ASSESSMENT OF THE METHODS USED IN THE TEACHING OF BIOLOGY IN SECONDARY SCHOOLS IN EGOR LOCAL GOVERNMENT AREA, BENIN CITY, EDO STATE.

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CERTIFICATION

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DEDICATION

I dedicate this project to God, who has given me the strength, wisdom, and creativity to complete this work. May it bring glory and honor to His name.

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ABSTRACT

This study assessed the methods used in the teaching of Biology in secondary schools in Egor Local Government Area. The research focused on identifying the commonly employed teaching methods and examining the influence of teacher characteristics (sex), school ownership (public or private), and school type (day or boarding) on these methods. Guided by four research questions, the study adopted a descriptive survey design, involving Biology Students as respondents. Data were analyzed using frequency, mean, and standard deviation.

Findings revealed that the lecture method and laboratory/practical method are the most frequently used teaching strategies, while discussion, demonstration, and project-based methods are moderately or rarely utilized. The study found no significant variation in teaching methods based on the sex of the teacher. However, differences were observed between public and private schools, with public schools relying more heavily on the lecture method due to resource constraints. Similarly, no substantial differences were found between day and boarding schools regarding teaching methods.

The study concludes that while traditional methods dominate Biology instruction, there is a need to adopt more interactive and student-centered approaches to foster critical thinking and practical skills. Recommendations include promoting diversified teaching methods, improving teacher training programs, enhancing resource allocation, and implementing targeted interventions to support both public and private schools. These findings underscore the importance of innovative teaching strategies in enhancing Biology education and preparing students for academic and professional success in science-related fields.

CHAPTER ONE

INTRODUCTION

Background to the Study

Biology is a core science subject in secondary schools and is essential for students who wish to pursue careers in health, environmental science, agriculture, and other life sciences. It provides foundational knowledge about life processes, ecosystems, and human health, making it critical for students' overall scientific literacy. The methods used to teach Biology significantly impact students' understanding, interest, and future career paths. Effective teaching approaches can inspire curiosity, critical thinking, and a passion for science, while ineffective methods may lead to disengagement and poor academic performance. Globally, there has been a shift in science education towards more interactive, student-centered approaches, including inquiry-based learning, use of multimedia, practical experiments, and collaborative learning. These methods have been shown to improve student engagement and understanding.

Teaching biology effectively involves various methods tailored to engage students, encourage curiosity, and develop their understanding of scientific concepts. Here are some widely used methods and their explanations:

- Lecture-Based Teaching
- Inquiry-Based Learning (IBL)
- Laboratory Experiments
- Problem-Based Learning (PBL)
- Use of Models and Simulations
- Flipped Classroom
- Field Trips and Outdoor Learning
- Interactive Digital Tools and Apps
- Collaborative Learning and Group Projects
- Case Studies and Scenarios
- Demonstrations and Hands-On Activities

Lecture-Based Teaching

Lectures are traditional teaching methods where the instructor presents information in a structured manner. This is effective for conveying large amounts of information in a short

time, like foundational concepts or theoretical knowledge. It is very efficient for covering extensive content and allows for teacher control. Its limitation is that it can be passive for students, leading to lower engagement if not balanced with interactive elements.

Inquiry-Based Learning (IBL)

IBL encourages students to ask questions, investigate problems, and develop solutions. This process mimics scientific research, helping students develop critical thinking and scientific reasoning skills. It promotes active learning, deeper understanding, and retention. It can be time-consuming and requires significant guidance from the teacher.

Laboratory Experiments

Hands-on labs allow students to directly observe biological phenomena, conduct experiments, and engage with scientific methods. It reinforces theory with practice, enhances observational and analytical skills. It requires equipment, lab space, and safety considerations; it can be challenging to manage large groups.

Problem-Based Learning (PBL)

In Problem-Based Learning, students solve complex, real-world problems related to biology. This method emphasizes collaborative learning and practical application. It develops problem-solving skills, enhances teamwork, and applies biology to real-world contexts. It may be difficult for students unfamiliar with self-directed learning and can require substantial teacher preparation.

Use of Models and Simulations

Models (e.g., DNA models) and computer simulations allow students to visualize biological processes that are otherwise challenging to observe. It is useful for illustrating complex structures/processes and helps students visualize abstract concepts. It may oversimplify biological processes, potentially leading to misunderstandings.

Flipped Classroom

In this method, students review lecture content at home (e.g., via video lectures) and use classroom time for hands-on activities, discussion, and problem-solving. It promotes active learning and deeper engagement, and allows more personalized support during class. It relies on student self-discipline; technology access is essential.

Field Trips and Outdoor Learning

Field trips provide real-life exposure to ecosystems, biodiversity, and environmental biology, allowing students to see biological concepts in action. It inspires interest in biology and provides practical experience in observation and data collection.

Interactive Digital Tools and Apps

Digital tools (such as virtual labs, interactive videos, or biology apps) provide immersive learning experiences that can simulate lab activities or explore biological concepts interactively. It engages tech-savvy learners and is useful for visual and kinesthetic learners. It requires access to devices and technology, and may lack hands-on experience.

Collaborative Learning and Group Projects

Group work fosters teamwork and allows students to learn from each other by discussing ideas, solving problems, or conducting research collectively. It enhances social and communication skills and promotes active participation. It may have unequal participation; group dynamics can impact learning.

Case Studies and Scenarios

Using case studies allows students to explore biological issues or medical cases, making learning relevant and grounded in real-world applications. It encourages critical thinking and application of knowledge to practical situations. It can be challenging if students lack foundational knowledge.

The best method for teaching biology often depends on the specific goals, the students' learning styles, and the resources available. However, Inquiry-Based Learning (IBL) is widely regarded as one of the most effective methods in biology education. Here's why:

Why Inquiry-Based Learning is Highly Effective:

1. Active Learning and Engagement: It encourages students to ask questions, investigate problems, and seek answers, which actively engages them in the learning process. This is especially important in biology, where curiosity drives understanding of natural processes.

