

**THE IMPACT OF HANDS- ON ACTIVITIES ON STUDENTS'  
ENGAGEMENT IN BIOLOGY LESSONS IN OVIA-NORTH EAST  
LOCAL GOVERNMENT AREA**

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**SEPTEMBER, 2025.**

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**A PROJECT SUBMITTED TO THE DEPARTMENT OF CURRICULUM AND  
INSTRUCTIONAL TECHNOLOGY, FACULTY OF EDUCATION IN PARTIAL  
FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE  
OF BACHELOR OF SCIENCE EDUCATION (B.Sc.Ed) BIOLOGY,  
UNIVERSITY OF BENIN, BENIN CITY, NIGERIA.**

**SEPTEMBER, 2025**

## CERTIFICATION

We, the undersigned, certify that the research work was carried out by Flourish Osemudiamé ORIBHABOR in the Department of Curriculum and Instructional Technology, Faculty of Education, University of Benin.

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## **DEDICATION**

This research work is dedicated to God Almighty for His grace throughout the period of study.

## ACKNOWLEDGEMENTS

The researcher extends sincere thanks to Dr. R.O Uzamere, the project supervisor for enriching the researcher's intellectual journey. She also acknowledges the Department of Curriculum and Instructional Technology (CIT) for providing tools and facilities needed to make this study available.

The researcher's sincere gratitude goes to her parents, Prince & Princess Ehis Oribhabor for their love, support, guidance and assistance towards her. Special thanks to her siblings Divine, Precious and Emmanuel Oribhabor for their unwavering support and encouragement. The researcher would also like to thank her extended family specifically, Miss Modupe Aiyesa and Mrs Kemi Akintola. The researcher also wishes to express her thanks to Pastor Michael Ipeli, Pastor Kayode Olusola and Sir Caleb Agbolagba for their spiritual guidance and support.

The researcher won't fail to recognize her wonderful friends Omotayo Hephzibah, Ovie David, Adewale David, Favour Linus, Akinrinlola Racheal, Udochukwu Peace, Oluwatoyin Racheal, Isesele Confidence, Jemilatu Favour, Emeka Joan, Idemudia James, Oriakhi Faith, for their care and support. The Lord bless you all richly.

## TABLE OF CONTENT

TITLE PAGE	i
CERTIFICATION	iii
DEDICATION	iv
ACKNOWLEDGEMENTS	v
LIST OF TABLES	x
ABSTRACT	xi
CHAPTER ONE: INTRODUCTION	1
Background to the Study	1
Statement of the Problem	5
Purpose of the Study	8
Research Questions	12
Significance of the Study	13
Scope and Delimitation of the Study	17
Definition of Terms	19

CHAPTER TWO: REVIEW OF RELATED LITERATURE	22
Concept of Biology	22
Concept of Hands-on Activities	22
Student Engagement in Biology	23
Theoretical Framework	24
Constructivist Learning Theory	24
Experiential Learning Theory	28
Effects of Hands-on Activities on Students' Academic Performance	31
Relationship Between Hands-on Learning and Students' Interest	34
Influence of Hands-on Activities and Students' Attendance	37
Challenges of using Hands-on Activities in classrooms	39
Importance of Interactive Learning in Science	41
Gaps in the Literature	43
Summary of Reviewed Literature	43
CHAPTER THREE: METHODOLOGY	46

Design of the Study	46
Population of the Study	47
Sampling and Sampling Techniques	47
Research Instrument	47
Validity of the Instrument	48
Reliability of the Instrument	48
Method of Data Collection	48
Method of Data Analysis	49
CHAPTER FOUR: PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS	50
Presentation of Results	50
Discussion of Findings	59
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS	58
Summary	61
Conclusion	62
Recommendations	62

Suggestions for further studies	63
REFERNCES	64
APPENDIX	69

## LIST OF TABLES

	<b>PAGE</b>
Table 1: Response Rate	52
Table 2: Distribution of Respondents by School	52
Table 3: Distribution of Respondents by Gender	53
Table 4: Distribution of Respondents by Class	53
Table 5: Distribution of Respondents by Age	55
Table 6: Combined Responses to Research Question 1 from all 100 Students	56
Table 7: Combined Responses to Research Question 2 from all 100 Students	57
Table 8: Combined Responses to Research Question 3 from all 100 Students	58

## **ABSTRACT**

This study investigated the impact of hands-on activities on students' engagement in Biology lessons in Ovia North-East Local Government Area of Edo State, Nigeria. The main purpose was to determine whether practical, activity-based instructional methods improve students' interest, participation, and attendance in Biology classes compared to traditional teaching methods. A survey research design was adopted, and data were collected from 100 senior secondary school students across four schools using a structured questionnaire based on three research questions. The questionnaire was validated by the supervisor and two other lecturers from the department of Curriculum and Instructional Technology and its reliability was established using Cronbach's alpha coefficient. Data were analyzed using frequency counts and percentages.

The findings revealed that hands-on activities significantly enhanced students' engagement in Biology lessons. Specifically, students exposed to hands-on methods demonstrated higher levels of interest, improved participation, and better attendance rates than those taught with traditional approaches. The results suggest that activity-based learning fosters deeper understanding and sustains learners' motivation in Biology.

Based on these findings, the study recommends that Biology teachers adopt hands-on strategies such as experiments, models, fieldwork, and group projects to stimulate student engagement. It further suggests that schools and education stakeholders provide adequate instructional materials and support for practical learning.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **Background to the Study**

Science is a systematic endeavor that builds and organizes knowledge about the natural world through testable explanations and predictions (National Research Council, 2015). It encompasses diverse disciplines such as Physics, Chemistry, and Biology, all of which contribute to our understanding of the universe. Science plays a pivotal role in addressing global challenges, from public health crises to climate change, and has driven numerous technological and medical innovations that shape our daily lives (Ojegba, 2022). As society becomes increasingly science-driven, fostering scientific literacy through effective education becomes a national and global priority.

Science education aims not only to convey scientific facts but also to develop skills such as critical thinking, inquiry, problem-solving, and evidence-based reasoning. Effective science teaching emphasizes student-centered approaches, particularly inquiry-based learning, which actively involves students in the learning process by encouraging them to ask questions, design experiments, and construct their own understanding of scientific concepts (Minner et al., 2019). Studies have shown that science instruction grounded in real-world applications can enhance student engagement, motivation, and retention of

knowledge (Wilson et al., 2020). Students are more likely to be engaged when they see how scientific knowledge connects to their lives and future careers.

Biology, a core branch of science, derives its name from the Greek words *bios* (life) and *logos* (study). It focuses on the study of living organisms, including their structure, function, evolution, growth, and ecological relationships (Campbell & Reece, 2018). Biology is fundamental to many applied fields such as medicine, Biotechnology, Agriculture, and Environmental science. However, despite its relevance, Biology is often perceived by students as abstract and difficult. Concepts like molecular genetics, biochemical cycles, and cellular processes can be highly theoretical and hard to visualize, leading to disinterest and low academic achievement (Yildiz, 2015).

The issue of student disengagement in biology lessons is increasingly concerning. Many students find Biology lessons unrelatable or monotonous due to passive instructional approaches dominated by rote memorization and textbook learning (Kang & Keinonen, 2017). This disengagement can result in poor performance, diminished interest in science-related fields, and a decline in enrollment in STEM (Science, Technology, Engineering, and Mathematics) courses and careers. Research has shown that traditional teacher-centered pedagogies are insufficient for fostering the kind of engagement and deep learning needed in biology education today (Dorph et al., 2018).

To address this, there has been growing advocacy for the integration of hands-on activities in Biology education. Hands-on activities are instructional strategies that

involve students in active manipulation of materials, experimentation, and exploration, promoting learning through doing (Hofstein & Lunetta, 2015). These methods encourage learners to investigate scientific phenomena firsthand, which strengthens their understanding and fosters a more personal connection to the subject matter. According to Liu et al., (2022), hands-on learning in biology significantly improves student engagement, conceptual comprehension, and problem-solving skills.

Hands-on activities align well with contemporary constructivist theories of learning, which emphasize active involvement and the construction of knowledge through experience. In the context of Biology, such activities include microscope usage to observe cells, dissections to understand anatomy, building models of DNA or ecosystems, and conducting experiments on processes like photosynthesis or fermentation. These experiences not only clarify abstract concepts but also make learning more memorable and enjoyable (Dorph et al., 2018; Liu et al., 2022).

Recent educational research supports the efficacy of these methods. Kang and Keinonen (2017) found that students exposed to hands-on science activities displayed significantly higher motivation and interest levels compared to their peers in traditional classrooms. Similarly, a study by Wilson et al., (2020) highlighted the role of experiential and inquiry-based activities in increasing both cognitive and emotional engagement. Moreover, hands-on learning can accommodate different learning styles, support inclusivity, and enhance collaborative skills—essential traits in modern scientific practice.

