; Olorundare, 2011).

Furthermore, biology as a practical subject requires regular experimentation and demonstration, yet the teaching in some schools remains heavily teacher-centered, with little or no laboratory engagement. This has led to rote memorization and shallow understanding of biological concepts among students, making it difficult for them to apply their knowledge in real-life situations or further scientific studies.

Egor Local Government Area, located in the urban part of Edo State, hosts a mixture of public and private secondary schools. Despite its location and access to urban infrastructure, differences in the provision and utilization of laboratory instructional materials persist. Some schools may have laboratories in name only, lacking the essential tools needed to carry out basic biology experiments. The implications of this are far-reaching, affecting not only students' academic performance but also their interest in science-related careers.

Given this situation, it becomes vital to conduct an empirical assessment of how laboratory instructional materials are utilized for the teaching and learning of biology in secondary

schools within Egor Local Government Area. This study seeks to examine the availability, accessibility, adequacy, and frequency of use of laboratory materials, as well as the challenges teachers and students face in their utilization. Understanding these issues is critical to informing educational policy, improving teaching methods, and ultimately enhancing students' performance and interest in biology.

In Egor Local Government Area of Edo State, which comprises both urban and semi-urban secondary schools, the situation is not markedly different. There are growing concerns about the readiness of students in external Biology examinations, suggesting possible lacks in instructional delivery, particularly in the practical aspects of the subject. Background research and case study indicate that many schools either lack standard laboratories or do not make adequate use of the available materials during teaching.

Given the crucial role of laboratory instruction in achieving the objectives of Biology education, it becomes imperative to assess how effectively these resources are being utilized in the teaching-learning process. Understanding the extent of material availability, frequency of use, and barriers to utilization will provide insights for education stakeholders, including school administrators, government agencies, and curriculum developers, towards improving the quality of science education in the area.

Moreover, curriculum guidelines from the Nigerian Educational Research and Development Council (NERDC) and examination bodies like WAEC emphasize practical work as a key component of biology education. Yet, the actual practice in many schools falls short of these

expectations. This disconnect between policy and practice raises questions about the level of implementation of practical biology lessons in secondary schools.

Given these concerns, this study seeks to assess the extent to which laboratory instructional materials are available and utilized in secondary schools in Egor Local Government Area. It will explore questions such as:

1. Are laboratory materials adequately supplied to schools?
2. How often are they used during biology lessons?
3. Are teachers trained to use them effectively?
4. What challenges do schools face in using these materials?

By investigating these questions, this study hopes to uncover the gaps and barriers in the use of laboratory instructional materials and suggest practical solutions that can improve the teaching and learning of biology. Ultimately, the goal is to promote better learning outcomes for students and raise the standard of science education in the area

Therefore, this study aims to assess the utilization of laboratory instructional materials for Biology learning in secondary schools in Egor Local Government Area, Edo State, Nigeria.

Statement of the Problem

Despite the emphasis placed on practical work in the biology curriculum, there appears to be a persistent gap between theory and practice. In many secondary schools, laboratory facilities are either poorly equipped or unused. Teachers often resort to theoretical teaching methods, due to either lack of materials or inadequate training in practical instruction (Umeh, 2011).

Observations and case study from educators, students, and inspectors reveal that many Biology lessons are conducted theoretically without adequate hands-on activities. Teachers often resort to verbal descriptions of practical processes rather than demonstrations or student-centered experimentation that can enhance students learning, possibly due to:

1. Inadequate laboratory facilities and materials
2. Lack of trained laboratory personnel
3. Overcrowded classrooms with limited resources
4. Insufficient funding from government and school management
5. Lack of teacher motivation or confidence in handling laboratory sessions
6. Poor maintenance and management of existing resources.

This situation potentially undermines the objectives of science education, particularly in enabling students to acquire scientific knowledge through inquiry, experimentation, and observation.

The dearth of laboratory instructional materials in secondary schools in Egor Local Government Area has reached critical level, down pour a catastrophic decline in the quality of biology education. The glaring inadequacy of essential equipment and resources has resulted in a woefully poor learning environment, where students are denied the opportunity to engage in hands-on scientific exploration and discovery.

The consequences are dire, students' performance in biology has plummeted, their interest in the subject has waned, and their capacity for critical thinking and scientific literacy has been severely impaired. The situation is further worsening by the gross unused of whatever limited

resources are available, due to a combination of factors including teacher incompetence, infrastructural deficiencies, and administrative inabilities.

This study aims to conduct a scathing examination of the utilization of laboratory instructional materials in secondary schools in Egor Local Government Area, with a view to exposing the depth of the crisis and identifying potential solutions to this instructional collapse. The stakes are high, and the need for urgent intervention is important, lest the future of science education in the area be irreversible damage.

Research Questions

This study will be guided by the following research questions:

1. What are the laboratory instructional materials utilized for biology learning?
2. Is there a difference in the utilization of laboratory instructional materials between private and public school?
3. Is there a difference in the utilization of laboratory instructional materials between rural and urban schools?
4. Is there a difference in the utilization of laboratory instructional materials between big schools and small schools?

Purpose of the Study

The primary purpose of this study is to assess the utilization of laboratory instructional materials in the teaching and learning of biology in secondary schools. This study is to also conduct a groundbreaking investigation into the utilization of laboratory instructional

materials for biology learning in secondary schools in Egor Local Government Area, with the ultimate goal of innovating the way science education is delivered in the region.

Specifically, the study seeks to:

1. Determine the availability of laboratory instructional materials in selected secondary schools.
2. Examine the frequency and extent of use of laboratory materials in biology classes.
3. Identify factors affecting the effective utilization of laboratory instructional materials.
4. Investigate the impact of laboratory material utilization on students' academic performance and interest in biology.
5. Provide recommendations for improving the use of laboratory instructional materials in biology teaching.
6. To identify the challenges or barriers that hinder the effective use of teaching laboratory instructional materials in Biology and learning.
7. To investigate teachers' and students' attitudes towards the use of laboratory instructional materials in Biology.
8. Reveal the stark reality of the dearth or abundance of laboratory materials and equipment.
9. Identify the root causes of ineffective utilization.
10. Shed light on the frequency, quality, and impact of laboratory instructional materials.

Significance of the Study

The significance of this study lies in its potential to impact multiple stakeholders within the educational system, particularly in the context of Biology education in secondary schools in Egor Local Government Area. For students, who are the primary beneficiaries of effective teaching, the proper use of laboratory instructional materials enhances their understanding of biological concepts through hands-on observation and experimentation. This, in turn, can lead to improved performance in both internal and external examinations such as WAEC and NECO. The study will help determine whether current classroom practices in Egor LGA support these outcomes and offer recommendations for improvement. For teachers, the research will highlight areas where they may require further training or professional development and empower them to advocate for better laboratory resources in their schools. School administrators and principals, who are responsible for ensuring the availability of instructional resources and maintaining teaching quality, will benefit from insights into the current state of laboratory facilities in their institutions. Additionally, policymakers and government agencies will find the study valuable for assessing the implementation and effectiveness of science education policies at the grassroots level. Finally, the research contributes to the broader field of science education in Nigeria by providing empirical data that can inform curriculum developers to place greater emphasis on practical components in Biology, and it serves as a resource for educational researchers seeking to explore similar themes.