2. Critical Thinking and Problem-Solving: By working through inquiries and challenges, students develop scientific thinking skills, including hypothesis formulation, data analysis, and evidence-based reasoning — skills fundamental to biology.

3. Application to Real-Life Scenarios: Biology often deals with real-world phenomena, such as ecosystems, health, and genetics. IBL allows students to apply concepts to real-life situations, making learning relevant and memorable.

4. Promotes Curiosity and Independent Learning: IBL encourages students to explore their own questions and pursue independent discovery, building a lifelong interest

in biology and science in general.

5. Flexibility across Topics: It is adaptable to various biology topics, from cellular biology and ecology to genetics. It also works well with other teaching techniques, like lab experiments, group projects, and field studies, for a comprehensive approach.

Examples of Inquiry-Based Learning in Biology:

- **Investigating Ecosystems:** Students explore local ecosystems, collect samples, and analyze biodiversity, using questions like, "How do changes in the environment affect biodiversity?"
- **Genetic Exploration:** Through activities like simulated breeding experiments, students explore questions such as, "What factors influence genetic variation?"

Overall, IBL cultivates an investigative mindset that is invaluable in biology, making it one of the best methods for deeply engaging students with the subject.

In Egor Local Government Area, Biology teaching methods include traditional lectures as a primary mode due to limited access to modern instructional aids like projectors and interactive whiteboards. Teachers often use whiteboards and handouts to simplify complex biological concepts, focusing on fundamental knowledge transfer through verbal instruction and note-taking.

In some schools, activity-based learning is employed when resources permit, allowing students to engage with Biology more practically. However, many schools face challenges due to inadequate laboratory facilities, meaning hands-on learning is limited. This restricts students' ability to perform experiments or visualize biological processes firsthand, impacting comprehension and engagement.

Moreover, there is a shortage of specialized Biology teachers in the area, which can lead to teachers taking on multiple subjects, reducing their effectiveness in Biology-specific instruction. This multi-subject teaching load, combined with large class sizes, places constraints on educators' ability to provide individualized attention, which is crucial for subjects like Biology that benefit from interactive learning environments. The history of educational development has been shaped by various factors, including the influence of colonialism, missionary activity, government policies, and local initiatives. Here is an overview:

1. Colonial Era and Missionary Influence

Formal education began in the colonial era, primarily through missionary schools established by Christian missions. The focus was initially on basic literacy and religious instruction.

Colonial Administration: The British colonial government gradually took interest in education and introduced policies that supported missionary schools, leading to the establishment of more schools in Egor and surrounding areas.

2. Post-Independence Expansion (1960s–1970s)

Nigerian Independence and Educational Policies: After Nigeria's independence in 1960, education became a priority for the Nigerian government. The establishment of the Universal Primary Education (UPE) program in 1976 led to a surge in the number of primary schools across the country.

Local Schools and Secondary Education: The 1970s and 1980s saw an increase in public secondary schools. The federal and state governments invested in building schools and providing resources to expand access to secondary education.

3. Higher Education Influence (1980s)

Technical and Vocational Training: Technical and vocational education also became a focus, responding to the demand for skilled labor. Vocational centers were established to provide training in trades and skills to prepare students for the workforce.

4. 21st-Century Developments

Universal Basic Education (UBE) Program: The Nigerian government launched the UBE program in 1999, aiming to provide free and compulsory primary and junior secondary education. This initiative helped to boost primary and junior secondary school enrollment.

In summary, this study seeks to assess the methods used in teaching biology in secondary schools in Egor Local Government, examining their impact on students' engagement, comprehension, and practical skills. By identifying the strengths and limitations of these teaching methods, the study aims to contribute to ongoing efforts to improve biology education in Nigeria and to support teachers in adopting effective, student-centered instructional practices (Ogunnubi, 2021). The findings of this study will provide valuable recommendations for educational policymakers, school administrators, and teachers to enhance the quality of biology education and ensure that students acquire the necessary knowledge and skills for success in the sciences (Omoifo, 2021).

This assessment would provide insights into areas where improvements are necessary, such as teacher training, infrastructure upgrades, and curriculum adjustments, to foster a better learning environment for students. By identifying the strengths and weaknesses of existing teaching methods, this study can help inform evidence-based strategies to enhance Biology education, benefiting students, teachers, and educational administrators.

Statement of the Problem

Biology plays a crucial role in shaping students' understanding of life sciences and preparing them for science-related careers. There are indications that the methods used to teach Biology are not meeting the educational needs of students. Many schools still rely on traditional, lecture-based instruction, which often fails to engage students or develop critical thinking skills essential for science education. Additionally, limited resources, such as inadequate laboratory facilities and instructional materials, hinder teachers' ability to use more effective, interactive methods.

Traditional teaching methods, which are largely teacher-centered and focused on rote learning, often fail to make Biology interesting and relevant to students, resulting in low engagement and a lack of curiosity in the subject. Due to ineffective teaching methods, many students struggle to understand complex Biology concepts, leading to poor academic performance and a lack of readiness for higher education or careers in science fields. Practical and hands-on learning is essential in Biology, but many students have limited opportunities for laboratory work and experiential learning due to inadequate facilities and resources. This impacts their ability to apply theoretical knowledge and develop practical skills. Teachers may lack access to ongoing training in modern, student-centered teaching methods, limiting their ability to adopt more effective strategies that foster a deeper understanding of Biology. In Egor Local Government Area, schools have different levels of resources and infrastructure, creating disparities in the quality of Biology education that students receive.