Despite the growing body of evidence in favor of hands-on learning, its adoption in many biology classrooms remains limited. Barriers such as lack of resources, insufficient teacher training, rigid curricula, and time constraints often hinder implementation (Liu et al., 2022). Teachers may also feel unequipped to manage hands-on experiments or may be unaware of the pedagogical benefits they offer. Nonetheless, these challenges can be mitigated through targeted professional development, curriculum redesign, and policy support that prioritizes active learning methods.

The integration of technology into hands-on Biology education further strengthens its impact. Digital simulations, interactive models, and virtual labs provide additional opportunities for students to engage with biological phenomena, especially in resource-constrained environments (Liu et al., 2022). These tools can replicate complex processes such as protein synthesis or ecological interactions in ways that are interactive, scalable, and accessible. Moreover, technology-enhanced hands-on activities can cater to diverse learning styles, allowing students to visualize abstract concepts, conduct experiments safely, and explore biological systems in-depth (Dziuban et al., 2018).

In conclusion, the challenge of student disengagement in Biology lessons is multifaceted and demands innovative teaching strategies. Hands-on activities represent a promising solution by making Biology more tangible, relevant, and stimulating. When students are allowed to explore Biology through direct interaction and experimentation, they are more likely to stay engaged, understand concepts more deeply, and develop a lasting interest in

science. As we look to prepare the next generation of scientists and informed citizens, integrating hands-on approaches into biology education should be seen not as an optional enhancement but as a foundational element of effective teaching.

### **Statement of the Problem**

The teaching of Biology, a subject fundamental to understanding the natural world, is critical in fostering scientific literacy and curiosity among students. However, in the context of Nigerian education, many Biology lessons remain predominantly theoretical, leaving students with limited opportunities to engage in practical or hands-on learning experiences. This issue has been identified as a major concern in the pedagogical approach to teaching Biology in secondary schools and universities (Okebukola, 2020). In recent years, it has become evident that a shift toward more interactive and student-centered learning strategies, such as hands-on activities, may be crucial in enhancing student engagement and academic achievement in Biology.

Student engagement plays a critical role in determining academic achievement. Engaged students are more likely to retain information, demonstrate critical thinking skills, and develop a lasting interest in the subject matter (Jeynes, 2015). In the Nigerian context, however, studies have indicated that many students in biology classrooms are passive learners, with minimal participation in discussions, practical experiments, or problem-solving tasks (Afolabi & Ajayi, 2019). One of the primary reasons for this passivity is the prevalent teaching method that prioritizes rote memorization and teacher-centered

instruction, often at the expense of hands-on learning opportunities that stimulate students' active involvement (Ayodele & Ojo, 2020).

The use of hands-on activities in Biology teaching is grounded in constructivist theories of learning, which argue that learners construct their understanding through active participation in learning processes (Piaget, 2015). Hands-on activities, such as experiments, field trips, and interactive simulations, encourage students to directly engage with biological concepts, thus enhancing their understanding and retention of the material. By offering real-world experiences and allowing students to manipulate objects and tools, hands-on activities provide practical applications of theoretical knowledge, making the subject matter more meaningful and relevant to students' lives (Chigona et al., 2021).

Although hands-on learning has recognized benefits, few studies have investigated its impacts on student engagement in Nigerian biology classrooms. While there have been studies on general teaching methods and student engagement in Nigerian schools (Adamu et al., 2022), there is a gap in research that focuses on the specific effects of hands-on activities in Biology lessons. This gap is particularly concerning given the growing calls from educators and policymakers to improve the quality of science education in Nigeria through more innovative and student-focused pedagogies (Federal Ministry of Education, 2021).

In Nigeria, the curriculum for Biology at the secondary school and university levels includes practical components aimed at fostering scientific inquiry and critical thinking. However, many schools are faced with challenges such as inadequate laboratory facilities, insufficient teaching materials, and large class sizes, which hinder the effective implementation of hands-on activities (Ogunyemi & Abolade, 2020). Furthermore, the traditional emphasis on theoretical learning and examination-oriented approaches often leads to neglect of practical, experiential learning. This not only limits students' exposure to hands-on activities but also detracts from their overall engagement with the subject. As a result, many students develop a passive attitude towards Biology, seeing it as a subject to be memorized rather than to understand or explore the concepts.

The lack of engagement in Biology lessons has broader implications for students' academic performance and their interest in pursuing science-related careers. A study by Ajayi and Adebayo (2018) found that students who were actively engaged in practical activities showed higher levels of motivation and a greater interest in science-related fields. Conversely, students who were taught in a passive manner exhibited lower academic achievement and less enthusiasm for learning. This highlights the importance of creating an engaging learning environment that fosters curiosity and a deeper understanding of biological concepts. In light of these challenges, this study aims to examine the impact of hands-on activities on student engagement in biology lessons in Nigerian secondary schools and universities.

## **Purpose of the Study**

The purpose of this study is to investigate the impact of hands-on activities on students' engagement in Biology lessons. Specifically, the study focuses on understanding how hands-on activities affect students' motivation, interest, academic performance, and classroom attendance. It also seeks to explore how hands-on methods can foster critical thinking and problem-solving abilities among Biology students. The insights gained from this research aim to support the development of more effective teaching practices, inform educational policy, and guide curriculum innovation towards creating more engaging and student-centered Biology education.

Engagement plays a vital role in student learning outcomes, particularly in science education where complex and abstract concepts require deep understanding and sustained cognitive effort. As emphasized by (Fredricks et al., 2016), engagement is not a singular phenomenon but a multidimensional construct, comprising behavioral, emotional, and cognitive elements. Behavioral engagement involves students' participation and effort in academic tasks, emotional engagement reflects their interest, enthusiasm, and positive attitudes toward learning, while cognitive engagement captures the investment in understanding challenging material and applying learning strategies. Addressing all three dimensions is essential for promoting meaningful learning experiences in Biology education.

Hands-on activities have been recognized as a particularly effective instructional strategy to enhance all facets of student engagement. By actively involving students in the learning process, hands-on activities shift the traditional dynamic from passive knowledge reception to active knowledge construction. According to (Kang and Keinonen, 2017), students who are exposed to hands-on learning environments in biology display significantly higher levels of interest, motivation, and enthusiasm compared to those in traditional lecture-based classrooms. The tactile and participatory nature of hands-on experiences allows students to connect theoretical knowledge with real-world applications, making Biology more accessible, tangible, and relevant to their everyday lives.

Student engagement is a critical component of effective teaching and learning, particularly in science subjects like Biology that require active participation and conceptual understanding. This part of the study aims to explore the extent to which hands-on activities influence students' engagement during biology lessons. Engagement refers to the level of interest, motivation, and involvement that students display in the learning process. When students are actively involved in experiments, model-making, dissections, and other practical exercises, they are often more likely to pay attention, ask questions, and participate in class discussions. This study seeks to determine whether these types of hands-on approaches lead to higher levels of cognitive, emotional, and behavioral engagement compared to traditional lecture-based methods. By evaluating students' responses, participation rates, and interest levels during lessons that incorporate

hands-on learning, the research will provide insights into how and to what degree such activities can foster deeper involvement in the classroom.

Furthermore, this study will focus on determining whether students who participate in hands-on biology activities perform better academically. Academic performance is often used as a measure of the effectiveness of instructional methods in the classroom. Performance will be assessed through test scores, practical assessments, and classwork evaluations. The rationale behind hands-on learning is that by actively engaging with materials, concepts are more easily understood and retained. This approach may support diverse learning styles and help clarify complex topics, thus improving comprehension and long-term academic success.

Another important aspect of the study is to examine the extent to which hands-on activities influence students' attendance rates in Biology classes. When students feel connected to what they are learning and are provided with opportunities for active participation, they are more likely to attend classes consistently. By evaluating attendance patterns before and after the introduction of hands-on learning, the study aims to uncover whether interactive pedagogy can serve as a strategy to reduce absenteeism and disengagement in Biology education.

Beyond immediate behavioral indicators such as attendance, the study also emphasizes the cognitive development benefits of hands-on activities. Inquiry-based learning approaches, which heavily rely on hands-on tasks, have been linked to the development

of critical thinking, creativity, and problem-solving skills (Dorph et al.,2018). Engaging in biological investigations, constructing models, conducting experiments, and analyzing real-world data mirror the authentic practices of scientists, thereby equipping students with essential scientific competencies. Developing these skills is crucial not only for academic success but also for preparing students for future careers in science, technology, engineering, and mathematics (STEM) fields, where analytical and problem-solving abilities are highly valued.