Scope and Definition

This study will focus on selected public and private secondary schools in Egor Local Government of Edo State. It will assess the availability, frequency of use, and effectiveness of laboratory instructional materials in biology teaching. The study will involve biology teachers, laboratory assistants, and senior secondary school students

The scope is vast and far-reaching:

1. **Geographical scope:** A comprehensive examination of secondary schools in Egor Local Government Area.
2. **Subject scope:** A detailed analysis of biology education.
3. **Focus:** A thorough investigation of the utilization of laboratory instructional materials.

Definition of Terms

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

1. **Laboratory Instructional Materials:** Physical tools and resources used to teach biology practically, such as microscopes, test tubes, charts, models, and specimens.
2. **Utilization:** The extent and manner in which teachers and students use laboratory materials in the teaching-learning process.
3. **Biology Learning:** The acquisition of knowledge, skills, and attitudes in biology through various instructional strategies, including laboratory activities.
4. **Secondary Schools:** Post-primary educational institutions that cater to students typically aged 12–16 years

5. **Egor:** is one of the Local Government Areas (LGAs) in Edo State, located in the southern region of Nigeria. It is part of the Benin City metropolitan area, which is the capital of Edo State. Egor LGA is both urban and semi-urban in nature, hosting several residential, commercial, and educational institutions. The area is home to a diverse population and includes communities such as Uselu, Ugbowo, and Ekosodin. Egor also houses parts of the University of Benin, making education a significant feature of the area. Due to its proximity to academic institutions and its urbanizing environment, Egor plays an important role in the educational development of the state.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

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

- Instructional Materials as a key Foundation
- Concept of Instructional Materials
- Importance of Instructional Materials in Biology Education
- Types of Instructional Materials
- Theoretical Framework
- Relevance of Theoretical Framework of the Study
- Factors Affecting the Use of Instructional Materials in Biology Teaching
- Challenges in the Use of Instructional Materials in Biology Teaching
- Empirical Studies
- Summary of Literature Review

Instructional materials are a key foundation

Instructional materials are a key foundation on the theoretical foundation of your research and are fundamental to effective teaching and learning processes, especially in science subjects such as Biology. This chapter reviews existing literature relevant to the assessment of instructional materials for Biology learning in secondary schools, with specific attention to Egor Local Government Area. It explores the types, significance, challenges, and effectiveness of instructional materials, as well as relevant theoretical frameworks and empirical studies. This helps to show your deep understanding of the research area, the gap in knowledge that your study will fill, provide a framework for interpreting your results, justify the need for your research.

Laboratory instructional materials are essential tools that bridge the gap between theoretical knowledge and practical understanding. These materials include both standard laboratory equipment such as microscopes, test tubes, dissecting kits, and preserved specimens as well as modern and improvised resources like virtual labs, models, charts, and locally available materials. The effectiveness of biology education depends heavily on the availability, accessibility, and proper utilization of these instructional materials, as they foster student participation, enhance conceptual clarity, and promote scientific inquiry.

Over the years, research has consistently shown that students perform better in biology when they are exposed to adequate and appropriate laboratory resources. Instructional materials help to simplify abstract biological concepts, making them easier for students to understand and retain. In many cases, these tools also increase students' interest and motivation toward

the subject, thereby improving learning outcomes and academic performance. However, in many parts of Nigeria, especially at the local government level, schools are often faced with challenges such as inadequate supply of laboratory materials, lack of maintenance of existing equipment, insufficient funding, and poor teacher training on the use of instructional aids. These issues significantly affect the quality of biology education delivered to students. The aim is to establish a strong foundation for assessing how instructional materials are currently being used and how they influence the learning outcomes of biology students in the area.

Egor Local Government Area in Edo State is no exception to these challenges. As a growing urban area with a mix of public and private secondary schools, there is a need to evaluate the current state of biology laboratories in terms of the materials available and how effectively they are used. There is limited research specifically focused on Egor LGA, which creates a knowledge gap in understanding the unique constraints and opportunities within the area. By assessing the laboratory instructional materials used in teaching biology in secondary schools in Egor, this study seeks to understand how these materials influence students' learning processes and outcomes. Furthermore, the assessment will help identify deficiencies, suggest areas for improvement, and contribute to the broader goal of enhancing science education in Nigeria.

This chapter will therefore review related literature on laboratory instructional materials, their impact on biology education, and the various factors that influence their effectiveness in secondary schools. It will also examine previous studies conducted in different parts of Nigeria and beyond, drawing insights relevant to the context of Egor Local Government.

Through this review, a foundation will be laid for understanding the importance of assessing laboratory instructional materials and how such an assessment can lead to better educational planning, policy, and practice.

Concept of Instructional Materials

Instructional materials refer to the tools, resources, and devices teachers use to facilitate learning and make abstract concepts more concrete. They can be categorized broadly into visual, audio, audio-visual, and kinesthetic types. These materials include textbooks, charts, diagrams, models, realia (real-life objects), slides, videos, interactive simulations, and laboratory equipment.

In the context of biology education, instructional materials are particularly critical because they help to simplify complex and theoretical topics. For instance, teaching topics such as cell structure, genetics, ecology, and human anatomy is more effective when supported with diagrams, models, microscopes, live or preserved specimens, and laboratory equipment. The use of such materials bridges the gap between abstract scientific theory and real-life biological phenomena. Instructional materials help to render learning, stimulate learners' interest, enhance retention of knowledge, and cater to different learning styles. They also allow students to explore scientific processes through inquiry, observation, experimentation, and problem-solving, which are central to science education.

Importance of Instructional Materials in Biology Education

The significance of instructional materials in Biology learning cannot be overstated. The following benefits have been identified by various scholars:

1. **Enhancement of Understanding:** Visual and hands-on materials make abstract biological processes more understandable.
2. **Retention and Recall:** Learning experiences involving instructional materials are more likely to be retained and recalled by students.
3. **Motivation and Interest:** Instructional aids often capture students' attention and spark interest in the subject.
4. **Catering to Learning Styles:** Students have different learning preferences (visual, auditory, kinesthetic). Instructional materials help accommodate these diverse styles.

Facilitating Practical Work: In Biology, practical application is essential. Materials such as microscopes, models, and preserved specimens make this possible.

5. **Bridging the Gap between Theory and Practice:** They help link theoretical concepts taught in the classroom with real-life

Types of Instructional Materials

Instructional materials play a pivotal role in enhancing teaching and learning experiences, especially in subjects like biology where learners must visualize complex concepts and conduct practical experiments. These materials can be classified based on their mode of presentation, technological complexity, or sensory involvement. Understanding the various

types of instructional materials is essential in evaluating how effectively they are used in the biology classroom. The major categories include:

1. Visual Instructional Materials

Visual materials are educational tools that primarily appeal to the sense of sight, helping learners better understand complex ideas or processes that may be difficult to grasp through words alone. These materials include charts and posters, such as diagrams of the human body, the nitrogen cycle, or photosynthesis, which visually represent biological concepts. Models, like 3D representations of the heart or DNA helix, offer tangible insights into structure and function. Drawings and diagrams provide detailed explanations of various biological topics, while flashcards are useful for quickly reviewing key terms such as parts of a plant or stages of mitosis. Additionally, photographs capture real-life biological phenomena like plant diseases or microscopic organisms, making abstract concepts more concrete and easier to comprehend.