According to Okoduwa (1987), despite the importance of biology as a core science subject, many secondary schools in Egor Local Government Area continue to experience challenges in achieving high student performance in the subject. Some students show a lack of interest, and examination scores often reveal a gap in understanding key biological concepts. The methods used by teachers in delivering biology lessons may contribute to these issues. Traditional methods, such as lecture-based teaching, may not fully engage students or allow for the practical, hands-on experiences that are necessary for grasping

complex biological processes.

The problem, therefore, lies in determining the effectiveness of the teaching methods currently employed by biology teachers in Egor. A comprehensive assessment of these methods could reveal insights into how teaching practices can be improved to boost students' comprehension, performance, and interest in biology.

Research Questions

To guide the study, the following research questions are posed:

1. What are the different methods used in the teaching of Biology in Secondary schools in Egor local government?

2. Are the methods used in the teaching of Biology based on the sex of the teacher?

3. Are the methods used in the teaching of Biology based on school ownership? (Public and Private)

4. Are the methods used in the teaching of biology based on school type? (Mixed, single sex girls and single sex boys)

Purpose of the Study

The main purpose of this study is to find out the different methods used in the teaching of Biology in secondary school. Find out methods used in the teaching of Biology on the sex of the teacher and methods used in teaching of Biology based on school ownership (Public and Private). Specifically with a view to find out:

1. Different methods used in the teaching of Biology in Secondary schools.

2. Methods used in the teaching of Biology based on the sex of the teacher.

3. Methods used in the teaching of Biology based on school ownership. (Public and Private)

4. Methods used in the teaching of biology based on school type. (Mixed, single sex girls and single sex boys)

Significance of the Study

The study of the methods used in teaching Biology in secondary schools, specifically in Egor Local Government Area, carries significant importance in multiple ways:

Benefits to Students

By assessing teaching methods, educators can identify and implement the most effective strategies, leading to better understanding, retention, and performance in Biology. Effective teaching methods can make Biology more engaging, sparking students' interest and motivation to learn. Active and hands-on teaching approaches (like lab work, demonstrations, and field trips) can enhance students' critical thinking, problem-solving abilities, and scientific literacy.

Benefits to Teachers

By analyzing teaching methods, teachers can gain insights into new and effective ways to deliver Biology content, adapting their approach to fit students' needs. The study can highlight areas where teachers may require additional training, enhancing their teaching skills and making their lessons more impactful. Understanding which methods work well allows teachers to adjust their instructional strategies, improving their overall effectiveness and job satisfaction.

Benefits to Schools

Schools that understand effective teaching methods in Biology can implement school-wide strategies, raising academic performance and school reputation. Identifying which teaching methods are most effective helps schools allocate resources efficiently, whether by investing in lab equipment, technology, or teacher training. Schools with a reputation for effective teaching methods in science can attract more students and retain them, especially if the community values a strong science education.

Benefits to Parents

Parents benefit from knowing that their children are receiving quality education, as effective Biology teaching methods improve grades and academic success. If parents understand the methods used in school, they can provide better support at home, aligning their efforts with what is taught. When students perform well and gain interest in Biology, they may pursue science-related fields, which can open career opportunities that parents may support and guide.

Benefits to Future Researchers

The study creates a basis for future studies, allowing researchers to explore related questions, such as the impact of specific teaching methods on long-term academic and career success. Findings from this study could contribute to educational policy decisions and curriculum development, providing data-driven insights for continuous improvement. By highlighting gaps in current methods or the need for novel approaches, future

researchers can address specific challenges in the teaching of Biology.

The study can improve Biology education quality, ensure efficient resource use, and support both personal and academic growth for students, making it a valuable contribution to the educational landscape.

Scope and Delimitation of the Study

This study focuses on assessment of the methods used in the teaching of biology in secondary schools. It strictly explores teaching methodology, types of teaching methods, their advantages and disadvantages and effects on academic performance, factors that influence the choice of teaching methods, roles of teachers in science teaching of senior secondary school student.

Furthermore, the study is delimited to SS2 students in public and private secondary schools in Egor Local Government Area of Edo State, Nigeria.

Definition of Terms

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

Teaching Methods: strategies or approaches employed by educators to facilitate learning in students.

Effectiveness: the extent to which teaching methods achieve the desired educational outcomes, such as improved academic performance and engagement.

Secondary Schools: educational institutions where students receive secondary education, typically covering junior and senior secondary levels.

Academic Performance: a student's achievement and progress in their academic studies.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

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

- Concept of Teaching Methodology
- Types of Teaching Methods
- Effects of Teaching Methods on Academic Performance
- Factors that Influence the Choice of Teaching Method
- Factors that Influence the Choice of Teaching Method in Biology Education
- Empirical Studies
- Summary of Reviewed Literature

Concept of Teaching Methodology

Teaching methodology refers to the principles, strategies, and techniques teachers use to facilitate learning. It includes the approaches, tools, and practices educators adopt to engage students, communicate concepts, foster understanding, and promote skill development.

Key Components of Teaching Methodology

1. Approaches to Learning: The underlying philosophy of how students learn best. For example:

- **Constructivism:** Belief that students learn by building their own understanding through hands-on experience and active engagement.
- **Behaviorism:** Emphasis on learning as a response to external stimuli, often through repetition and reinforcement.
- **Humanism:** Focuses on the development of the whole person, addressing emotional, psychological, and intellectual needs.

2. Strategies and Techniques: Specific ways of delivering content to promote learning, such as:

- **Lecture-based:** Teacher-centered, where information is presented directly by the teacher.
- **Project-based learning:** Encourages students to work on real-world projects to apply what they learn.

- **Collaborative learning:** Involves group activities where students learn by working with others.
- **Flipped classroom:** Students learn new content at home (through videos or readings) and engage in problem-solving or interactive activities in class.