The study also recognizes the role of technology in enhancing hands-on learning experiences. The integration of digital simulations, virtual laboratories, and interactive software has expanded the possibilities of what can be achieved in a classroom setting (Liu et al., 2022). These tools provide opportunities for students to explore complex biological phenomena that would otherwise be difficult to observe directly, such as molecular genetics or ecological interactions. By examining the combination of traditional hands-on methods with technology-enhanced learning, this study aims to explore how modern innovations can further improve engagement and understanding in Biology education.

However, despite the clear benefits of hands-on learning, many Biology classrooms still rely predominantly on traditional, teacher-centered instruction. Barriers such as limited resources, lack of teacher training, and curricular constraints continue to impede the widespread adoption of experiential learning strategies (Dorph et al., 2018). Therefore,

this study also aims to identify challenges and best practices in the implementation of hands-on activities. Understanding the obstacles that teachers face, and how successful classrooms overcome them, will be instrumental in formulating recommendations for educational policy and teacher professional development programs.

Through a comprehensive investigation into the effects of hands-on activities on motivation, engagement, academic performance, attendance, critical thinking, and equity, this study seeks to contribute to a growing body of literature that advocates for more interactive, student-centered teaching approaches in Biology education. The findings will provide valuable insights for teachers, school administrators, curriculum designers, and policymakers seeking to foster more dynamic, responsive, and effective learning environments. Ultimately, by shedding light on the transformative potential of hands-on learning, the study aspires to support the broader educational mission of cultivating scientifically literate, critically thinking, and actively engaged citizens for the challenges of the 21st century.

### **Research Questions**

1. To what extent do hands-on activities enhance students' interest or engagement in Biology lessons?
2. Does participation in hands-on activities enhance students' performance in Biology lessons?

3. To what extent do hands-on activities influence students' attendance rates in Biology classes?

### **Significance of the Study**

This study is significant for several reasons. By investigating the impact of hands-on activities on students' engagement in Biology lessons, it addresses a critical need in contemporary science education: the need for teaching approaches that are both effective and inclusive. In an era where scientific literacy is increasingly important for personal, societal, and economic well-being, finding strategies that maximize student engagement, achievement, and interest in Biology is essential.

Firstly, the study contributes to a deeper understanding of how hands-on activities influence various dimensions of student engagement—behavioral, emotional, and cognitive. Research consistently shows that engagement is a strong predictor of academic success (Fredricks et al., 2016). However, much of the existing literature emphasizes general strategies for improving engagement without focusing on specific pedagogical interventions like hands-on learning. By narrowing the focus to this interactive approach, the study provides valuable empirical evidence about which instructional methods are most effective for promoting sustained student involvement in Biology education.

Secondly, the study is significant because it examines engagement not as a vague, subjective feeling but as a measurable outcome, including students' attendance rates and

academic performance. Attendance is often overlooked as an indicator of engagement, yet it serves as a concrete reflection of students' commitment to and interest in the subject (Minner et al., 2019). By evaluating changes in attendance before and after the introduction of hands-on activities, the study offers tangible evidence of the practical benefits of active learning environments. This is crucial for schools and policymakers who need measurable outcomes to justify curricular reforms and resource allocations.

Thirdly, this research is important because it highlights the role of hands-on activities in fostering critical thinking and problem-solving skills. Modern Biology is not only a body of knowledge but also a method of inquiry. Students must be able to ask questions, design experiments, interpret data, and draw evidence-based conclusions (Dorph et al. 2018). Hands-on activities provide authentic opportunities to practice these skills in ways that traditional lectures cannot. As global education systems shift towards competency-based learning models, this study offers insights into how biology education can evolve to meet 21st-century learning goals.

Furthermore, the findings of this study can have practical implications for teachers and curriculum developers. Educators often struggle to balance the demands of content coverage with the need for deeper learning. Hands-on activities, when strategically implemented, can serve as efficient tools for achieving both objectives simultaneously—promoting engagement while reinforcing content mastery (Kang & Keinonen, 2017). By showcasing effective hands-on strategies, this research can help teachers design lessons

that are not only educational but also highly engaging, without requiring prohibitive time or resource investments.

The study also holds significance for educational leadership and policy. Decision-makers at school, district, and national levels increasingly recognize the importance of STEM education in preparing students for future careers. Yet, without clear, research-based strategies for enhancing engagement, many initiatives fail to achieve their intended impact. The insights from this study can inform policy decisions regarding teacher training, curriculum standards, classroom resource allocation, and assessment practices. As (Liu et al., 2022) noted, evidence-based reforms that prioritize active learning lead to greater student achievement and satisfaction across scientific disciplines.

Another important aspect of the study's significance is its potential contribution to educational equity. Traditional Biology instruction methods often alienate students from underrepresented or marginalized backgrounds, exacerbating gaps in achievement and participation in STEM fields (Wilson et al., 2020). Hands-on activities, by making learning more accessible, relatable, and inclusive, can help bridge these divides. By highlighting the potential of active learning to promote inclusivity, the study supports broader efforts to create educational environments where all students can thrive regardless of their socio-economic status, ethnicity, or prior academic experience.

Moreover, the study's findings are timely and relevant in light of the growing integration of technology in education. With the advent of virtual labs, augmented reality

applications, and interactive simulations, the possibilities for hands-on learning have expanded beyond traditional classroom settings (Liu et al., 2022). This study not only acknowledges these technological advancements but also explores how they can complement traditional hands-on methods to further enhance student engagement and learning outcomes.

The study also offers future research directions by identifying potential gaps and challenges in implementing hands-on learning strategies. By documenting barriers such as resource limitations, lack of teacher expertise, or curricular inflexibility, the research provides a foundation for subsequent studies that seek to address these issues. It opens up avenues for exploring professional development programs, community partnerships, or policy innovations that can support broader adoption of experiential learning practices.

In summary, this study is significant because it addresses pressing issues in science education, offers practical solutions for teachers and policymakers, supports equity and inclusivity, embraces technological innovation, and contributes to a broader reimagining of the learning process. By focusing on the specific context of Biology education, it provides actionable insights that can help create more dynamic, engaging, and effective classrooms, ultimately preparing students for both academic success and lifelong scientific literacy.

## **Scope and Delimitations of the Study**

This study is specifically focused on investigating the impact of hands-on activities on student engagement in Biology lessons among secondary school students in Ovia North-East Local Government Area, Edo State. The research seeks to examine how active participation in practical, manipulative, and interactive learning experiences influences students' motivation, interest, academic performance, attendance, and critical thinking abilities within the context of Biology education.

The scope of the study is limited to selected secondary schools within the Ovia North-East region. By concentrating on this specific geographic location, the study aims to provide an in-depth understanding of the local educational environment and how hands-on activities affect student engagement in Biology classes within this context. However, it should be noted that due to the focus on a single locality, the findings may not be fully generalizable to other regions, states, or countries with different educational systems, cultural backgrounds, or resource availability.

The study will exclusively target students currently enrolled in Biology courses at the secondary school level. It will not extend to other science subjects such as chemistry or physics, nor will it include students from primary schools, tertiary institutions, or informal educational settings.

Another limitation of the study is the timeframe. Data collection will occur within a single academic term, allowing for measurement of immediate and short-term impacts of hands-on activities on student engagement but not long-term academic performance over subsequent years. As such, the study may not capture the enduring effects of sustained exposure to hands-on learning practices.

Additionally, the study assumes that students' self-reports in the questionnaire (instrument used in data collection) will be honest and reflective of their actual experiences. However, there is an inherent risk of bias responses, where students might provide socially desirable answers rather than accurate depictions of their engagement or attitudes.

It is also important to note that this study focuses primarily on students' perspectives. While teachers' roles in facilitating hands-on activities are critical to their success, the study will not systematically investigate teacher practices, attitudes, or instructional challenges. Nevertheless, findings from students' responses may indirectly highlight areas where teacher support and professional development are needed.

In summary, this study is designed to provide valuable insights into the impact of hands-on activities on secondary school students' engagement in Biology lessons within Ovia North-East.

## **Definition of Terms**

**1. Hands-on Activities:** In the context of this study, hands-on activities refer to instructional practices that require students to actively engage with materials, specimens, equipment, or simulations to explore biological concepts. These activities involve direct physical manipulation, experimentation, observation, or model construction, rather than passive reception of information through lectures or textbook reading. Hands-on activities may include laboratory experiments, dissections, fieldwork, model-building exercises, and interactive simulations that allow students to visualize and investigate biological processes.

**2. Student Engagement:** Student engagement encompasses the emotional, behavioral, and cognitive involvement of learners in educational activities. Behavioral engagement refers to students' participation in classroom activities, completion of assignments, and attendance. Emotional engagement pertains to students' feelings of interest, enjoyment, or belonging during the learning process, while cognitive engagement involves the investment of mental effort to comprehend complex ideas and apply higher-order thinking skills.