2. Audio Instructional Materials

Audio materials are instructional tools that rely on the sense of hearing and are particularly effective for supporting spoken instructions or delivering information through narration. Common examples include recorded lessons or podcasts that explain complex biological topics such as genetics, evolution, or ecological balance. Educational songs and rhymes are often used to help students memorize biological processes or classification systems. Additionally, radio programs can serve as valuable resources for distance learning or as support content in the classroom. Although audio materials are less commonly used than

visual aids in biology, they play a significant role in supporting auditory learners by enhancing their understanding through listening.

3. Audiovisual Instructional Materials

Audiovisual materials blend both sound and visual elements to create a more engaging learning experience, making them powerful tools in modern biology education. Examples include educational videos and documentaries that explore topics such as plant reproduction, food chains, or organ systems. Animations and simulations bring biological processes like mitosis, osmosis, or enzyme activity to life through motion. Multimedia presentations, such as PowerPoint slides enriched with videos, narration, and images, enhance understanding through a variety of formats. Interactive whiteboard content is also used to demonstrate virtual experiments or dissections, promoting hands-on learning. These resources are especially valuable when access to actual laboratory settings is limited, encouraging active participation and deeper comprehension.

4. Tactile/Manipulative Instructional Materials

Physical, hands-on materials are essential tools in biology education, allowing students to actively engage with the subject through direct interaction. These materials include laboratory equipment such as microscopes, test tubes, beakers, petri dishes, and Bunsen burners, all fundamental for conducting experiments. Biological specimens like plant samples, preserved animals, and prepared tissue slides provide real-world examples for study and observation. Dissection kits enable learners to explore the internal organs of organisms like frogs, rats, or fish, offering a deeper understanding of anatomy. Prepared slides allow microscopic

examination of cells, tissues, and microorganisms. Together, these resources promote experiential learning by engaging students in authentic scientific processes.

5. Printed instructional materials: are among the most common and foundational resources used in teaching. These include textbooks and workbooks, which provide standard biology curriculum content with explanations, exercises, and diagrams to support student learning. Teacher's manuals serve as valuable guides, offering effective teaching methods and detailed lesson plans. Laboratory manuals are also essential, containing practical procedures, safety guidelines, and step-by-step experimental instructions for hands-on learning. Additionally, handouts and worksheets are frequently used to support specific topics such as classification, respiration, or heredity. These printed materials are both accessible and flexible, making them suitable for use in the classroom as well as at home.

6. Digital and ICT-Based Instructional Materials

With the integration of technology into education, digital and ICT-based instructional materials are playing an increasingly important role in biology instruction. Virtual labs, for instance, allow students to perform simulated experiments in a virtual environment, providing practical experience even in the absence of fully equipped physical labs. Educational software and apps, including biology quiz applications, simulation games, and interactive textbooks, offer engaging and interactive ways to reinforce learning. Online learning platforms such as Google Classroom, Khan Academy, and YouTube provide a wealth of tutorials and resources tailored to biology topics. Additionally, smartboards and projectors enhance classroom instruction by displaying visual content that supports understanding.

These digital tools are especially valuable in settings where access to physical lab resources is limited or where remote learning is required.

7. Laboratory Equipment and Realia: Microscopes, test tubes, live or preserved specimens, models of organs, and plants.

8. Printed Materials: Textbooks, manuals, workbooks, and journals.

9. Improvised and Locally Available Materials

Improvised instructional materials are those created using locally available resources, often as a result of limited access to standard educational equipment. These materials are especially common in resource-poor settings, such as many public schools in Egor Local Government Area (LGA). Examples of such materials include plastic bottles used to model lungs and demonstrate the mechanics of breathing; clay or dough shaped into cell models to represent the structures of plant and animal cells; matchsticks or straws assembled into skeleton models to teach about bones and joints; and natural items like sand, leaves, or pebbles used to explain soil composition or the classification of plants. These improvised materials not only make learning more accessible but also foster creativity and adaptability in teaching. They play a crucial role in ensuring that all students, regardless of their school's resources, can engage meaningfully in the learning process.

The utilization of instructional materials refers to how effectively these resources are selected, prepared, and used by teachers during instruction. This involves not just the presence of materials in the school, but also teachers' competence in using them appropriately, creatively,

and regularly. Utilization also depends on factors such as teacher training, access to resources, class size, and administrative support.

In the Nigerian context, and more specifically in Egor Local Government Area, there are challenges and variations in the use of instructional materials. Many schools suffer from inadequate supply of standard laboratory equipment and materials, while some teachers lack proper training on how to use the available resources effectively. On the other hand, schools that are better equipped and have well-trained teachers tend to record better academic performance in biology. Therefore, understanding the concept and role of instructional materials is key to assessing their utilization and impact on student learning.

Theoretical Framework

The theoretical framework serves as the foundation upon which this study is built. It provides a lens through which the assessment of the utilization of instructional materials in biology classrooms can be understood and interpreted. For this research, the theories that underpin the use and impact of instructional materials in the learning of biology are:

1. Cognitive Theory of Multimedia Learning (Mayer, 2001)

This theory suggest that students learn better when information is presented through both words and pictures rather than through words alone. It supports the use of instructional materials such as animations, diagrams, and simulations in science education.

2. Bruner's Theory of Instruction (1966)

Jerome Bruner's cognitive theory of instruction emphasizes the importance of active learning, discovery, and the use of teaching aids to promote meaningful understanding. Bruner identified three modes of representation, enactive (learning by doing), iconic (learning through images), and symbolic (learning through language). These modes align directly with the use of instructional materials in the classroom. For instance, when students use laboratory equipment to conduct experiments (enactive), observe charts or models (iconic), or read biology textbooks (symbolic), they engage in multi-sensory learning that enhances their ability to grasp complex biological concepts.

Bruner also believed in the spiral curriculum, where complex ideas can be taught at a simplified level first and revisited later in more depth. Instructional materials are vital in this process, as they help reinforce understanding at various stages of development

3. Piaget's Cognitive Development Theory (1952)

Jean Piaget's theory of cognitive development explains how learners construct knowledge based on their developmental stages. For secondary school students, who are generally in the formal operational stage, learning becomes more abstract, logical, and hypothetical. However, Piaget argued that even at this stage, learners benefit greatly from concrete experiences to support abstract thinking.

In biology education, instructional materials such as models, specimens, and experiments provide those concrete experiences. They allow learners to interact physically and mentally with biological phenomena, which supports cognitive development. Instructional materials

thus serve as scaffolding tools that help students transition from concrete to abstract reasoning.

4. Dale's Cone of Experience (1946)

Edgar Dale's "Cone of Experience" is a visual model that illustrates the varying degrees of learner engagement depending on the type of instructional method used. At the base of the cone are direct, purposeful experiences such as hands-on activities, simulations, and experiments—activities where students "learn by doing." At the top are verbal symbols, such as reading or listening to lectures.