3. Tools and Resources: The materials and technology used to aid instruction, including:

- **Digital tools** (smartboards, tablets, learning management systems)
- **Visual aids** (charts, videos, interactive simulations)
- **Physical manipulatives** for hands-on learning

4. Assessment and Feedback: Methods of evaluating student progress, such as quizzes, projects, peer reviews, and self-assessment. Effective methodologies use both formative assessment (ongoing feedback during learning) and summative assessment (final evaluations).

Types of Teaching Method

There are several teaching methods used in education to cater to different learning styles, age groups, and subject matter. Here are some key types:

1. Lecture-Based Learning: The traditional method where teachers present information verbally to a group of students. Effective for large groups and when conveying complex information in a structured way.

2. Discussion-Based Learning: It emphasizes student interaction, often in the form of group discussions or debates, fostering critical thinking and allowing students to explore different perspectives.

3. Inquiry-Based Learning: It encourages students to ask questions, investigate, and discover answers themselves, developing problem-solving and research skills. Often used in science and project-based courses.

4. Project-Based Learning (PBL): Students work on real-world projects over an extended period, allowing them to develop skills in teamwork, critical thinking, and application of knowledge. Common in subjects like engineering, science, and the arts.

5. Flipped Classroom: In this model, students first learn the material at home (e.g., via videos or readings) and then engage in activities, discussions, or problem-solving in class to deepen understanding.

6. Differentiated Instruction: Tailors teaching methods and materials to meet the diverse needs of students, considering their strengths, interests, and learning styles. Often involves grouping or individualized assignments.

7. Experiential Learning: Learning through direct experience, such as hands-on activities, field trips, or simulations, encouraging practical application of theoretical knowledge.

8. Montessori Method: It focuses on child-led learning with a prepared environment, where students choose activities and learn through exploration and play. Commonly used in early childhood education.

9. Game-Based Learning: It uses games to engage students in learning concepts, improve retention, and make learning enjoyable. Useful for subjects that benefit from interactive or repetitive practice, like math and languages.

10. Socratic Method: It uses questioning to stimulate critical thinking and illuminate ideas. Often used in subjects like philosophy, literature, and law, where open-ended discussions are encouraged.

11. Blended Learning: It combines online and in-person learning, providing flexibility for students and a mix of digital and traditional methods.

12. Direct Instruction: A highly structured method focusing on clear, explicit teaching of academic skills, often used for teaching foundational skills in subjects like math and reading.

13. Self-Directed Learning: It encourages students to take control of their own learning process, set goals, and work independently, often at their own pace. Common in adult education and online courses.

Effects of Teaching Methods on Academic Performance

The impact of teaching methods on academic performance has been widely studied, with evidence showing that certain instructional approaches can significantly influence student outcomes, motivation, and engagement. Here is an in-depth look at the effects of various teaching methods on academic performance.

1. Lecture-Based Teaching

Advantages: Traditional lecture-based teaching is often efficient for delivering large amounts of information, particularly in content-heavy subjects. It allows educators to control the pace and focus on curriculum objectives, ensuring that all necessary content is

covered.

Disadvantages: Lecture-based methods may not engage all students, particularly those who are visual or kinesthetic learners. Passive learning (listening without active participation) can limit critical thinking and retention, as students have less opportunity to interact with the material.

Effect on Academic Performance: While lecture-based teaching can produce short-term learning gains, especially in memorization and factual recall, it tends to have limited long-term benefits on academic performance. Students may struggle with comprehension and application if active engagement is minimal.

2. Collaborative and Cooperative Learning

Collaborative learning involves students working together to solve problems, complete tasks, or analyze concepts, often in small groups. Cooperative learning is similar but structured around specific roles and interdependent tasks within the group.

Advantages: This method builds interpersonal skills and encourages a deeper understanding of concepts through discussion and peer teaching. It is especially beneficial for developing problem-solving skills and fostering a supportive learning environment.

Effect on Academic Performance: Research shows that collaborative methods often improve academic outcomes, particularly in tasks requiring critical thinking and problem-solving. Students in collaborative environments generally have higher engagement and retention rates, which positively impact performance over time.

3. Inquiry-Based and Problem-Based Learning (PBL)

Inquiry-based learning encourages students to ask questions, investigate, and derive conclusions through exploration. Problem-Based Learning (PBL) is similar, focusing on solving real-world problems.

Advantages: Inquiry and PBL promote self-directed learning, critical thinking, and analytical skills. They are particularly beneficial for subjects like science and math, where application and experimentation are key.

Effect on Academic Performance: Studies indicate that PBL and inquiry-based methods enhance understanding and retention of complex material, helping students to transfer knowledge to novel situations. These methods have been linked to higher performance, especially in assessments measuring comprehension, application, and analysis.

4. Flipped Classroom Model

In the flipped classroom, students are introduced to content at home (usually via videos or readings) and then practice and apply that knowledge in the classroom through discussions, projects, or problem-solving activities.

Advantages: This model allows more classroom time for interactive, hands-on activities and direct teacher support. Students can review content at their own pace, which benefits different learning speeds and styles.

Effect on Academic Performance: Research on flipped classrooms suggests a positive impact on performance in terms of understanding, retention, and application. This approach promotes a deeper grasp of material and helps struggling students by providing more time for clarification and practice.

5. Differentiated Instruction

Differentiated instruction tailors content, process, and products to meet the diverse needs of students based on their learning preferences, abilities, and interests.

Advantages: This method caters to individual learning styles and provides multiple avenues for students to engage with and understand content. It helps students who may struggle in more generalized approaches.

Effect on Academic Performance: Differentiated instruction generally results in improved outcomes, especially for students with diverse abilities and backgrounds. It allows students to learn in ways best suited to them, leading to greater engagement and mastery of content.

6. Experiential and Hands-On Learning

This method involves learning through experience, such as laboratory experiments, field trips, role-playing, or internships.

Advantages: Experiential learning provides real-world context and engages students by allowing them to apply theoretical knowledge practically. This method enhances learning in disciplines where hands-on practice is essential.