**3. Critical Thinking:** Critical thinking is defined as the ability to analyze, evaluate, and synthesize information in order to make reasoned judgments or solve complex problems. It involves skills such as interpreting evidence, identifying biases, making inferences, and drawing logical conclusions. In the realm of Biology education, critical thinking is

essential for understanding complex systems, evaluating scientific arguments, and designing experiments.

**4. Problem-solving Skills:** Problem-solving skills refer to the cognitive processes involved in identifying problems, generating possible solutions, evaluating alternatives, and implementing effective strategies. In Biology education, problem-solving might involve designing experiments, interpreting data, diagnosing biological issues, or predicting the outcomes of biological interactions.

**5. Inquiry-based Learning:** Inquiry-based learning is an instructional approach that emphasizes student-led investigation and discovery. Rather than presenting information directly, teachers facilitate environments where students formulate questions, design experiments, collect and analyze data, and construct explanations based on evidence. Inquiry-based learning aligns closely with hands-on activities, as it encourages active exploration and critical engagement with scientific concepts.

**6. Attendance Rates:** Attendance rates refer to the frequency and consistency with which students are physically present and participating in scheduled lessons. Regular attendance is a basic prerequisite for academic success, as it directly affects students' exposure to instruction, opportunities for interaction, and engagement in learning activities.

**7. Traditional Instruction Methods:** Traditional instruction methods are characterized by teacher-centered approaches where information is primarily transmitted from instructor to student through lectures, rote memorization, textbook reading, and standardized assessments. These methods often position students as passive recipients of knowledge rather than active participants in the learning process.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

This chapter presents a review of existing literature related to the impact of hands-on activities on students' engagement in Biology lessons. The review of literature related to this study is organized under the following sub-headings;

- Concept of Biology
- Concept of Hands-on Activities
- Concept of Student Engagement
- Theoretical Framework
- Effects of Hands-on Activities on Students' Academic Performance
- Relationship Between Hands-on Learning and Students' Interest
- Influence of Hands-on Activities and Students' Attendance
- Challenges of using Hands-on activities in classrooms
- Importance of interactive learning in science
- Gaps in the literature
- Summary of Reviewed Literature

#### **Concept of Biology**

Biology is the study of living things and how they interact with their environment. It is a branch of science that helps students understand the human body, plants, animals, health,

genetics, and ecosystems (Campbell & Reece, 2018). Biology is very important because it helps students build knowledge that can be used in medicine, agriculture, and environmental conservation. However, many students find Biology difficult and boring because the subject includes abstract ideas and complex processes like cell division, respiration, or photosynthesis (Yildiz, 2015). This often leads to low performance and poor interest, especially when teaching methods are only theory-based or lecture-centered.

### **Concept of Hands-on Activities**

Hands-on activities are learning methods where students actively participate by doing practical tasks. These activities include experiments, fieldwork, dissections, model-building, and use of laboratory tools. Rather than just listening or writing notes, students get involved with materials and learn by touching, observing, and exploring (Hofstein & Lunetta, 2015). In Biology lessons, this may include using microscopes to study cells, conducting experiments on plants, or building models of body systems. According to (Liu et al., 2022), hands-on activities help students better understand difficult topics and stay more focused in class.

### **Student Engagement in Biology**

Student engagement means how involved and interested students are in their learning. It includes behavioral engagement (participation), emotional engagement (enjoyment or interest), and cognitive engagement (mental effort) (Fredricks et al., 2016). In many

Biology classes, students are often passive and not involved in discussions or activities, especially when teaching is mostly lecture-based. This can lead to boredom, poor performance, and skipping classes (Afolabi & Ajayi, 2019). Using hands-on activities makes students more active, excited, and focused, which improves their overall engagement.

## **Theoretical Framework**

### **Constructivist Learning Theory**

Constructivist Learning Theory is a modern approach to education that says students learn best when they are actively involved in the learning process. Instead of just listening to lectures or memorizing facts, learners are encouraged to build their own understanding through experience, exploration, and reflection (Piaget, 2015; Chigona et al., 2021). In other words, learning happens when students do things, ask questions, and find answers themselves. This theory is especially important in science subjects like Biology, where students often struggle to connect with abstract concepts taught in traditional ways.

Constructivism is based on the idea that learners are not blank slates but come into the classroom with previous knowledge, beliefs, and experiences. Teachers, therefore, are expected to act as guides or facilitators rather than information-givers. This means that teaching should involve activities that allow students to interact with content in

meaningful ways. For example, in Biology lessons, rather than only reading about cell structures, students can use microscopes to observe cells directly. This hands-on activity helps them understand better because they are seeing and exploring the content themselves.

One of the key benefits of using the constructivist approach in Biology is that it improves student engagement. Research shows that when students are given opportunities to participate in experiments, investigations, or model building, they become more interested in the lesson (Kang & Keinonen, 2017). They are more likely to ask questions, make observations, and contribute to class discussions. These forms of participation are important signs of engagement—both emotional and cognitive.

Constructivist learning aligns very well with hands-on activities because both promote active involvement. In a constructivist Biology classroom, students might build models of DNA, conduct experiments on photosynthesis, dissect organisms, or simulate ecosystems. These types of tasks allow them to "construct" their knowledge rather than just receive it passively from a textbook or teacher (Dorph et al., 2018). These activities also make lessons more enjoyable, which keeps students motivated and interested over time.

In Nigeria, many students find Biology difficult and boring because most lessons are taught using lecture-based methods. They are often told to memorize terms and definitions without seeing how these ideas apply in real life (Okebukola, 2020). The constructivist theory suggests that this method does not help students truly understand or

remember what they learn. When students are only passive listeners, their level of engagement drops, leading to poor academic performance and reduced interest in science-related careers (Afolabi & Ajayi, 2019). To solve this problem, teachers can apply constructivist strategies by using more hands-on methods that get students involved physically and mentally.

(Liu et al., 2022) showed that when Biology students are engaged in real or simulated laboratory activities, their performance and understanding improve. This supports the idea that students build stronger knowledge when they are part of the learning process. These findings also align with the constructivist view that knowledge is best developed through active engagement, especially when it involves real-world experiences.

Moreover, constructivist learning supports different learning styles. Not all students learn by reading or listening; some need to touch, see, or move to understand better. Hands-on Biology activities cater to these diverse needs by providing different ways to explore content. For instance, a student struggling to understand genetic inheritance through diagrams might learn better by using colored beads to build models of DNA and chromosomes (Wilson et al., 2020). Such activities help bridge the gap between theory and practice, which is one of the main goals of constructivist teaching.

Also, the constructivist theory promotes collaboration. In a Biology classroom, students working in groups on a dissection or an experiment can share ideas, ask questions, and help each other. This teamwork builds social and communication skills while also

deepening their understanding of the topic (Fredricks et al., 2016). Students are no longer just receivers of information; they become contributors to knowledge in the classroom.

Despite the benefits, applying constructivist methods through hands-on Biology activities is still a challenge in many Nigerian schools. Some of the major problems include lack of laboratory facilities, overcrowded classrooms, and teachers not being trained to use activity-based methods (Ogunyemi & Abolade, 2020). However, research suggests that even low-cost and simple hands-on strategies can make a big difference in student engagement if applied properly (Adamu et al., 2022). For example, using local materials to demonstrate digestion or plant growth can be as effective as expensive lab equipment.

In conclusion, Constructivist Learning Theory provides a strong foundation for understanding why hands-on activities are effective in teaching Biology. By allowing students to interact with materials, conduct experiments, and explore biological concepts through experience, these methods increase interest, motivation, and understanding. In a subject like Biology, where engagement is often low due to abstract content and passive teaching, the constructivist approach offers a practical solution. When students are actively involved, they not only enjoy the lesson more but also learn in a deeper and more lasting way. Therefore, embracing constructivist principles is essential for improving Biology education, especially in the Nigerian context where traditional teaching still dominates.

## **Experiential Learning Theory**

Experiential Learning Theory is one of the most important theories that support the use of hands-on activities in education, especially in subjects like Biology. The concept of experiential learning was first investigated by John Dewey, Kurt Lewin and Jean Piaget. It was made popular by education theorist David Kolb who developed the David Kolb experiential learning theory. It is a theory based on the idea that learning is a process where knowledge is created through out the transformation of experience. Simply putting it is "learning by doing". It explains that learning is a continuous circle where experiences shape what learners know and what learners know shapes what they will do next. This also shows that knowledge results from the combinations of understanding and transforming experience.