According to Dale, the more direct the learning experience, the greater the retention. This theory supports the use of instructional materials, especially in science education, where practical and visual experiences (e.g., using microscopes, dissecting specimens, viewing animations) allow for deeper and more lasting learning.

In the context of this study, the theory emphasizes the need for practical, interactive instructional materials in biology classrooms to improve learning outcomes among secondary school students in Egor Local Government.

5. Vygotsky's Social Constructivist Theory (1978)

Lev Vygotsky's theory focuses on the social nature of learning and the concept of the Zone of Proximal Development (ZPD). He argued that learners can achieve higher levels of understanding with the help of more knowledgeable others (e.g., teachers) and instructional tools.

In this theory, instructional materials serve as mediating tools that support the interaction between teacher and student, and among students themselves. In a biology class, collaborative activities using lab equipment, models, or virtual simulations not only help students understand complex content but also promote peer learning and engagement.

Vygotsky's theory supports the idea that when instructional materials are used effectively, they can help learners move from what they currently know to what they are capable of knowing with

Constructivist Learning Theory. Constructivism holds that learners build knowledge through active engagement and experiences. Instructional materials support this engagement, especially in practical subjects like Biology.

Relevance of theoretical framework to the study

The relevance of the theoretical framework to this study lies in its collective emphasis on active, learner-centered, and multisensory instruction. The selected theories Cognitive Theory of Multimedia Learning, Bruner's Theory of Instruction, Piaget's Cognitive Development Theory, Dale's Cone of Experience, and Vygotsky's Social Constructivist Theory highlight the critical role that instructional materials play in facilitating meaningful and effective learning, especially in science subjects like biology. In the context of biology education in

secondary schools within Egor Local Government Area, these theories provide a robust foundation for assessing key aspects such as the availability and types of instructional materials used, the extent of teacher engagement with these resources, and the overall impact on students' learning outcomes, participation, and retention. Furthermore, they offer a lens through which to explore the barriers to effective utilization of instructional materials, including challenges like inadequate funding, limited teacher training, and poor access to appropriate teaching aids. Grounding the study in these well-established educational theories ensures a deeper understanding of how instructional materials influence biology learning and provides a conceptual basis for recommending strategies to improve their use in the local educational context.

Factors Affecting the Use of Instructional Materials in Biology Teaching

The use of instructional materials in biology teaching is essential for effective science education, especially in helping students understand complex and abstract concepts through practical and visual experiences. However, in many educational settings particularly in developing regions like Egor Local Government Area in Edo State the utilization of instructional materials is often limited or ineffective. Several factors influence whether and how these materials are used, ranging from resource availability to teacher competence. These factors can be grouped into the following key areas:

1. Availability and Accessibility of Instructional Materials

One of the most fundamental factors affecting the use of instructional materials is their availability. In many secondary schools, especially public schools in rural or underfunded areas, basic biology instructional materials such as microscopes, models, charts, and specimens are either insufficient or entirely absent. Even when materials are available, they may not be accessible due to administrative restrictions, poor storage, or lack of maintenance. The unavailability of these materials directly limits teachers' ability to provide hands-on learning experiences, thereby reducing the effectiveness of biology teaching.

2. Teacher Knowledge, Competence, and Training

Teachers play a central role in determining how effectively instructional materials are utilized. A teacher's competence, knowledge of subject matter, and familiarity with various instructional aids significantly affect their usage in the classroom. Teachers who are not trained to operate laboratory equipment or who lack experience in using visual and digital aids may avoid integrating these tools into their lessons. Furthermore, if biology teachers are not included in regular professional development programs or workshops on innovative teaching methods and instructional technologies, they may continue to rely solely on traditional chalk-and-talk methods, which limit student engagement and understanding.

3. Funding and Government Support

The sourcing and maintenance of instructional materials require adequate funding. Many schools, particularly public schools, depend on government subsidies or parent-teacher association (PTA) contributions to fund laboratory resources. When government support is inadequate, schools are unable to purchase essential materials or update existing ones.

Additionally, without consistent investment, many instructional materials become outdated or damaged. Inadequate funding also affects teacher training programs, infrastructure development (such as proper laboratory buildings), and access to digital tools all of which are vital for effective teaching and learning of biology.

4. School Infrastructure and Laboratory Facilities

The physical environment of the school greatly influences how instructional materials are used. A biology lab that lacks electricity, clean water, ventilation, or enough space for students to conduct experiments is unlikely to support meaningful practical work. In some schools, there may be no designated laboratory at all, forcing teachers to rely solely on theoretical explanations. Poor infrastructure also means that even when instructional materials are available, they may be underused or improperly stored, leading to wear and tear. Inadequate laboratory space may further restrict students' participation in practical activities, limiting their practical learning.

5. Curriculum Demands and Time Constraints

The structure of the biology curriculum and the time allocated to it can also affect the use of instructional materials. In many Nigerian secondary schools, the school timetable is often overcrowded, leaving little time for practical activities. Teachers may be forced to rush through topics to meet syllabus requirements or prepare students for national examinations,

leaving little room for laboratory work or visual demonstrations. As a result, even when materials are available, they may not be used to their full potential due to pressure to “cover the syllabus” within a limited timeframe.

6. Attitudes and Beliefs of Teachers and School Administrators

The attitudes of teachers and administrators toward the use of instructional materials can significantly influence their adoption. Teachers who believe that instructional materials are unnecessary or too time-consuming to prepare may neglect their use altogether. Similarly, if school principals and administrators do not prioritize science education or do not allocate budget for teaching aids, teachers may feel unsupported and lack the motivation to innovate in their teaching. A positive school culture that encourages experimentation, practical learning, and innovation is essential for the effective utilization of instructional materials.

7. Students' Interest and Participation

Students' interest in biology can also affect how often and how effectively instructional materials are used. When students are eager to participate in practical activities or show curiosity in exploring biological concepts, teachers are more likely to invest effort in organizing practical sessions and using teaching aids. On the other hand, if students are passive, disinterested, or poorly behaved during lessons, teachers may avoid using materials that require active participation, especially in large or poorly managed classrooms.

8. Security and Safety Concerns

In some schools, the fear of vandalism, theft, or accidents discourages the use of instructional materials especially expensive or fragile equipment like microscopes, glassware, or chemicals.

If a school lacks secure storage or safety policies, materials may be locked away and rarely used. Furthermore, without proper safety measures, teachers may hesitate to involve students in hands-on experiments due to potential health risks, especially in poorly supervised or overcrowded classrooms.

9. Class Size and Student Population

Overcrowded classrooms are a major challenge in many Nigerian secondary schools. When class sizes are large, sometimes exceeding 60 students per class, it becomes difficult for teachers to effectively use instructional materials, especially those that require individual or group manipulation. Practical lessons involving microscopes, dissection kits, or experiments may be limited or skipped altogether due to the logistical difficulties of managing large numbers of students. Teachers may opt for lecture-based teaching instead of organizing practical sessions, leading to a decline in hands-on learning experiences.