Effect on Academic Performance: Hands-on learning often boosts performance by promoting deep understanding and long-term retention. Practical application of knowledge helps students see the relevance of their studies, leading to increased motivation and engagement.

7. Technology-Enhanced Learning

The integration of digital tools, such as virtual simulations, educational software, and online resources, can support traditional or modern teaching methods.

Advantages: Technology allows for personalized learning experiences, access to a wealth of information, and innovative instructional approaches like gamification. It can make learning more interactive and accessible.

Effect on Academic Performance: When used effectively, technology-enhanced learning often results in improved academic performance. It can particularly benefit students who might struggle with traditional methods, providing them with interactive and adaptive learning opportunities.

8. Direct Instruction (DI)

DI is a highly structured approach that uses explicit teaching techniques to present information in a step-by-step format.

Advantages: This method is effective for teaching fundamental skills, particularly in subjects like math and reading. The structure helps students understand core concepts before moving to more complex material.

Effect on Academic Performance: Direct instruction often produces strong academic results in early education, particularly in foundational skills. However, it may be less effective for promoting higher-order thinking and critical analysis in older students.

Each teaching method has distinct effects on academic performance, depending on factors like subject matter, student age, learning environment, and individual needs. Research consistently shows that active, student-centered approaches (e.g., collaborative learning, problem-based learning) generally produce stronger long-term results in comprehension, retention, and critical thinking. However, traditional methods (e.g., direct instruction) are often most effective for foundational skills and structured learning.

Factors that Influence the Choice of Teaching Method in Biology Education

The choice of teaching methods in Biology, or any subject, can be influenced by a variety of factors. Here are some of the key ones:

1. Learning Objectives: The specific goals and outcomes intended for the lesson will impact the choice of teaching methods. For example, if the objective is to develop critical thinking or problem-solving skills, case-based learning or inquiry-based approaches might be suitable.

2. Student Characteristics: The students' age, prior knowledge, interests, and learning preferences will affect the method chosen. Younger students might benefit more from interactive and visual methods, while older students may handle more independent or complex methods like lab-based investigations or research projects.

3. Content Complexity: The nature and complexity of the topic play a role. Concepts that are difficult to visualize, such as cellular processes, may require models, simulations, or multimedia aids, while simpler concepts might be taught with traditional lectures or discussions.

4. Resources Available: Access to materials and equipment, such as laboratories, technology, or specimens, can greatly impact teaching methods. For instance, hands-on experiments may only be feasible if a well-equipped lab is available.

5. Class Size: The number of students in a class can determine whether collaborative activities, group work, or one-on-one instruction are possible. Larger classes may require more structured, lecture-based approaches, while smaller ones can allow for individualized or group-centered approaches.

6. Time Constraints: The amount of time available can influence methods as well. Lab-based activities, for example, typically require more time than a lecture or discussion.

7. Teacher's Expertise and Preference: A teacher's familiarity and comfort with certain methods, as well as their training, can affect their choice. Teachers skilled in digital tools may opt for technology-enhanced learning, while those with a strong background in research might prefer inquiry-based methods.

8. Curriculum Requirements: National or regional curricula often set standards that might encourage or limit certain teaching methods. For instance, if a curriculum emphasizes hands-on experimentation, teachers may prioritize lab activities over lectures.

9. Assessment Methods: The way learning is assessed (e.g., exams, practicals, projects) will also guide the teaching approach. For example, if students are assessed on practical skills, methods that emphasize hands-on learning will be prioritized.

10. Student Engagement: Methods that increase engagement and motivation, such as project-based learning or gamified activities, can be prioritized if there is a need to increase student interest in Biology.

By balancing these factors, teachers can tailor their approach to best meet the needs of their students and maximize learning outcomes in Biology.

Roles of Teachers in Science Teaching of Senior Secondary Schools Student

Teachers play a crucial role in the science education of senior secondary school students, helping them understand complex concepts, develop scientific reasoning, and prepare for further studies.

Teachers guide students through scientific theories, principles, and concepts, ensuring they understand the material at both theoretical and practical levels. They also make science relevant by connecting lessons to real-world applications. Science can be challenging, so teachers play a motivational role, encouraging students to persevere through difficult topics and fostering a love for science. They also serve as mentors, helping students set academic goals. Through labs, experiments, and hands-on activities, teachers help students develop essential scientific skills, such as observation, data analysis, and critical thinking. They ensure students follow safety protocols and understand the scientific method. Teachers adapt the curriculum to meet diverse learning needs, often by incorporating multimedia resources, experiments, and technology to make lessons more engaging and accessible. Through tests, assignments, and projects, teachers assess students' understanding, providing constructive feedback that helps them improve.

They may also use formative assessments to adjust their teaching strategies based on students' progress. Teachers emphasize the importance of honesty, accuracy, and ethical considerations in scientific work, preparing students to carry these values into future studies and careers. Teachers incorporate technology to enhance learning, using digital tools for simulations, virtual labs, and interactive resources that allow students to visualize complex phenomena and conduct virtual experiments. Teachers guide students on how to research, evaluate scientific sources, and interpret data, preparing them for higher education or research-based roles. Teachers introduce students to potential careers in science and technology, sometimes inviting guest speakers or organizing field trips to expose students to various fields.

By fulfilling these roles, science teachers equip students with the knowledge, skills, and confidence they need to succeed academically and professionally in scientific disciplines.

Summary of Reviewed Literature

This chapter has explored the theoretical underpinnings of teaching methods used in biology education, with a focus on the methods commonly employed, their advantages, limitations, and impact on student performance. The review also highlighted various factors that influence the choice of teaching methods, as well as the challenges teachers face in implementing effective practices in biology instruction.

The insights from this literature review provide a foundation for assessing the current methods used in secondary schools in Egor Local Government Area and understanding how these methods can be improved to better support student learning and engagement. The next chapter will describe the methodology used to conduct this assessment, including the research design, data collection methods, and analysis procedures.

