THE ROLE OF TECHNOLOGY INTERGRATION IN ENHANCING STUDENT'S PERFORMANCE IN BIOLOGY IN EGOR LOCAL GOVERNMENT AREA

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FAULTY OF EDUCATION
UNIVERSITY OF BENIN
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IN PARTIALFULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF EDUCATION B.Sc(Ed) DEGREE IN BIOLOGY EDUCATION IN THE DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY
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CERTIFICATION

This is to certify that this project work was carried out by **OLADUNJOYE ABIGAIL IBUKUNOLUWA** With mat no **EDU2102044** in the Department of CIT, Faculty of Education , University of Benin, Benin City under my supervision.

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DEDICATION

I dedicate this project work to God Almighty who in His boundless infinite love, goodness and guidance, gave me the strength to successfully complete this project work.

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ABSTRACT

This study examines the role of technology integration in enhancing students' academic performance in Biology in public secondary schools in Egor Local Government Area of Edo State. A descriptive survey research design was adopted, and data were collected through questionnaires from one hundred (100) students and twenty-five (25) teachers across five selected public schools in Egor Local Government Area of Edo State. The study was guided by five research questions. Data were analyzed using frequency counts, percentages, and mean scores, and the reliability of the instrument stood at 0.82 for students and 0.79 for teachers. The study revealed that the use of technology helps students understand Biology concepts better and improves their performance in examinations. It also showed that technology makes Biology lessons more interactive and engaging for learners. However, the availability of technological resources such as computers and projectors was found to be very low, and challenges like poor electricity and lack of internet access hinder effective integration. It was recommended that schools should invest more in modern technology tools and infrastructure, and provide regular training for teachers to enhance the use of technology in Biology instruction.

CHAPTER ONE

INTRODUCTION

Background To The Study

Information and Communication Technology (ICT) is essential in the teaching and learning process. Today, most people can easily access the internet through personal computers, smartphones, smartwatches, and other devices. Consequently, learning environments and approaches to gaining knowledge have transformed, and multitasking has become common.

Ajayi defined Information and Communication Technology as a technological means of collecting, collating and conveying information using technology. UNESCO defined Information and Communication Technology as forms of technology that are used to transmit, store, create, share or exchange information. According to Tamiselvan et al., it is a field that encompasses any product that is capable of electronically storing, retrieving, manipulating, transmitting, or receiving information in a digital format. It not only focuses on these individual functions but also emphasizes the importance of how these different functions can interact and work synergistically with each other. Prakash & Naik stated that ICT encompasses the integration of communication technologies and computers that collectively empower users to efficiently store, transmit, and manipulate information. Additionally, Shokeen et al. Characterized it as the application of computer systems and internet connectivity for the management and communication of information. From the definitions provided above, it is deduced that ICT refers to the dynamic use of technology tools and systems to gather, process, analyze, store,

retrieve, manipulate, transmit, and receive information in a digital format. It refers to a wide range of products, software, and networks that enable the seamless exchange, sharing, and creation of information. Individuals and businesses benefit from ICT because it improves communication, enables effective data management, fosters collaboration, and promotes technological innovation. ICT serves as a catalyst for societal progress, transforming the way we communicate, work, learn, and engage in a rapidly evolving digital world. These technologies include communication mediums such as radio, television, video, DVDs, and telephones, including both fixed-line and mobile devices.

Biology is a distinct field of the natural sciences that deals with the study of plants and animals, contributing to the development of scientific literacy that is necessary for a country's growth and development. Esureloso et al. (1977) defined Biology as the scientific study of living things. The primary objective of biology education is to equip students with a comprehensive understanding of biological concepts, principles, theories, and laws. This information is essential for equipping the workforce in areas like medicine, agriculture, and related fields. The work of biologists has significant impacts across various industries, including crime investigation, research, healthcare, disease management, population control, agriculture, and education. Technology integration refers to the effective implementation of educational technology to accomplish intended learning outcomes. Educational technology includes any tool, piece of equipment, or device – electronic or mechanical – that can be used to help students accomplish specified learning goals (Davies, Sprague, & New, 2008). Educational technology includes both