According to Kolb, real learning occurs through a cycle of doing, reflecting, thinking, and applying (Kolb, 2015). In simple terms, students understand a topic better when they have the chance to experience it. This theory is very relevant to Biology as a science subject because it involves studying living things, processes, and environments. These topics are often abstract and hard for students to understand through theory alone. When students take part in hands-on activities such as experiments, dissections, or model-building, they connect with the content in a more meaningful way. Instead of just hearing or reading about photosynthesis, for example, students who plant seeds and observe their growth over time are more likely to understand how sunlight, water, and nutrients affect

plants. This is exactly what Experiential Learning Theory promotes—learning by doing (Wilson et al., 2020).

Kolb’s theory also fits well with the goals of science education, which include developing skills such as observation, inquiry, critical thinking, and problem-solving. Hands-on Biology lessons create real-life learning situations where students use these skills. For example, when students are asked to investigate why certain plants in their schoolyard grow better than others, they are required to observe, ask questions, gather data, and draw conclusions—all of which are essential steps in Kolb’s experiential learning cycle (Chigona et al., 2021).

Experiential learning also supports student engagement, which is a key concern in Biology classrooms. Research shows that students are more likely to stay interested and focused when they are actively participating in learning activities rather than passively listening to teachers (Kang & Keinonen, 2017). Emotional and behavioral engagement increases when students handle lab tools, take measurements, build models, or interact with living organisms. These experiences make learning exciting and personal. In turn, students are more likely to attend classes regularly, ask questions, and take part in discussions, which are all signs of increased engagement (Fredricks et al., 2016).

In the Nigerian context, where many Biology classrooms are still dominated by lecture-based teaching, the principles of experiential learning offer a valuable alternative. Students in such settings often see Biology as difficult or boring because they are rarely

given the chance to experience the subject (Okebukola, 2020). By using hands-on activities supported by experiential learning, teachers can change this perception and make Biology more accessible and engaging. For instance, using low-cost materials for experiments or taking students on local field trips can make topics more relatable and interesting (Adamu et al., 2022).

Technology also supports experiential learning in modern Biology education. Tools like virtual labs and simulations allow students to explore complex ideas like genetics or human anatomy in ways that are interactive and safe. According to (Liu et al., 2022), such tools can replace or support traditional lab work when resources are limited. These digital experiences still follow Kolb's cycle because they allow students to explore, reflect, and apply what they learn in a practical setting.

Despite the benefits, implementing experiential learning in Nigerian schools faces some challenges. These include a lack of resources, overcrowded classrooms, and limited teacher training. However, studies suggest that even small changes, such as adding short experiments or interactive group activities, can make a big difference in student engagement and understanding (Afolabi & Ajayi, 2019).

In conclusion, Experiential Learning Theory offers a strong foundation for promoting hands-on activities in Biology lessons. It shows that students learn better when they are actively involved in meaningful tasks that connect theory to real life. In a subject like Biology, where understanding processes and systems is crucial, experiential learning

helps students move beyond memorization to deeper understanding. More importantly, it boosts their interest, participation, and academic performance. By adopting this approach, educators in Nigeria and beyond can create more engaging and effective Biology classrooms.

### **Effects of Hands-on Activities on Students' Academic Performance**

Hands-on activities have been proven to help students perform better academically, especially in subjects like Biology. These activities allow students to explore and understand scientific concepts through real-life experience, rather than just reading from a textbook or listening to lectures. In Biology, this approach is very useful because many of the topics—such as genetics, digestion, photosynthesis, or reproduction—can be difficult to understand without visual or physical support. Through hands-on learning, students get the chance to see and feel what they are learning, making it easier to understand and remember (Minner et al., 2019; Afolabi & Ajayi, 2019).

When students take part in activities like experiments, dissections, and model-building, they are not just passive listeners but active learners. For example, observing how enzymes break down food in an experiment can help students understand digestion more clearly than just hearing the explanation. According to (Liu et al., 2022), students who learn by doing are better able to explain what they have learned and apply it to real-world problems. This deepens their understanding and improves their academic performance.

The success of hands-on activities in improving learning outcomes is strongly supported by the constructivist learning theory, which explains that learners build their own understanding when they are actively involved in the learning process. (Piaget , 2015) argued that knowledge is not simply transferred from teacher to student—it must be constructed by the learner through interaction and experience. In Biology classes, this could mean growing plants to learn about germination, observing living organisms, or building a model of the heart to understand blood circulation. These experiences allow students to connect theory with real-world examples, helping them to retain knowledge better and perform well in tests and assignments (Hofstein & Lunetta, 2015; Dorph et al., 2018).

Hands-on learning also makes it easier for teachers to assess students continuously. Instead of waiting for exams, teachers can observe how students carry out tasks, solve problems, and work in groups. This helps teachers to give immediate feedback and make changes to their teaching if students seem confused (Wilson et al., 2020). Such real-time feedback helps students correct their mistakes early and improve their academic performance over time.

Another major benefit is that hands-on activities help different types of learners. Some students learn best by seeing, others by doing. Traditional lectures do not support all learners equally, especially those who are visual or hands-on learners. But when students use microscopes, observe specimens, and interact with lab materials, they are able to

learn in a way that suits them best. (Kang & Keinonen, 2017) pointed out that students who are involved in practical activities stay more focused, ask more questions, and show greater interest in the subject, which often leads to better academic results.

Hands-on activities also support students of all learning levels. Strong students can go beyond the basics and explore deeper concepts, while weaker students can learn at their own pace with more support and practice. This helps reduce learning gaps and gives every student a fair chance to succeed (Fredricks et al., 2016).

Moreover, working in small groups during hands-on lessons teaches students how to communicate, collaborate, and lead. These are important life skills that also help them perform better in school. Group work allows students to learn from one another, explain ideas in simple terms, and boost each other's confidence. This positive classroom environment helps students stay motivated and perform better academically (Chigona et al., 2021).

In conclusion, hands-on activities greatly improve academic performance in Biology by making learning easier, more engaging, and more meaningful. They help students understand difficult concepts, support different learning styles, and encourage teamwork. For Nigerian schools and beyond, adopting more hands-on strategies in Biology lessons could lead to better performance and greater interest in science among students.

## **Relationship Between Hands-on Learning and Students' Interest**

Student interest is a major factor that influences how well students learn and stay engaged in class. In Biology education, hands-on learning has been shown to significantly boost student interest by making lessons more practical, exciting, and meaningful. When students take part in activities like lab experiments, building models, or going on environmental field trips, their natural curiosity is triggered. This curiosity often leads to deeper exploration, greater effort, and a positive attitude toward learning (Kang & Keinonen, 2017; Dorph et al., 2018).

Biology covers topics that are closely related to everyday life, such as the human body, health, food, the environment, and genetics. These are areas that naturally interest many students, especially when taught using active and interactive methods. When students dissect a flower to learn about reproduction, or test the acidity of soil to understand plant growth, they are directly connecting the lesson to the world around them (Chigona et al., 2021). This connection between learning and real life increases their interest in the subject and helps them understand that Biology is not just theory—it is something they can see, touch, and use.

Hands-on activities make learning personal and engaging. Students feel like they are part of the learning process, not just observers. When they are allowed to conduct experiments, ask questions, and find answers on their own, they develop a sense of responsibility and control over their learning. This feeling, known as “student agency,” increases emotional

attachment to the subject and builds stronger interest and motivation (Fredricks et al., 2016).

Teachers who use hands-on methods in Biology classrooms often report that students are more excited to learn and more willing to participate in class. These students become curious, ask more questions, and show better focus during lessons. This kind of learning environment helps not only with content mastery but also with developing students' confidence and love for science (Ajayi & Adebayo, 2018).

In schools where students usually find science difficult or boring, hands-on learning provides a new and enjoyable way of understanding the subject. Many students struggle with abstract ideas like osmosis, mitosis, or respiration when they are only explained with words or diagrams. But when these concepts are taught through activities—like using a microscope to observe dividing cells or measuring breathing rates after exercise—they become easier to grasp and more interesting (Wilson et al., 2020). This practical approach helps reduce fear or anxiety around science, especially for students who may not perform well in lecture-based classes.

Moreover, interest developed through hands-on learning does not end in the classroom. Research shows that students who engage in active science learning are more likely to pursue science-related courses and careers in the future. This is especially important in Nigeria and other countries where student enrollment in STEM (Science, Technology, Engineering, and Mathematics) fields is still low. A study by (Liu et al., 2022) found that

interactive and practical learning experiences in Biology increase students' likelihood of choosing science subjects in higher education.

Technology has also made it easier to deliver hands-on experiences, even in schools with limited resources. Virtual labs, 3D simulations, and interactive animations allow students to observe complex biological processes like digestion, DNA replication, or ecological interactions in ways that are both engaging and informative. These tools make learning more inclusive and provide equal learning opportunities for schools without traditional laboratory equipment (Liu et al., 2022). For example, using a virtual microscope or a simulation of the human heart helps students understand difficult concepts while maintaining their interest.