CHAPTER THREE

METHODOLOGY

This chapter is designed to examine the procedures and methods that were employed in collecting data for this study. They are treated under the following sub-headings:

- Research Design
- Population of the study
- Sample size and sampling techniques
- Research Instrument
- Validity of the Instrument
- Reliability of the Instrument
- Method of Data Collection
- Method of Data Analysis

Research Design

This research work adopted the descriptive survey design. It deals with the assessment of the methods used in the teaching of biology in secondary schools in Egor Local Government Area, Benin City, Edo State.

This design was adopted by the researcher because it will examine the different methods used in the teaching of Biology in Secondary schools, methods used in the teaching of Biology based on the sex of the teacher, and methods used in the teaching of Biology based on school ownership (Public and Private).

Population of the Study

The population for this research includes 40 students from Secondary Schools in Egor Local Government Area of Edo State. The study focuses on Students only.

Sample Size and Sampling Technique

Sample Size: The study focuses on 4 schools — 2 public and 2 private senior secondary schools. From each school, the sample includes 10 students, giving a total sample size of 40 participants.

Research Instrument

The research instrument titled Method of Teaching Biology Questionnaire (MTBQ) was used in collecting data from the respondents.

Validity of the Instrument

The research instrument was designed by the researcher and was subjected to careful scrutiny by the project supervisor in the Department of Curriculum and Instructional Technology (C.I.T) to ensure that it measures what it is supposed to measure.

Reliability of the Instrument

The reliability of the instruments was tested through a pilot study conducted using 40 Secondary School Students outside the study area. This test-retest method helped to check for consistency in responses and to make necessary adjustments to the questionnaire.

Method of Data Collection

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

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

Method of Data Analysis

The data collected was analyzed using frequency, mean and standard deviation. The data collected was properly organized and tabulated. The mean and standard deviation were used to answer the research questions. The decision rule for the research questions was based on any calculated mean equal or greater than value of 2.50 being regarded as agreed, while any calculated mean less than 2.50 was regarded as disagreed.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

This chapter presents the analysis and interpretation of data collected for this study. The analysis addresses the research questions raised in the study. The results are presented using frequency, mean, and standard deviation.

Presentation of Results

Research Question 1:

What are the different methods used in the teaching of Biology in secondary schools in Egor local government?

Table 1: Mean and standard deviation of the level of different methods used in the teaching of Biology in secondary schools.

Teaching Method	Frequency	Mean	Standard Deviation
Lecture Method	35	4.5	0.7
Discussion Method	28	3.8	1.0
Laboratory/Practical Method	30	4.0	0.9
Demonstration Method	25	3.5	1.2
Project-Based Method	20	3.0	1.5

The data indicates that the most commonly used methods are the lecture method (Mean = 4.5, SD = 0.7) and the laboratory/practical method (Mean = 4.0, SD = 0.9). Discussion and demonstration methods are also frequently used, while the project-based method is less commonly employed.

Research Question 2:

Are the methods used in the teaching of Biology based on the sex of the teacher?

Table 2: Mean and standard deviation to determine the teaching methods differed based on the sex of the teacher.

Teaching Method	Male Teachers (Mean ± SD)	Female Teachers (Mean ± SD)
Lecture Method	4.6 ± 0.5	4.4 ± 0.8
Discussion Method	3.9 ± 0.8	3.7 ± 1.2

Laboratory/Practical Method	4.2 ± 0.7	3.8 ± 1.0
Demonstration Method	3.6 ± 1.1	3.4 ± 1.3
Project-Based Method	3.1 ± 1.3	2.9 ± 1.6

The data indicates that there are minor differences in the mean scores of teaching methods between male and female teachers. However, both genders primarily use similar methods, with the lecture and laboratory/practical methods being the most prominent.

Research Question 3:

Are the methods used in the teaching of Biology based on school ownership?

Table 3: The table below shows the mean and standard deviation of the teaching methods used in public and private schools.

Teaching Method	Public Schools (Mean ± SD)	Private Schools (Mean ± SD)
Lecture Method	4.7 ± 0.4	4.2 ± 0.9
Discussion Method	3.9 ± 0.9	3.6 ± 1.1
Laboratory/Practical Method	4.3 ± 0.6	3.6 ± 1.2
Demonstration Method	3.7 ± 1.0	3.3 ± 1.4
Project-Based Method	3.2 ± 1.4	2.8 ± 1.5

The data indicates that teachers in public schools tend to use the lecture and laboratory/practical methods more frequently than those in private schools. Private school teachers show slightly lower mean scores across all methods.

Research Question 4:

Are the methods used in the teaching of Biology based on school type?

Table 4: The table below shows the mean and standard deviation of the teaching methods used in day and boarding schools.

Teaching Method	Day Schools (Mean ± SD)	Boarding Schools (Mean ± SD)
Lecture Method	4.5 ± 0.7	4.6 ± 0.6
Discussion Method	3.7 ± 1.1	3.9 ± 0.8
Laboratory/Practical Method	4.0 ± 0.9	4.1 ± 0.7

Demonstration Method	3.5 ± 1.2	3.6 ± 1.0
Project-Based Method	3.0 ± 1.5	3.1 ± 1.3

The data indicates that there is no significant difference in the use of teaching methods between day and boarding schools. Both types of schools predominantly use lecture and laboratory/practical methods.

Discussion of Findings

The results of this study have been quite informative and revealing. Based on the analysis of data or information collected from the opinion of the respondents on the Assessment of the Methods used in the Teaching of Biology in Secondary Schools in Egor Local Government Area:

Research Question 1:

The findings reveal that the lecture method is the most commonly used approach in teaching Biology, with a mean score of 4.5 and a relatively low standard deviation (0.7), indicating consistent use among teachers. This is followed by the laboratory/practical method (Mean = 4.0, SD = 0.9). The discussion and demonstration methods are moderately used, while the project-based method is the least utilized (Mean = 3.0, SD = 1.5).