10. Educational Policies and Curriculum Implementation

The implementation of national and state-level educational policies can significantly impact the availability and usage of instructional materials. If government policies do not prioritize practical science education or if there is no proper monitoring of curriculum implementation, schools may ignore laboratory components or treat them as optional. Furthermore, poor alignment between the curriculum and available resources often leads to situations where teachers are expected to deliver content that requires materials they do not have. This disconnect hampers the effective realization of educational goals in biology instruction.

11. Technological Barriers

Incorporating modern digital instructional materials such as simulations, virtual labs, interactive models, and educational software into biology teaching can greatly enhance learning. However, technological barriers including lack of electricity, internet access, computers, or digital literacy prevent many schools from taking advantage of these innovations. In Egor Local Government Area, many secondary schools, especially public ones, still operate without consistent access to power or ICT infrastructure. Even when digital resources are provided, lack of training in their use often leads to underutilization.

12. Motivation and Professional Development of Teachers

A motivated teacher is more likely to explore diverse instructional strategies and invest time in preparing or sourcing teaching aids. Conversely, teachers who are demotivated due to low pay, lack of recognition, or poor working conditions may lack the drive to go beyond routine methods of instruction. Continuous professional development through in-service training, workshops, and seminars is necessary to keep teachers updated on innovative teaching practices and new instructional technologies. Unfortunately, many teachers in public schools are not given regular opportunities for such capacity-building, which limits their effectiveness in using available materials.

13. Cultural and Language Barriers

In some educational settings, cultural beliefs or language differences may influence how biology content is taught or how materials are interpreted. For example, topics like human reproduction, anatomy, or evolution may be considered sensitive or controversial in certain communities, discouraging teachers from using relevant instructional materials. Additionally,

when instructional resources (such as posters or software) are presented only in English and not in local languages or simplified formats, students with limited proficiency in English may struggle to engage meaningfully with the materials.

14. Teacher Workload and Multiple Subject Teaching

In some secondary schools, especially those with staff shortages, teachers are assigned to teach multiple subjects or classes beyond their specialization. A biology teacher who is also required to teach Integrated Science, Chemistry, or even non-science subjects may be overburdened and have limited time to prepare or implement lessons that require instructional aids. High workload can reduce teacher effectiveness, leading to minimal or no use of instructional materials, even when such materials are available.

15. Community and Parental Involvement

The level of Community and parental involvement supporting school infrastructure and teaching resources can also affect the use of instructional materials. In some cases, parent-teacher associations (PTAs) raise funds to equip science laboratories or provide basic instructional materials. In others, community apathy or low awareness of the importance of science education leads to neglect. Where communities value and invest in education, schools are more likely to be better resourced and teachers more motivated to use instructional tools effectively.

16. Maintenance and Sustainability of Materials

Even when schools receive science materials through government grants or NGOs, the maintenance and sustainability. These resources often pose challenges. Poor handling by

students, lack of trained laboratory assistants, and absence of maintenance budgets often result in rapid deterioration of materials. In some schools, materials donated years ago are no longer functional due to neglect or misuse. Without a system for repair, replacement, or continuous supply, instructional materials may soon become unusable and leave the school with the same challenges as before.

Challenges in the Use of Instructional Materials in Biology Teaching

Despite the proven importance of instructional materials in improving the quality of science education, many secondary schools, particularly in under-resourced areas like Egor Local Government Area, face several obstacles that limit their effective use. These challenges are often systemic and multifaceted, affecting both the supply and implementation of these resources in the biology classroom.

1. Inadequate Availability of Instructional Materials

One of the most persistent challenges is the insufficient supply or complete absence of instructional materials. In many public secondary schools, essential teaching aids such as microscopes, models of the human body, preserved biological specimens, lab reagents, and charts are either not provided or are available in very limited quantities. According to Okebukola (2005), the lack of basic science equipment is a significant impediment to effective science teaching in Nigeria. This problem is more pronounced in public schools where government funding is low, and parental contributions are minimal. In some cases,

schools rely on outdated or improvised materials, which may not meet the standard required for quality science instruction.

2. Poor Teacher Training and Competence

Another major challenge is the limited training and professional capacity of teachers to use instructional materials effectively. Many biology teachers are not adequately exposed to modern teaching methodologies or digital instructional tools. As noted by Adeyanju (2003), many Nigerian teachers lack the practical skills needed to use laboratory equipment or digital resources such as animations and simulations, which are essential for making abstract biological concepts more understandable. In Egor LGA, teachers may also be burdened with multiple teaching assignments or lack access to in-service training programs, thereby reducing their preparedness and motivation to incorporate instructional aids into their lessons.

3. Infrastructure Deficiencies

Effective use of instructional materials especially in science subjects like biology requires functional infrastructure and laboratory facilities. Many schools lack well-equipped biology laboratories or designated science rooms. Where labs do exist, they may suffer from inadequate space, poor ventilation, lack of clean water, or unreliable electricity all of which are necessary for conducting safe and meaningful biology experiments. The absence of secure storage facilities further discourages the acquisition and regular use of materials, as valuable equipment may be prone to damage or theft.

4. Insufficient Funding and Government Support

The lack of adequate financial support from government agencies is a critical barrier. Many schools do not receive sufficient funds to purchase or maintain instructional materials, and science education is often under-prioritized in budget allocations. According to the Federal Ministry of Education (2016), there is a widespread funding gap in the implementation of practical science education across Nigerian schools. Even when government or donor interventions provide materials, there is rarely a sustained plan for replenishment, maintenance, or teacher training. This financial constraint also affects the ability of schools to participate in external science programs or competitions, which would otherwise stimulate resource use and innovation.

5. Curriculum Constraints and Time Limitations

The structure of the secondary school curriculum in Nigeria is heavily loaded, and teachers are often pressured to complete the syllabus in preparation for internal and national examinations. As a result, time constraints discourage the use of instructional materials, particularly those that require setup and demonstration time. Practical activities may be skipped or treated superficially, with teachers opting instead for theory-based instruction to meet academic deadlines. This approach undermines the inquiry-based and experiential nature of biology education, leading to shallow understanding and poor retention.

6. Technological and Digital Barriers

In an era where digital tools and virtual labs can revolutionize biology teaching, many schools in Egor LGA lack access to basic technological infrastructure. The absence of

computers, projectors, internet access, and even electricity limits the use of ICT-based instructional materials. Even when such resources are available, the lack of digital literacy among teachers and students alike hinders their effective utilization. This digital divide widens the educational gap between well-resourced and under-resourced schools, putting students in rural or disadvantaged areas at a significant disadvantage.

7. Large Class Sizes and Poor Student-Teacher Ratios

Overcrowded classrooms pose a serious challenge to the use of instructional materials. In many public secondary schools, a single teacher may be responsible for 60–80 students in one biology class. This high student-teacher ratio makes it difficult to manage hands-on activities or group demonstrations, as there may not be enough materials for every student or group. Teachers may avoid using instructional aids altogether to prevent classroom disruption or damage to the few resources they have.