Importantly, when students are interested in what they are learning, they are more likely to stay focused, complete assignments, and participate in group discussions. Interest also improves memory retention and understanding because students are emotionally connected to the content (Fredricks et al., 2016; Dorph et al., 2018). This is why hands-on activities are considered one of the best ways to keep students interested and actively involved in Biology lessons.

In summary, hands-on learning is a powerful strategy for increasing student interest in Biology. By allowing students to explore real-world problems, manipulate materials, and interact with their environment, it transforms Biology from a difficult subject into an exciting and relevant one. It gives students ownership of their learning, builds emotional

connections, and inspires long-term interest in science. Whether through traditional experiments or modern digital tools, hands-on activities are essential for making Biology lessons engaging and effective in schools today.

### **Influence of Hands-on Activities and Students' Attendance**

Student attendance is not only a prerequisite for learning but also a reflection of students' attitudes toward school and specific subjects. In Biology education, where topics can sometimes be perceived as abstract or challenging, hands-on activities have proven effective in improving classroom attendance. By making learning more enjoyable and interactive, such approaches reduce the monotony often associated with traditional instruction and encourage students to attend lessons more consistently (Wilson et al., 2020). One of the reasons students avoid certain classes is the predictability and passivity of the teaching style. In contrast, hands-on activities bring variety, excitement, and unpredictability to the classroom. Students are often eager to participate in experiments, build models, or take part in group investigations, and this anticipation plays a vital role in increasing daily attendance. When students look forward to an engaging classroom experience, absenteeism naturally decreases (Ayodele & Ojo, 2020). Additionally, hands-on learning creates a social and collaborative atmosphere that strengthens peer relationships and classroom cohesion. Students tend to enjoy working in groups, sharing ideas, and learning from one another. This social dimension can positively affect attendance, as students begin to view the classroom not just as a place for instruction but

also as a community they belong to and enjoy being part of (Fredricks et al., 2016). Another important aspect is the psychological motivation hands-on activities instill. When students experience success through interactive learning—such as successfully completing an experiment or constructing a working model—they feel a sense of achievement and competence. This boost in self-esteem can encourage regular attendance, especially among students who might otherwise struggle with academic confidence (Kang & Keinonen, 2017). Moreover, teachers who implement hands-on methods often establish more positive relationships with their students. By facilitating rather than dictating the learning process, these teachers are seen as approachable and supportive. Such relational dynamics create a safe and welcoming learning environment, further encouraging students to attend class regularly (Chigona et al., 2021). In underserved or resource-limited communities, where student absenteeism is often high, hands-on activities may serve as a motivational tool to keep students in school. Even when resources are limited, creative use of locally available materials for experiments or demonstrations can sustain interest and commitment. According to (Adamu et al., 2022), students in Northern Nigeria became more consistent in school attendance when engaged in practical science lessons that connected learning with their local environment and everyday life. Furthermore, incorporating technology into hands-on activities—such as virtual labs and interactive simulations—can further stimulate attendance, especially when physical resources are unavailable. (Liu et al., 2022) note that even low-cost digital tools, when used effectively, can mimic hands-on experiences and promote consistency

in student presence and engagement. Overall, hands-on activities contribute not just to academic engagement but to a broader culture of attendance and participation in school life. They promote enjoyment, relevance, and connection, which are essential for reducing absenteeism and fostering a more inclusive and consistent learning environment.

### **Challenges of using Hands-on Activities in classrooms**

Although hands-on activities have many benefits in teaching Biology, their use in Nigerian schools—especially in regions like Ovia North-East—is still limited. Many teachers and schools face serious challenges that prevent them from fully implementing practical and interactive lessons.

One major issue is the lack of laboratory equipment and materials. Many schools, especially in rural or underfunded areas, do not have access to basic tools like microscopes, test tubes, preserved specimens, or chemical solutions (Okebukola, 2020). Without these materials, teachers are forced to teach Biology only through lectures, drawings, or verbal explanations. This reduces students' opportunities to observe, experiment, or interact with what they are learning. According to (Ogunyemi & Abolade, 2020), some schools do not even have designated science laboratories, making it nearly impossible to conduct meaningful practicals.

Large class sizes are another significant barrier. In many public schools, a single Biology teacher may be assigned to teach 60 or more students in a classroom meant for 30. In

such crowded environments, it becomes difficult to organize and supervise hands-on activities safely and effectively. Students may not get equal access to materials, and some may be left out of the learning experience altogether. (Adamu et al., 2022) observed that in such conditions, teachers often avoid practical work to maintain order and manage time.

Another problem is limited teacher training. Some Biology teachers have little or no experience in organizing practical lessons, especially using modern tools or technology. Even when laboratories are available, some teachers may lack the confidence or technical know-how to demonstrate experiments properly (Okebukola, 2020). This lack of training can lead to mistakes, safety issues, or poor learning outcomes. (Wilson et al., 2020) also reported that when teachers are not trained in student-centered methods, they are less likely to adopt active learning strategies like hands-on instruction.

In addition, curriculum pressure plays a big role. Teachers often feel the need to rush through the syllabus to prepare students for standardized exams. Because hands-on activities take more time than lectures, some teachers avoid them in order to "cover" the entire curriculum. This pressure can make teachers rely more on memorization-based instruction rather than practical learning (Afolabi & Ajayi, 2019).

Lastly, insufficient funding and administrative support limit schools' ability to upgrade their facilities or provide professional development. When school leaders and

policymakers do not prioritize science practicals, teachers are left without the support needed to create effective Biology learning environments (Adamu et al., 2022).

In summary, while hands-on activities can improve student engagement and understanding in Biology, their use is limited by poor infrastructure, large classes, lack of training, exam pressure, and inadequate support. Addressing these challenges requires collective efforts from teachers, school administrators, government bodies, and education stakeholders.

### **Importance of Interactive Learning in Science**

Interactive learning is a student-centered approach that allows learners to be fully involved in the learning process. In science subjects like Biology, interactive learning is very important because it helps students gain a better understanding of concepts by doing rather than just listening. Traditional methods such as note-taking or lectures often result in passive learning, where students memorize information without fully understanding it. However, when students are engaged in hands-on experiments, group discussions, educational games, role-playing, or digital simulations, they become more interested and active in class.

One major benefit of interactive learning is that it makes science more fun and meaningful. Biology topics such as photosynthesis, human digestion, or the life cycle of organisms are better understood when students can observe or model them in real-time.

For example, a student watching a video simulation of the heart pumping blood or observing plant growth in a school garden is more likely to grasp the topic than one who simply reads about it. (Minner et al., 2019) noted that students who learn through experiences and discovery perform better academically than those who rely only on textbooks or lectures.

Interactive learning also encourages critical thinking and inquiry, two important goals of science education. When students are allowed to ask questions, test their own hypotheses, and analyze data from experiments, they become curious and more willing to investigate further. This approach builds their ability to reason scientifically and solve problems independently, which are key skills for real-world situations (Wilson et al., 2020).

Another important advantage is that interactive learning helps improve communication and teamwork. Many interactive strategies, such as group projects or peer instruction, require students to work together, share ideas, and listen to one another. Through this collaboration, they not only understand the content better but also learn how to work in teams—an essential skill for future careers, especially in science and technology fields (Chigona et al., 2021).

Furthermore, interactive learning is known to support different learning styles. While some students learn best by seeing (visual learners), others prefer doing (kinesthetic learners) or hearing (auditory learners). Interactive methods offer a mix of visual, verbal,

and hands-on experiences that accommodate a variety of learners and make science more accessible to all students (Liu et al., 2022).

In conclusion, interactive learning plays a vital role in science education. It helps students to understand Biology concepts more clearly, stay motivated, and develop life skills such as critical thinking, communication, and teamwork. Schools that promote interactive learning are more likely to produce students who are not only knowledgeable but also confident and curious learners.

### **Gaps in the Literature**

Most of the studies reviewed agree that hands-on learning improves student engagement and academic achievement in Biology. However, there is limited research focusing specifically on how these activities affect student engagement in Nigerian classrooms, especially in local areas like Ovia North-East. There is also little data on how hands-on learning affects students' attendance and critical thinking in this context. Therefore, this study fills an important gap by focusing on these areas.

### **Summary of Reviewed Literature**

This chapter reviewed key concepts, theories, and studies related to the impact of hands-on activities on students' engagement in Biology lessons. It began by explaining the concept of Biology as a life science that covers topics such as human anatomy, health, plants, and the environment. Although Biology is an important subject, many students

find it abstract and difficult to understand, especially when taught through lectures and note memorization.