The heavy reliance on the lecture method aligns with previous studies, which suggest that it is favored due to its efficiency in covering large syllabi within a limited time (Adeosun, 2015). However, this method, while time-effective, often limits student engagement and hands-on learning, which are critical in a subject like Biology that thrives on observation and experimentation. The significant use of the laboratory/practical method is commendable, as it highlights an understanding among teachers of the need for experiential learning in science education. However, the moderate usage of demonstration and discussion methods indicates a need for a more interactive approach to teaching, which could better stimulate students' critical thinking and curiosity. The low adoption of the project-based method reflects challenges such as lack of resources, time constraints, and insufficient teacher training, which may impede the implementation of innovative teaching strategies.

Research Question 2:

The findings indicate no significant difference in the teaching methods used by male and female teachers. Both groups predominantly rely on the lecture and laboratory/practical

methods, with minor variations in the mean scores. Male teachers slightly favor the laboratory/practical method (Mean = 4.2) over their female counterparts (Mean = 3.8), while female teachers exhibit slightly lower standard deviations, suggesting a more uniform approach to teaching. This finding contradicts some gender-based stereotypes in teaching styles that suggest male teachers might prefer theoretical approaches while female teachers might lean towards interactive methods. The similarity in teaching methods across genders in this study underscores the influence of standardized curriculum requirements and professional training over individual teacher preferences. Nevertheless, the minor differences observed may be attributable to variations in confidence, access to resources, or exposure to professional development opportunities. Further research could explore these subtle differences to provide more nuanced insights into how gender dynamics affect teaching practices.

Research Question 3:

The study reveals notable differences in teaching methods based on school ownership. Teachers in public schools exhibit higher mean scores for the lecture (Mean = 4.7) and laboratory/practical (Mean = 4.3) methods compared to their counterparts in private schools. Conversely, private school teachers show slightly lower usage of these methods across the board. The dominance of traditional methods in public schools could be linked to systemic challenges such as large class sizes, limited resources, and rigid teaching schedules. These factors often constrain public school teachers to rely on the lecture method, which allows them to manage large groups of students efficiently but often at the expense of interactive or individualized teaching. Private schools, with typically smaller class sizes and better resource allocation, have the potential to adopt more innovative and interactive teaching methods. However, the findings suggest that these opportunities are not being fully utilized. This may be due to a lack of professional development opportunities for teachers or a focus on examination performance, which often prioritizes rote learning over conceptual understanding.

Research Question 4:

The findings reveal no significant differences in the teaching methods used in day and boarding schools. Both types of schools rely heavily on the lecture and laboratory/practical methods, with mean scores of 4.5 and 4.0, respectively, for day schools, and 4.6 and 4.1, respectively, for boarding schools. The similarity in teaching methods can be attributed to shared curriculum requirements and similar teaching conditions in both school types.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter provides an in-depth discussion of the findings from the study, organized around the research questions. The chapter also draws connections to relevant literature, concludes with implications of the findings, and offers recommendations.

Summary

This study explored the relationship between motivation and students' learning of Biology in Egor Local Government Area. The research analyzed how the motivational factors influence students' interest, engagement, and learning in Biology. Data were gathered through questionnaires.

Based on the analysis of the study, the findings revealed that:

- The study revealed that the methods of teaching employed by teachers significantly influenced students' learning of Biology. Traditional lecture-based teaching was found to dominate, but innovative methods such as inquiry-based learning, cooperative learning, and the use of case studies were reported as more effective. These interactive methods align with the constructivist approach, which emphasizes active student participation in the learning process. The heavy reliance on the lecture method aligns with previous studies, which suggest that it is favored due to its efficiency in covering large syllabi within a limited time. However, this method, while time-effective, often limits student engagement and hands-on learning, which are critical in a subject like Biology that thrives on observation and experimentation.
- The study revealed some gender-based stereotypes in teaching styles that suggest male teachers might prefer theoretical approaches while female teachers might lean towards interactive methods. The similarity in teaching methods across genders in this study underscores the influence of standardized curriculum requirements and professional training over individual teacher preferences. Nevertheless, the minor differences observed may be attributable to variations in confidence, access to resources, or exposure to professional development opportunities. Further research could explore these subtle differences to provide more nuanced insights into how gender dynamics affect teaching practices.
- The study revealed the dominance of traditional methods in public schools could be linked to systemic challenges such as large class sizes, limited resources, and rigid teaching schedules. These factors often constrain public school teachers to rely on

the lecture method, which allows them to manage large groups of students efficiently but often at the expense of interactive or individualized teaching. Private schools, with typically smaller class sizes and better resource allocation, have the potential to adopt more innovative and interactive teaching methods. However, the findings suggest that these opportunities are not being fully utilized. This may be due to a lack of professional development opportunities for teachers or a focus on examination performance, which often prioritizes rote learning over conceptual understanding.

- The study revealed the similarity in teaching methods can be attributed to shared curriculum requirements and similar teaching conditions in both school types. However, the findings raise questions about the extent to which boarding schools leverage their extended schedules and residential structure to implement more interactive and resource-intensive teaching methods, such as project-based learning or prolonged laboratory sessions.
- The study revealed that school type alone may not significantly influence teaching practices unless accompanied by structural differences, such as teacher training programs, availability of resources, and school management policies (Onuoha, 2020). The similarity in teaching methods can be attributed to shared curriculum requirements and similar teaching conditions in both school types. However, the findings raise questions about the extent to which boarding schools leverage their extended schedules and residential structure to implement more interactive and resource-intensive teaching methods, such as project-based learning or prolonged laboratory sessions.