8. Attitudinal and Administrative Challenges

The attitudes of teachers and school administrators toward instructional materials can significantly influence their usage. Some teachers view teaching aids as extra work or unnecessary, especially if they are not held accountable for using them. Others may lack the motivation to innovate due to job dissatisfaction, limited career growth, or lack of incentives. Similarly, school heads or administrators may fail to prioritize science education, neglecting to allocate funds or time for laboratory activities. In environments where instructional materials are not seen as essential, their use naturally declines.

9. Security, Maintenance, and Sustainability Issues

Another challenge lies in the safety and maintenance of available instructional materials. In schools where there is no secure storage, expensive or delicate items such as microscopes or models are often kept locked away and rarely used. In some cases, the fear of theft, vandalism, or damage discourages schools from investing in more instructional materials. Additionally, without trained lab assistants or maintenance budgets, materials may fall into disrepair, becoming unusable over time.

10. Socio-Cultural and Religious Barriers

Certain biology topics such as reproduction, evolution, or anatomy may be considered culturally or religiously sensitive in some communities. Teachers may feel uncomfortable using instructional materials (like reproductive organ models or charts) for fear of backlash from parents or religious groups. In some extreme cases, these materials are outright banned or discouraged, limiting students' exposure to key parts of the curriculum. Such cultural constraints interfere with the comprehensiveness of biology instruction and hinder students' full understanding of the subject

Empirical Studies

Empirical studies provide practical insights into the real-world use, effectiveness, and challenges associated with instructional materials in teaching and learning processes. These studies are based on observation, data collection, and analysis, making them essential in establishing evidence-based understanding of how instructional materials affect biology learning outcomes in secondary schools. Over the years, various scholars have conducted investigations on the availability, accessibility, and impact of instructional materials in science education both within Nigeria and in other educational contexts.

A study by Okafor (2013) investigated the impact of instructional materials on the academic performance of secondary school students in biology in Anambra State. The findings revealed that students taught with visual and audio-visual instructional materials performed significantly better than those taught using traditional lecture methods. The study concluded that the integration of teaching aids such as charts, models, and experimental tools helped simplify abstract concepts, improved students' retention, and enhanced their participation in class. Similarly, Ibe and Nwosu (2014) conducted a study in Imo State, examining the availability and use of laboratory materials in secondary schools. The results showed that while instructional materials had a positive effect on student engagement and achievement in biology, their use was often limited due to lack of resources and insufficient teacher training. In a more recent study, Adewuyi (2018) examined the extent to which biology teachers in Ogun State utilize instructional materials in their daily teaching. The research adopted a descriptive survey design and found that although teachers understood the value of

instructional materials, they rarely used them consistently due to factors such as overcrowded classrooms, insufficient materials, and lack of administrative support. This aligns with the findings of Eze and Okoro (2016), who found that even where instructional resources were available, poor laboratory infrastructure and irregular electricity supply hindered their effective use in biology practicals.

Outside Nigeria, Ndirangu et al. (2015) conducted a comparative study in Kenya on the influence of laboratory activities on student performance in secondary school biology. The study revealed that schools with well-equipped laboratories and trained teachers consistently outperformed schools lacking such facilities. This reinforced the assertion that exposure to practical and hands-on learning experiences significantly enhances learners' understanding of scientific principles. Similarly, Mutunga and Mwanja (2017) found that students in schools where instructional materials were regularly used demonstrated higher levels of curiosity, creativity, and problem-solving abilities.

In Edo State, which includes Egor Local Government Area, Ogbemor (2020) conducted an empirical assessment of instructional resources in government-owned secondary schools and observed a consistent lack of biology instructional materials, particularly in rural schools. The study highlighted that many teachers resorted to theoretical teaching due to the unavailability of laboratory reagents and models. The research also recommended that school management and government agencies prioritize the provision of modern instructional materials to improve learning outcomes in science subjects.

These empirical findings indicates the critical role instructional materials play in facilitating meaningful biology education. They also reveal a consistent pattern of challenges such as inadequate supply, underutilization, lack of teacher competence, and infrastructural constraints. Moreover, the studies suggest that when instructional materials are effectively employed, they not only enhance academic achievement but also foster scientific thinking and inquiry-based learning among students.

Summary of Literature Review

The literature reviewed indicates the crucial role of instructional materials in the effective teaching and learning of Biology in secondary schools. These materials including models, charts, specimens, laboratory equipment, and, increasingly, digital tools enhance students' understanding of biological concepts, improve retention, and stimulate interest in the subject. Research consistently shows that the use of instructional materials facilitates more engaging, interactive, and practical learning experiences which are important in Biology. However, despite their proven benefits, the effective utilization of these materials is often hindered by several challenges. Key among these are inadequate availability of instructional materials, poor teacher training and competence, and infrastructure deficiencies, curriculum constraints and time limitations, technological and digital barriers, sociology-cultural and religious barriers etc. Although numerous studies have examined the availability and use of instructional materials in different parts of Nigeria, there is a noticeable gap in research focused specifically on the Egor Local Government Area of Edo State. This lack of localized

data shows the need for further investigation to assess the current state of laboratory instructional material utilization in this area and to provide targeted recommendations for improving Biology education at the secondary school level.

CHAPTER THREE

METHODOLOGY

This chapter describes the methodology adopted for the study. It is organized and discussed under the following sub-headings:

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

Design of the study

This research used a descriptive survey design, which simply means the researcher went out to gather information from many senior secondary schools in Egor Local Government Area. The purpose was to find out how often and in what ways laboratory materials are being used

to teach biology. This method helps to describe what is currently happening without trying to change anything. It gives a clear picture of the situation across various schools.

To get a better understanding of the reasons behind the results, the study also included some interviews and classroom observations. These helped the researcher see things from the teachers' point of view and understand the problems they face in using laboratory materials. While the survey provided general facts and figures, the interviews and observations added more detailed explanations.

The study focused on two main types of information. The first type, called independent variables, included things that might affect how often lab materials are used such as whether materials are available in the school. The second type, called the dependent variable, is the actual use of the laboratory materials. This includes how often they are used, the kinds of materials used, and how well they are used to teach biology.

Population of the Study

The population of the study consists of Three hundred and twenty (320) senior secondary school biology students within Egor Local Government area of Edo state

Sample and Sampling Techniques

A total of eighty (80) senior secondary school two (2) students was sampled from four(4) public senior secondary schools in Egor Local Government area of Edo State.

Research Instruments

The research instruments used in this study were carefully selected and developed to ensure the collection of reliable and valid data relevant to assessing the utilization of laboratory instructional materials for biology learning in secondary schools within Egor Local Government Area. The primary instrument employed was a structured questionnaire, designed specifically for biology teachers. The questionnaire aimed to gather information on the availability and frequency of use of laboratory instructional materials, the types of materials commonly used during biology instruction, the teachers' level of competence in utilizing such materials, as well as the challenges they encounter in the process. The instrument also assessed teachers' perceptions and attitudes toward the use of laboratory-based instruction.