The concept of hands-on activities was then discussed. These are practical and interactive methods of teaching where students learn by doing. Examples include experiments, model-making, dissections, and field trips. Hands-on learning makes Biology more interesting and helps students connect classroom lessons to real-life situations. It also supports different learning styles and encourages participation, curiosity, and deeper thinking.

Two key learning theories—Constructivist Learning Theory and Experiential Learning Theory—were used to support the study. These theories emphasize that learning is most effective when students are actively involved in exploring, discovering, and applying knowledge. Hands-on activities align with these theories by encouraging students to take ownership of their learning through direct experience.

The review also explored the concept of student engagement, which includes behavioral (active participation), emotional (interest and enjoyment), and cognitive (mental effort) involvement. Research shows that hands-on activities increase all forms of engagement and improve academic performance in Biology.

Several empirical studies both in Nigeria and internationally support the idea that hands-on activities improve students' understanding and motivation in science. However,

challenges such as lack of laboratory equipment, large class sizes, limited teacher training, and time constraints were also identified as barriers to implementing hands-on learning, especially in under-resourced areas like Ovia North-East.

In conclusion, the literature strongly supports the use of hands-on activities to make Biology more engaging and meaningful for students. Although there are challenges, the benefits outweigh the limitations. Therefore, addressing these barriers through teacher support, proper funding, and curriculum improvement is essential for improving student engagement and performance in Biology.

## **CHAPTER THREE**

### **METHODOLOGY**

This chapter describes the following;

- Design of the Study
- Population of the Study
- Sampling 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**

The survey research design was employed in this study. This design was chosen because it allows the researcher to collect and analyze data from a representative sample of the population in order to determine the effect of hands-on activities on students' engagement in Biology lessons. The survey research design is suitable for studies where the opinions, perceptions, and attitudes of respondents are sought using structured questionnaires. It

entails formulating precise questions, selecting an appropriate question style, and arranging the survey in a logical sequence. Researchers may make sure they are asking the right questions of the right people in the right ways by creating a well-constructed survey, which will ultimately produce reliable and useful data.

### **Population of the Study**

The population of the study consists of respondents who are students of the senior secondary schools in Ovia North East Local Government Area of Edo state.

### **Sampling and Sampling Techniques**

The sample size for the study was composed of one hundred (100) students of which twenty-five (25) each from four (4) selected senior secondary schools in Ovia North East Local Government Area.

### **Research Instrument**

The instrument used for data collection was the likert form of questionnaire titled "The Impact of Hands-on Activities on Students' Engagement in Biology Lessons". The questionnaire was divided into two sections:

Section A contains Demographic information (gender, class, and age).

Section B contains Statements addressing the three research questions, rated on a four-point likert scale: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD).

The instrument contained 20 items covering the extent of engagement, academic performance, and attendance rates due to hands-on activities.

### **Validity of the Instrument**

The instrument was given to the supervisor and two lecturers in the Department of Curriculum and Instructional Technology (CIT) to read in other to ensure face and content validity. Corrections and modifications were incorporated into the instrument to produce the final instrument.

### **Reliability of the Instrument**

The reliability of the instrument was determined by establishing the internal consistency coefficient using the Cronbach Alpha method.

### **Method of Data Collection**

The data for the study was collected personally by the researcher by physically administering the research instrument to the sample of the study. After administration of the research instrument, the respondent were given a period of 15 minutes to fill the instrument before they were retrieved by the researcher.

## **Method of Data Analysis**

The data collected was analyzed using simple percentages and frequency.

## CHAPTER FOUR

### DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter presents the data analysis of responses obtained from 100 students across four secondary schools in Ovia-North East Local Government Area (25 respondents from each school). Data were analyzed based on the three research questions formulated for the study. The results are as follows:

#### Response Rate

<b>Questionnaire Printed</b>	<b>Questionnaire Administered</b>	<b>Questionnaire Returned</b>	<b>Response Rate</b>
100 copies	100 copies	100 copies	100%

#### Data Presentation and Analysis

Data collected from the field were organized and presented in frequency tables showing percentages to facilitate data analysis. The following tables show the analysis of the data collected from the respondents. Data from the study were analyzed using descriptive statistics.

## Demographics of the Respondents

### Distribution of the Respondents by School

<b>School</b>	<b>Frequency</b>	<b>Percentage (%)</b>
School 1	25	25.0
School 2	25	25.0
School 3	25	25.0
School 4	25	25.0
Total	100	100

Interpretation: The table shows the sample was evenly distributed across the four schools.

### Distribution of Respondents by Gender

<b>School</b>	<b>Male</b>	<b>Female</b>	<b>Total Number of Male and Female</b>	<b>Percentage of Males (%)</b>	<b>Percentage of Females (%)</b>	<b>Total</b>
School 1	10	15	25	40.0	60.0	100
School 2	12	13	25	48.0	52.0	100
School 3	15	10	25	60.0	40.0	100
School 4	11	14	25	44.0	56.0	100

Interpretation: The sample consisted of 40% males and 60% females in school 1, 48% males and 52% females in school 2, 60% males and 40% females in school 3, 44% males and 56% females in school 4. This shows a near balance in the distribution of males and females across the four schools.

### Distribution of Respondents by Class

<b>School 1</b>	<b>Frequency</b>	<b>Percentage (%)</b>	<b>School 2</b>	<b>Frequency</b>	<b>Percentage (%)</b>
SS1	10	40.0	SS1	15	60.0
SS2	7	28.0	SS2	6	24.0
SS3	8	32.0	SS3	4	16.0
Total	25	100	Total	25	100

<b>School 3</b>	<b>Frequency</b>	<b>Percentage (%)</b>	<b>School 4</b>	<b>Frequency</b>	<b>Percentage (%)</b>
SS1	12	48.0	SS1	10	40.0
SS2	5	20.0	SS2	5	20.0
SS3	8	32.0	SS3	10	40.0
Total	25	100	Total	25	100

Interpretation: The results shows that the sample from school 1 consisted of more percentage of respondents from SS1 (40%), with SS3 (32%) and the least percentage from SS2 (28%). The sample from school 2 also consisted of more respondents from SS1 (60%), SS2 (24%) and SS3 (16%). In school 3, SS1 had the highest percentage of respondents (48%), SS2 (20%) and SS3 (32%). In school 4, SS1 and SS3 had the highest percentage of respondents (40%), with the least from SS2 (20%).

**Distribution of Respondents by Age**

<b>School 1</b>	<b>Frequency</b>	<b>Percentage (%)</b>	<b>School 2</b>	<b>Frequency</b>	<b>Percentage (%)</b>
15-17	12	48.0	15-17	15	60.0
18-20	10	40.0	18-20	7	28.0
21 and above	3	12.0	21 and above	3	12.0
Total	25	100	Total	25	100

### Distribution of Respondents by Age

School 3	Frequency	Percentage (%)	School 4	Frequency	Percentage (%)
15-17	9	36.0	15-17	10	40.0
18-20	10	40.0	18-20	10	40.0
21 and above	6	24.0	21 and above	5	20.0
Total	25	100	Total	25	100

Interpretation: In School 1, the highest proportion of students (48%) were between 15 and 17 years, followed closely by those aged 18–20 years (40%), while only 12% were 21 years and above. In School 2, however, the age distribution is more towards the younger category, as 60% of the students were between 15 and 17 years, 28% were aged 18–20 years, and 12% were 21 years and above, suggesting that this school has a younger student population than School 1. In School 3, the sample is more evenly spread, with 36% of students in the 15–17 years group, 40% in the 18–20 years group, and 24% being 21 years and above. Similarly, School 4 recorded 40% of students each in the 15–17 and 18–20 years categories, while 20% were 21 years and above.

## Responses on Research Items

The questionnaire was designed to assess the impact of hands-on activities on students' engagement in Biology lessons. Responses were analyzed using frequencies and percentages.

**Research Question 1: To what extent do hands-on activities enhance students' interest or engagement in Biology lessons?**

**Combined Responses to Research Question 1 from all 100 Students**

ITEMS	SA	A	D	SD	SA (%)	A (%)	D (%)	SD (%)	TOTAL
1	64	27	7	2	64.0	27.0	7.0	2.0	100
2	56	31	11	2	56.0	31.0	11.0	2.0	100
3	58	24	13	5	58.0	24.0	13.0	5.0	100
4	66	22	8	4	66.0	22.0	8.0	4.0	100
5	51	35	7	7	51.0	35.0	7.0	7.0	100
6	72	22	6	0	72.0	22.0	6.0	0.0	100
7	53	29	10	8	53.0	29.0	10.0	8.0	100

Interpretation: The combined results show that a large majority of students (80-90%) either strongly agreed or agreed that hands-on activities made Biology lessons interesting and engaging. Item 6 received the strongest support, with 72% strongly agreeing. Very few students disagreed across the items (less than 15% in most cases). This confirms that hands-on activities are widely seen as effective in enhancing students' interest and engagement.