instructional technologies, which focus on technologies teachers employ to provide instruction, and learning technologies, which focus on technologies learners use to accomplish specific learning objectives. Studies by various researchers show that the integration of ICT in schools has predominantly positive impacts on both teachers and students, in numerous surveys, teachers, students, and school administrators have reported substantial improvements in the quality of students' work, as well as in the quality of teaching, learning, and research activities within the school environment, resulting from the incorporation of ICT into the learning environment. The current method of teaching and learning Biology used in Nigerian secondary schools is outdated and, as such, hinders the comprehension and retention of biological knowledge and its associated concepts. The current method of teaching and learning Biology primarily centers on memorization or "cramming," which is a practice commonly used by Nigerian secondary school students. Memorization or "cramming" often leads to surface-level learning, where students may be able to recite information for examinations but may find it difficult to apply their knowledge to practical situations or more difficult scientific concepts. The pedagogical approaches used in teaching need to be modernized. In order to address this problem, Dickerson asserted that the absence of technology in schools contributes to the prevalence of "lecture and listen" instructional scenarios. In such scenarios, teachers predominantly deliver verbal explanations while students listen and take notes. This traditional teaching method is inadequate for preparing students with the essential skills and competencies required to thrive in the contemporary world. Therefore, to improve the quality of education, learning methods need to be modernized and

upgraded through the integration of ICT into teaching and learning. Integrating technology would promote a transition from the conventional teaching model to a more interactive "show and tell" method, leading to a more engaging and effective learning experience. There is still a significant gap in the consistent and effective use of technology across many public secondary schools in Egor Local Government Area of Edo State, Nigeria. Issues such as insufficient infrastructure, limited teacher training, and inadequate access to digital resources obstruct the full exploitation of technology's advantages in the classroom. This study aims to investigate how the integration of technology influences students' performance in Biology in selected secondary schools within the Egor Local Government Area and to identify effective strategies for better implementation.

Statement Of Problem

The academic performance of secondary school students in Biology has raised significant concerns among educators, parents, and policymakers. Although there have been initiatives aimed at improving science education through curriculum enhancements and teacher training, many students continue to find it challenging to grasp fundamental biological concepts, leading to unsatisfactory academic results. Traditional teaching approaches—primarily lecture-driven and focused on the teacher—may not effectively engage modern learners or meet their varied educational needs. The increasing availability of digital tools and resources suggests that integrating technology into classrooms could be a promising way to improve student learning and academic success. However, there is a lack of research regarding the effectiveness of these

technologies in Biology education in Benin City and their measurable effects on student performance. This study seeks to explore the impact of technology integration on enhancing Biology performance among secondary school students in Egor Local Government Area of Edo State, Nigeria.

Research Questions

The following research questions guided the study:

1. How extensively is technology being utilized in Biology instruction in secondary schools within Egor Local Government Area?
2. What impact does the incorporation of technology have on students' academic achievement in Biology?
3. How skilled and motivated are Biology teachers in Egor LGA to incorporate technology into their teaching practices?
4. What obstacles do teachers and students encounter in using technology for Biology education in the region?
5. What measures can be taken to enhance the integration of technology in the teaching and learning of Biology in secondary schools?

Purpose Of Study

This study aims to examine the influence of technology integration on the academic performance of students in Biology at public secondary schools in Egor Local Government Area

(LGA). As technology increasingly reshapes educational methodologies, this research will investigate how the implementation and effective utilization of various technological tools and resources can enhance students' comprehension, involvement, and success in Biology. The introduction of digital resources such as interactive whiteboards, computer simulations, virtual labs, multimedia presentations, and online learning platforms has the potential to transform the teaching and learning experience, especially in science disciplines like Biology, where abstract concepts and practical experiments are prevalent.

The study specifically aims to:

1. Investigate how extensively technology is incorporated into Biology teaching and learning in public secondary schools of Egor LGA.
2. Evaluate the effects of technology integration on students' academic performance and their grasp of Biology concepts.
3. Identify the technological tools and resources frequently utilized in Biology classrooms within the study region.
4. Explore the attitudes and perceptions of both teachers and students regarding the use of technology in the Biology educational process.
5. Examine the challenges and constraints encountered in applying educational technology in Biology instruction.

6. Offer recommendations for effectively integrating technology to improve Biology education and student outcomes in Egor LGA.

By pursuing these objectives, the study aims to provide valuable insights and data that could assist in shaping educational policies, enhancing teacher training programs, and guiding school investment strategies focused on advancing Biology education through technology.

Significance Of The Study

This research is crucial as it aims to showcase how integrating technology can influence students' academic success in Biology—a fundamental science subject essential for careers in medicine, agriculture, environmental science, and biotechnology. In an increasingly digital world, equipping students with technological skills is not just advantageous but essential for contemporary education.For educators and policymakers in the Egor Local Government Area and beyond, this study will offer evidence-based insights into the effectiveness of using technological tools in Biology classrooms. It aims to identify shortcomings in current practices and develop strategies to enhance teaching and learning, particularly in resource-limited settings.Additionally, the study will aid teachers by pinpointing areas where professional development or support is necessary, especially regarding the use of ICT tools. It could also enrich the existing knowledge base on educational technology by providing localized data from Nigerian secondary schools. According to UNESCO (2021), integrating ICT in education enhances learning quality and provides students with the skills required for the digital age.