The questionnaire was divided into four sections. Section A focused on the demographic information of the respondents, including gender, academic qualifications, years of teaching experience, and type of school (public or private). Section B addressed the availability of laboratory instructional materials in their respective schools. Section C explored the extent and frequency of utilization of these materials in biology teaching. Section D examined the challenges encountered and teachers' overall perception of laboratory material usage. Most items in Sections B to D were structured on a four-point Likert scale: Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1), which allowed for ease in quantifying responses for statistical analysis.

Validity of the Instruments

The researchers designed FBIBLQ questionnaire was validated by the researchers supervisor and two other lecturers from the department of curriculum and instructional technology, faculty of education,

University of Benin. Their corrections, suggestions, modifications, and recommendations were included into the final draft of the instrument.

Reliability of the instrument

To establish the reliability of the instrument the FBIBLQ questionnaire was administered to eighty (80) SS2 students in Egor Local Government Area. To obtain the reliability of the instrument, Cronbach Alpha reliability techniques was used to obtain the reliability of 0.81. This shows that the instrument is reliable. This statistic was suitable for dichotomous score of agree and disagree response of likert instrument.

Method of data collection

The questionnaire was administered by the researcher. Permission was asked from the principal of the schools that is been sampled and the completed questionnaires were collected on the spot from the respondents to avoid the problem of mortality of the instrument

Method of data analysis

The data collected was analyzed using percentage and frequency to answer the research question

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

This chapter presents the analysis of data collected, with the interpretation and discussion of findings. The data obtained from the study were used to answer the research questions.

Presentation of Results

Research Question 1: What are the laboratory instructional materials utilized for biology learning?

Table I: Descriptive Statistics on Laboratory Instructional Materials Utilized for Biology Learning

S/N	Items	Mean Score	Standard Deviation	Criterion Mean	Remark
1.	Microscopes are regularly used for observing cells and microorganisms during biology lessons.	3.23	.62	2.50	Accepted
2.	Specimen jars and preserved samples	3.28	.58		Accepted

	are available for teaching plant and animal structures.			
3.	Laboratory charts and biological models are used to explain complex biological systems.	3.78	.49	Accepted
4.	Prepared slides and cover slips are commonly used for microscopic observations.	2.80	.67	Accepted
5.	Basic laboratory reagents and chemicals are utilized during biology practical activities.	2.85	.64	Accepted

Source: Field survey 2025

This table displays the mean responses on the laboratory instructional materials Utilized for biology learning. This conclusion is drawn is drawn from them meeting the mean criteria score of 2.50. It can therefore be deduced that microscopes, specimen jars, laboratory charts, slides and cover slips, and laboratory reagents and chemicals are the laboratory instructional materials utilized for learning.

Research Question 2: Is there a difference in the utilization of laboratory instructional materials between private and public school?

Table II: Descriptive Statistics on the Differences in the Utilization of Instructional Materials between Private and Public Schools

S/N	Items	Mean Score	Standard Deviation	Criterion Mean	Remark
1.	Private schools make greater use of laboratory materials due to better funding.	3.53	.55	2.50	Accepted
2.	Public schools experience shortages	3.43	.57		Accepted

	that limit effective utilization of laboratory materials.			
3.	Teachers in private schools have better training in using laboratory instructional tools.	3.18	.63	Accepted
4.	Public schools rely more on theoretical teaching because of inadequate lab resources.	3.20	.61	Accepted
5.	Practical biology activities are more frequent in private schools than in public schools.	3.10	.66	Accepted

Source: Field survey 2025

This table displays the mean responses on the differences in the utilization of laboratory instructional materials between public and private schools. This conclusion is drawn from them meeting the mean criteria score of 2.50. It can therefore be deduced that private schools make greater use of laboratory materials due to better funding, adequate resources, and well trained teachers.

Research Question 3: Is there a difference in the utilization of laboratory instructional materials between rural and urban schools?

Table III: Descriptive Statistics on the Differences in the Utilization of Instructional Materials between Rural and Urban School

S/N	Items	Mean Score	Standard Deviation	Criterion Mean	Remark
1	Urban schools have better access to laboratory instructional materials than rural schools.	2.78	.69	2.50	Accepted
2	Rural schools have outdated or insufficient laboratory equipment.	3.12	.62		Accepted
3	Students in urban schools engage more	3.68	.50		Accepted

4	often in hands-on biology activities. Rural schools depend more on improvised laboratory materials for biology lessons.	3.00	.65	Accepted
5	Urban schools find it easier to maintain and replace laboratory tools.	2.78	.62	Accepted

Source: Field survey 2025

This table displays the mean responses on the differences in the utilization of laboratory instructional materials between rural and rural schools. This conclusion is drawn is drawn from them meeting the mean criteria score of 2.50. It can therefore be deduced that urban schools have better access laboratory materials, can easily replace laboratory tools, engage in more hands on biology activities, and do not have to use improvised laboratory materials for lessons unlike rural schools.

Research Question 4: Is there a difference in the utilization of laboratory instructional materials between big schools and small schools?

Table IV: Descriptive Statistics on the Differences in the Utilization of Laboratory Instructional Materials between Big and Small School

S/N	Items	Mean Score	Standard Deviation	Criterion Mean	Remark
1	Big schools utilize laboratory instructional materials more effectively than small schools.	2.88	.67	2.50	Accepted
2	Small schools have fewer laboratory resources for biology practicals.	3.90	.42		Accepted
3	Big schools employ more specialized science teachers skilled in laboratory use.	3.20	.61		Accepted
4	Small schools often share limited	3.00	.64		Accepted

	laboratory equipment across classes.			
5	Practical biology lessons are conducted more regularly in big schools than in small schools.	2.98	.62	Accepted

Source: *Field survey 2025*

This table displays the mean responses on the differences in the utilization of laboratory instructional materials between big and small schools. This conclusion is drawn from them meeting the mean criteria score of 2.50. It can therefore be deduced that big schools engage in more practical biology lessons as a result of more skilled teachers, and adequate resources provided by the big schools.

Discussion of Findings

Firstly, microscopes, specimen jars, laboratory charts, slides and cover slips, and laboratory reagents and chemicals are the laboratory instructional materials utilized for learning. Microscopes, specimen jars, laboratory charts, slides and cover slips, as well as laboratory reagents and chemicals form the core instructional materials that support effective biology learning because they enable students to observe real biological structures, engage in hands-on inquiry, and better understand abstract scientific concepts. Through microscopes and prepared slides, learners are able to view cells and microorganisms directly, while specimen jars provide concrete examples of preserved plant and animal forms for detailed study. Laboratory charts and models help simplify complex systems for easier comprehension, and reagents or chemicals allow students to perform simple experiments that reinforce theoretical

knowledge. Collectively, these materials enhance practical engagement and deepen understanding of biological processes (Olatunde, 2019).

Secondly, private schools make greater use of laboratory materials due to better funding, adequate resources, and well trained teachers. Private schools tend to make greater use of laboratory materials because they often have stronger funding structures that enable the purchase and maintenance of essential scientific equipment, as well as the provision of well-equipped laboratories that support regular practical activities. With adequate resources readily available, teachers in private schools are better positioned to integrate hands-on learning into biology instruction, creating more meaningful and engaging learning experiences for students. In addition, private schools frequently employ well-trained and professionally supported teachers who are confident in using laboratory tools effectively, which further enhances the quality and frequency of practical lessons. This combination of funding, resources, and teacher competence generally leads to higher utilization of laboratory materials in private schools compared to public ones (Adeyemi, 2020).