**Research Question 2: Does participation in hands-on activities enhance students' performance in Biology lessons?**

**Combined Responses to Research Question 2 from all 100 students**

<b>ITEMS</b>	<b>SA</b>	<b>A</b>	<b>D</b>	<b>SD</b>	<b>SA (%)</b>	<b>A (%)</b>	<b>D (%)</b>	<b>SD (%)</b>	<b>TOTAL</b>
8	45	28	18	9	45.0	28.0	18.0	9.0	100
9	39	31	19	11	39.0	31.0	19.0	11.0	100
10	53	24	15	8	53.0	24.0	15.0	8.0	100
11	61	22	13	4	61.0	22.0	13.0	4.0	100
12	57	25	10	8	57.0	25.0	10.0	8.0	100
13	67	23	8	2	67.0	23.0	8.0	2.0	100
14	50	26	16	8	50.0	26.0	16.0	8.0	100
15	50	28	15	7	50.0	28.0	15.0	7.0	100

Interpretation: The combined results show that most students believed hands-on activities enhanced their performance in Biology. Items 11-13 showed the highest level of strong agreement (57-67%). Although some students (about 15-20%) disagreed on certain items, the overall result suggests that hands-on activities are effective in boosting students' performance in Biology.

**Research Question 3: To what extent do hands-on activities influence students' attendance rates in Biology lessons?**

**Combined Responses to Research Question 3 from all 100 Students**

ITEMS	SA	A	D	SD	SA (%)	A (%)	D (%)	SD (%)	TOTAL
16	47	30	15	8	47.0	30.0	15.0	8.0	100
17	50	28	14	8	50.0	28.0	14.0	8.0	100
18	55	26	12	7	55.0	26.0	12.0	7.0	100
19	52	27	13	8	52.0	27.0	13.0	8.0	100
20	49	29	14	8	49.0	29.0	14.0	8.0	100

Interpretation: The results show that most students agreed that hands-on activities improve their attendance in Biology lessons. Between 75% and 80% of respondents

supported this view, while only a small number disagreed. The highest agreement was recorded in Item 18, suggesting that practical activities makes students more excited to attend classes. Overall, this indicates that hands-on activities enhance better class attendance.

### **Discussion of Findings**

The results of this study give useful information about how hands-on activities affect students' interest, performance, and attendance in Biology classes.

From the background information, the students were fairly shared across the four schools, different classes, genders, and ages. This balance makes the study reliable because it reflects the views of different groups of students.

For the first research question, the findings showed that most students agreed that hands-on activities made Biology lessons more interesting and engaging. More than 80% of the students said practical work helped them enjoy Biology, and the strongest agreement (72%) was on the fact that practicals made lessons exciting. This means that students are more active and willing to learn when they are involved in practical activities instead of only listening to lectures.

For the second research question, results showed that hands-on activities also improved students' performance. About 70–90% of the respondents agreed that practicals helped them understand Biology better and improved their results. The highest support (67%)

came from the view that practical activities directly improved their performance. Although a few students (15–20%) did not agree, most of the responses showed that hands-on activities help students to remember and apply what they have learned.

For the third research question, the findings showed that practical activities influenced students' attendance in Biology lessons. Between 75% and 80% of the students said they attended classes more regularly when practicals were involved. The highest agreement (55% strongly agreeing) was that practical work encouraged them to come to class. This shows that hands-on activities not only make learning more interesting but also make students look forward to attending Biology lessons.

In general, the study found that hands-on activities have a strong positive effect on students' learning in Biology. They make lessons more engaging, improve performance, and encourage regular class attendance. This shows the importance of using practical and activity-based methods when teaching Biology to secondary school students.

## CHAPTER FIVE

### SUMMARY, CONCLUSION & RECOMMENDATIONS

#### Summary

This study investigated the Impact of Hands-on Activities on Students' Engagement in Biology lessons in Ovia-North Local Government Area. Four schools were selected, involving one hundred respondents drawn from SS1, SS2 and SS3 classes. The study sought to determine the extent to which hands-on activities influence students' participation, understanding, and attendance in Biology lessons. A descriptive survey design was adopted and data were gathered using a structured questionnaire. The reliability of the instrument was tested using the Cronbach Alpha method, which confirmed its consistency. Responses collected were analyzed using frequency counts and percentages to present the distribution of opinions.

The findings from the analysis revealed that a majority of students agreed that hands-on activities significantly improve their level of participation in Biology lessons. Many students also indicated that practical activities help them to understand and retain Biology concepts better than purely theoretical methods. Furthermore, it was observed that students were more motivated to attend Biology classes when the lessons involved practical, activity-based learning rather than the expository traditional lecture method.

## **Conclusion**

From the findings of this research, it is concluded that hands-on activities have a positive impact on students' engagement in Biology lessons. They stimulate interest, enhance participation, and provide a clearer understanding of concepts, thereby making lessons more meaningful and memorable. The inclusion of practical activities also improves students' attendance, as they tend to look forward to classes that are interactive and activity-based. This study therefore establishes that hands-on activities are not just supportive tools but are essential for effective teaching and learning of Biology in secondary schools.

## **Recommendations**

Based on the findings of this study, it is recommended that Biology teachers should make greater use of hands-on activities in their instructional delivery. Teachers should go beyond the traditional lecture method and incorporate practical experiments, model demonstrations, and fieldwork to stimulate active participation among students. School administrators have a role to play in providing adequate laboratory facilities and teaching aids that will enable effective practical work. The government, through its educational agencies, should also give more attention to science education by ensuring that laboratories in secondary schools are well equipped and policies that encourage practical learning are strictly implemented. In addition, teachers should be exposed to regular training and retraining through workshops and seminars to strengthen their skills in

activity-based teaching methods. Students themselves should develop a positive attitude towards practical sessions by actively participating in group work, demonstrations, and experiments, as this will enhance their learning outcomes and make Biology lessons more engaging and enjoyable.

### **Suggestions for Further Studies**

This study was limited to secondary school students in Ovia North-East Local Government Area, with a focus on four schools and one subject, Biology. Future researchers may wish to expand the scope by including a larger sample size across more schools and local government areas, so as to provide a broader perspective on the influence of hands-on activities. In addition, further studies could examine the impact of hands-on activities on other science subjects such as Chemistry, Physics, and Agricultural Science to see if similar outcomes will be recorded. Another area that may be explored is the effect of hands-on activities on the performance of students across different class levels and gender groups. Finally, researchers may also consider a comparative study between schools with well-equipped laboratories and those with limited resources, to better understand how the availability of facilities influences the effectiveness of hands-on activities in teaching and learning.

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**APPENDIX**

**QUESTIONNAIRE**

Title: The Impact of Hands-on Activities on Students' Engagement in Biology Lessons in Ovia-North East Local Government Area

Instructions: Please indicate your level of agreement with each statement below by ticking (✓) the appropriate option.

Rating Scale: SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree

Section A – Demographic Information

1. Gender:  Male  Female

2. Class:  SS1  SS2  SS3

3. Age:  15-17  18-20  21 and above

Section B – Research Questions

Research Question 1: To what extent do hands-on activities enhance students' interest or engagement in Biology lessons?

S/N	ITEM	SA	A	D	SD
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1.	I enjoy Biology lessons more when hands-on activities are included.				
2.	Hands-on activities make Biology lessons more interesting to me.				
3.	Practical activities help me focus better during Biology lessons.				
4.	I understand more when I participate in class discussions after doing hands-on activities.				
5.	I feel more motivated to learn Biology when practical activities are used.				
6.	Hands-on activities help me understand Biology concepts more clearly.				
7.	I am more comfortable asking questions in class after participating in hands-on activities.				

Research Question 2: Does participation in hands-on activities enhance students' performance in Biology lessons?

8.	My test and exam scores in Biology improve when I take part in practical activities.				
9.	Hands-on activities help me remember Biology concepts for a longer time.				
10.	I can answer more questions correctly in Biology after doing practical activities.				
11.	Hands-on activities make it easier for me to complete Biology assignments.				
12.	Hands-on activities make it easier for me to complete Biology assignments.				
13.	My overall academic performance in Biology has improved because of practical activities.				
14.	I find it easier to apply what I have learned in Biology when hands-on activities are used.				
15.	Practical activities help me connect Biology topics to real-life situations.				

Research Question 3: To what extent do hands-on activities influence students'

attendance rates in Biology classes?

16.	I look forward to attending Biology classes that involve practical work.				
17.	I am less likely to miss Biology lessons when I know a practical will be conducted.				
18.	Practical activities make me feel excited about coming to school.				
19.	My interest in hands-on activities encourages me to arrive early enough for Biology classes.				
20.	I attend Biology lessons more regularly when they include practical activities				