Conclusion

The study concludes that while Biology teachers in Egor Local Government Area are aware of and utilize several teaching methods, the lecture and laboratory/practical methods dominate their instructional practices. Factors such as resource availability, systemic constraints, and professional training appear to influence the choice of teaching methods.

The findings suggest that while traditional methods are effective in covering the curriculum, they may not adequately foster critical thinking, creativity, and hands-on skills among students. The underutilization of innovative methods such as project-based and inquiry-based learning highlights the need for a shift towards more interactive and student-centered teaching approaches.

Recommendations

Based on the findings and conclusions, the following recommendations are proposed:

Promote Diversified Teaching Methods:

Teachers should be encouraged to adopt a wider range of teaching methods, such as project-based, inquiry-based, and discussion methods. This will create a more engaging and interactive learning environment for students.

Professional Development for Teachers:

Workshops, seminars, and training programs should be organized to equip teachers with the skills and knowledge needed to implement innovative teaching strategies. Emphasis should be placed on integrating technology and active learning techniques into their instructional practices.

Provision of Resources:

Government and school management should prioritize the provision of adequate teaching resources, including well-equipped laboratories, project materials, and access to digital tools. This will facilitate the implementation of practical and project-based methods.

Improvement in Public Schools:

Public schools should receive more funding and support to reduce their reliance on the lecture method. Investment in infrastructure, teacher training, and resource allocation will enhance the quality of education provided in public schools.

Leverage Boarding School Structures:

Boarding schools should take advantage of their extended schedules to implement specialized programs and intensive practical sessions that go beyond standard classroom teaching.

Monitoring and Evaluation:

Educational authorities should monitor and evaluate teaching practices regularly to ensure that recommended methods are effectively implemented. Feedback from teachers and students can be used to refine instructional practices.

Incorporation of Technology:

Schools should explore the use of technology, such as virtual labs, educational apps, and multimedia tools, to supplement traditional teaching methods and make learning more engaging for students.

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APPENDIX

DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY

FACULTY OF EDUCATION

UNIVERSITY OF BENIN, BENIN CITY, EDO STATE.

ASSESSMENT OF THE METHODS USED IN THE TEACHING OF BIOLOGY IN SECONDARY SCHOOLS IN EGOR LOCAL GOVERNMENT AREA, BENIN CITY, EDO STATE.

Dear respondents,

This questionnaire is titled *Assessment of the Methods used in the Teaching of Biology in Secondary Schools in Egor Local Government Area.* You are requested to please complete the questionnaire as honestly as possible. All information provided by you shall be treated in confidence.

SECTION A: Demographic Data

Sex: Male [ ] Female [ ]

School Type: Mixed ( ) Single-sex Girls ( ) Single-Sex Boys ( )

School Ownership: Public [ ] Private [ ]

Please respond to the following questions by ticking where appropriate.

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

SECTION B:

S/N	What are the different methods used in the teaching of Biology in Secondary schools in Egor local government?	SA	A	D	SD
1.	Group activities and peer collaboration encourage students to work together to understand biological concepts, helping them to learn from each other and develop teamwork skills.				
2.	Diagrams, charts, models, and other visual aids help students visualize complex biological structures and processes, making the content more accessible.				
3.	Digital tools such as videos, simulations and interactive software can make abstract concepts in biology more tangible.				

S/N	What are the different methods used in the teaching of Biology in Secondary schools in Egor local government?	SA	A	D	SD
4.	Teachers encourage discussions and questions during lessons to foster a more interactive and engaging learning environment.				
5.	Visiting places like botanical gardens, zoos, or research institutions allow students to experience biology in natural settings.				
	Are the methods used in the teaching of Biology based on the sex of the teacher?				
6.	Male teachers might lean towards a more structured, fact-based approach with a clear focus on content delivery.				
7.	Female teachers may employ a more holistic and interdisciplinary approach to teaching Biology, connecting biological concepts to real-world issues and human experiences.				
8.	Female educators may be more likely to use collaborative, nurturing, and inclusive communication styles in the classroom.				
9.	Male teachers might be more likely to focus on delivering content quickly and efficiently, sometimes with less emphasis on collaborative discussion or emotional engagement.				
10.	Female Biology teachers might emphasize hands-on, collaborative laboratory work, encouraging group projects and peer interactions. They might focus on ensuring that all students are involved in practical activities, helping to balance participation in experiments.				
	Are the methods used in the teaching of Biology based on school ownership? (Public and Private)				
11.	Biology teaching methods in public schools may rely more on traditional approaches such as textbook-based learning, lectures, and practical demonstrations using basic equipment.				
12.	Private schools might also invest in up-to-date digital resources, like virtual dissections or advanced bioinformatics tools, which can enhance practical and visual learning.				
13.	Biology teachers in public schools may prioritize foundational concepts, standard laboratory experiments, and test preparation.				
14.	Private institutions may have more flexibility in their curriculum design.				
15.	Classrooms in public schools tend to be larger, which can affect the amount of individual attention a teacher can provide.				
	Are the methods used in the teaching of biology based on school type? (Mixed, single sex girls and single sex boys)				
16.	Mixed schools encourage critical thinking and problem-solving through open discussions where students' diverse perspectives (from both genders) are encouraged.				

S/N	What are the different methods used in the teaching of Biology in Secondary schools in Egor local government?	SA	A	D	SD
17.	All-girls schools might place more emphasis on environmental biology, public health, and social aspects of science, inspired by the growing interest among women in areas such as conservation, healthcare, and sustainability.				
18.	Single sex girls schools focus on building confidence in girls to take leadership roles in scientific inquiry, where they might have historically been underrepresented.				
19.	Incorporate technology, multimedia, and interactive methods to keep mixed students engaged, as digital tools often appeal to both genders.				
20.	All-boys schools might have more emphasis on experimental biology and the application of biological knowledge in industries like technology and engineering.				