Furthermore, urban schools have better access laboratory materials, can easily replace laboratory tools, engage in more hands on biology activities, and do not have to use improvised laboratory materials for lessons unlike rural schools. Urban schools generally have better access to laboratory materials because they are located in areas where educational supplies and support services are more readily available, allowing them to maintain well-stocked laboratories. Their proximity to educational vendors and service providers also makes it easier to replace damaged or outdated laboratory tools, ensuring continuity in

practical instruction. As a result, students in urban schools participate in more hands-on biology activities that strengthen understanding and build scientific skills. In contrast, rural schools often face shortages and limited supply chains, forcing teachers to rely on improvised materials. These disparities in access and support give urban schools a clear advantage in the effective utilization of laboratory resources (Nwosu, 2018).

Lastly, big schools engage in more practical biology lessons as a result of more skilled teachers, and adequate resources provided by the big schools. Big schools tend to engage in more practical biology lessons because they usually have a larger pool of skilled and specialized science teachers who are capable of facilitating laboratory-based activities effectively. These schools also benefit from more substantial financial and material resources, which enable them to maintain well-equipped laboratories and provide students with consistent access to essential instructional materials. With adequate resources and professional staff in place, big schools are better positioned to integrate frequent hands-on learning experiences into their biology curriculum, thereby strengthening students' scientific understanding and practical competence. This advantage makes practical activities more regular and comprehensive in larger schools compared to smaller ones (Ogunleye, 2021).

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATIONS

This chapter presents summary of the study alongside the conclusion drawn from the analysis of data collected and the results obtained in the course of this study. The recommendations offered based on the findings of the study are also highlighted.

Summary

A descriptive survey design was adopted to collect data from 80 randomly selected students. The main instrument for data collection was a structured questionnaire validated by experts from the University of Benin, and its reliability was confirmed using. The researcher personally administered the questionnaires to ensure clarity and honest responses. Data collected were analyzed using descriptive statistics such as frequency counts, percentages, and mean scores, with 2.50 as the decision benchmark.

Findings

Findings from the study revealed that:

1. Microscopes, specimen jars, laboratory charts, slides and cover slips, and laboratory reagents and chemicals are the laboratory instructional materials utilized for learning.
2. Private schools make greater use of laboratory materials due to better funding, adequate resources, and well trained teachers.
3. Urban schools have better access laboratory materials, can easily replace laboratory tools, engage in more hands on biology activities, and do not have to use improvised laboratory materials for lessons unlike rural schools.
4. Big schools engage in more practical biology lessons as a result of more skilled teachers, and adequate resources provided by the big schools.

Conclusion

On the basis of the findings, it was concluded that the utilization of laboratory instructional materials in biology learning is strongly influenced by the availability of essential tools such as microscopes, specimen jars, charts, slides, and basic reagents, all of which enhance students' understanding through hands-on engagement. However, the level of access and usage varies significantly across different school types. Private schools generally demonstrate higher utilization because they possess stronger funding, well-trained teachers, and better-equipped laboratories. Similarly, urban schools outperform rural schools due to easier access to materials, quicker replacement of tools, and fewer constraints that force the use of improvised resources. In the same vein, large schools benefit from greater resources and

more specialized teachers, enabling them to conduct practical biology lessons more frequently than smaller schools. Altogether, these differences highlight the need for improved funding, resource allocation, and teacher training across under-resourced schools to promote equitable and effective biology education for all learners.

Recommendations

Based on the findings, it is recommended that

1. Additional laboratory equipment should be provided to schools with limited resources to enhance practical biology learning.
2. Teachers in rural and public schools should be regularly trained in the effective use of laboratory instructional materials.
3. Government funding should be increased to ensure equitable access to well-equipped laboratories in all schools.
4. Outdated or damaged laboratory tools should be replaced promptly to maintain the quality of practical lessons.
5. The utilization of laboratory materials should be regularly monitored to ensure they are used effectively.
6. Partnerships with non-governmental organizations and private institutions should be fostered to support the provision of additional laboratory resources.

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APPENDIX
QUESTIONNAIRE
DEPARTMENT OF CURRICULUM INSTRUCTIONAL AND TECHNOLOGY
FACULTY OF EDUCATION
UNIVERSITY OF BENIN
BENIN CITY, NIGERIA

Dear Respondents,

I am a final year student in the above department. The purpose of this research is to conduct an ASSESSMENT OF UTILIZATION OF LABORATORY INSTRUCTIONAL MATERIALS FOR BIOLOGY LEARNING IN SECONDARY SCHOOL IN EGOR LOCAL GOVERNMENT AREA. kindly answer as correctly to ensure reliable data collection for the study. The research is clearly for academic purposes and your response will be treated as confidential . Thanks for your co-operation

Yours faithfully,

ABOKHA FESTUS OSIGBEME

INSTRUCTIONS: Please tick []the correct answer

SECTION A: Personal Information of the respondents

Name of school:

1. Type of School: [] Public [] Private

2. Location of School: [] Rural [] Urban

3. Sex: [] Male [] Female

Section B: Laboratory Instructional Materials Utilization

Tick your level of agreement with the following statements.

SA = Strongly Agree A = Agree D = Disagree SD = Strongly Disagree

S/ N	ITEMS	SA	A	D	SD
	Laboratory Instructional Materials Utilized for Biology Learning				
1.	Microscopes are regularly used for observing cells and microorganisms during biology lessons.				
2.	Specimen jars and preserved samples are available for teaching plant and animal structures.				
3.	Laboratory charts and biological models are used to explain complex biological systems.				
4.	Prepared slides and cover slips are commonly used for microscopic observations.				
5.	Basic laboratory reagents and chemicals are utilized during biology practical activities.				

Differences Between Private and Public Schools					
6.	Private schools make greater use of laboratory materials due to better funding.				
7.	Public schools experience shortages that limit effective utilization of laboratory materials.				
8.	Teachers in private schools have better training in using laboratory instructional tools.				
9.	Public schools rely more on theoretical teaching because of inadequate lab resources.				
10.	Practical biology activities are more frequent in private schools than in public schools.				

Differences Between Rural and Urban Schools		SA	A	D	SD
11.	Urban schools have better access to laboratory instructional materials than rural schools.				
12.	Rural schools have outdated or insufficient laboratory equipment.				
13.	Students in urban schools engage more often in hands-on biology activities.				
14.	Rural schools depend more on improvised laboratory materials for biology lessons.				
15.	Urban schools find it easier to maintain and replace laboratory tools.				
Differences Between Big and Small Schools					
16.	Big schools utilize laboratory instructional materials more effectively than small schools.				
17.	Small schools have fewer laboratory resources for biology				

	practicals.				
18.	Big schools employ more specialized science teachers skilled in laboratory use.				
19.	Small schools often share limited laboratory equipment across classes.				
20.	Practical biology lessons are conducted more regularly in big schools than in small schools.				