Ultimately, students are likely to reap the most benefits, as enhanced teaching methods can lead to better engagement, a more profound comprehension of the material, and improved academic performance. This may, in the long run, foster greater interest and success in science subjects, thereby contributing to national advancement in STEM fields.

Scope And Delimitation Of The Study

This research centers on how technology can enhance students' performance in Biology at secondary schools in the Egor Local Government Area (LGA) of Edo State, Nigeria. It specifically examines the use of digital tools, online resources, multimedia, and other technological supports in Biology education. The study aims to analyze teachers' roles in technology integration and its effects on student engagement, understanding, and academic achievement in Biology.The research will focus on a selection of public secondary schools within the Egor LGA. It will investigate various technological tools used in Biology classrooms, such as educational software, virtual labs, multimedia presentations, and e-learning platforms. Data will be gathered from students and teachers through surveys, interviews, and classroom observations to assess how effectively technology is integrated to enhance Biology education. This study is focused solely on technology use in Biology classes in schools within the Egor Local Government Area and does not include institutions from other parts of Edo State or Nigeria. It will only consider senior secondary schools (both junior and senior) and will not cover primary or tertiary educational institutions.The research will exclusively investigate technology use in the context of Biology instruction, without delving into other subjects or the

overall curriculum. Additionally, it will concentrate on contemporary technology usage and its immediate effects, without examining historical trends or future developments in educational technology.Lastly, while the study aims to evaluate the impact of technology on student performance, it will not consider other factors that might affect academic success, such as socioeconomic background, teacher qualifications, or external tutoring.

Definition Of Terms

To ensure clarity and a common understanding of key concepts used in this study, the following terms are defined operationally:

1. **Information and Communication Technology (ICT**): For this study, ICT refers to the diverse set of technological tools and resources used to create, store, process, manage, and communicate information (Ajayi, 2009; Tamiselvan et al., 2015). This includes computers, the internet, broadcast media, telephones, and various software applications that facilitate the digital transmission and manipulation of information in an educational context.
2. **Technology Integration**: This is the effective incorporation of technology tools and resources into the teaching and learning process to achieve specific instructional objectives (Davies, Sprague, & New, 2008). It signifies a move beyond using technology as a supplement to making it a core part of the educational experience to enhance understanding and engagement in Biology.

3. **Academic Performance**: In the context of this research, academic performance refers to the measurable outcome of students' learning in Biology, as indicated by their scores in tests, examinations, and continuous assessments. It serves as an indicator of their comprehension and mastery of biological concepts and principles.
4. **Biology Education:** This refers to the teaching and learning of the scientific study of living organisms, including their structure, function, growth, evolution, and distribution (Esureloso et al., 1977). The goal is to equip students with a comprehensive understanding of biological concepts, principles, and laws.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

The literature for the study was reviewed under the following subheadings:

- Theoretical framework
- Empirical studies
- Summary of literature review.

Theoretical Framework

This study is grounded in Constructivist Learning Theory and Vygotsky's Social Development Theory. According to Piaget (1972), constructivism emphasizes that learners actively construct their own knowledge through experiences. In this context, technology serves as an aid for experiential learning, particularly in Biology, allowing students to visualize intricate processes through simulations and animations.

Vygotsky (1978) highlighted the role of tools and social interaction in learning. His concept of the Zone of Proximal Development (ZPD) suggests that learners can achieve higher levels of understanding with the help of mediating tools and guidance. Technology acts as one such mediating tool, helping students connect their existing knowledge with new learning opportunities.

Empirical Studies

Empirical research plays a vital role in validating the effectiveness of technology integration in education, particularly in enhancing student performance in Biology. A wide range of studies – employing experimental, quasi-experimental, and descriptive approaches – have explored this topic both within Nigeria and internationally. These investigations provide substantial evidence on how digital tools influence teaching effectiveness, student engagement, academic achievement, and knowledge retention in Biology classrooms.

In a quasi-experimental study conducted in Osun State, Nigeria, Adewale and Salawu (2019) examined the effects of computer simulations and video-based instruction on senior secondary school students. The study revealed that learners taught with multimedia tools outperformed those taught through traditional lecture methods in both immediate and delayed post-tests. The researchers concluded that interactive digital instruction enhances both comprehension and long-term retention of Biology concepts.

Similarly, Nwachukwu and Okoli (2020) explored the effectiveness of animated Biology instructional software among SS2 students in Anambra State. Using a pretest-posttest control group design, they found that students exposed to animated content achieved significantly higher scores and demonstrated a more positive attitude toward the subject. These results suggest that the visual appeal and interactivity of digital content can increase learner motivation and deepen engagement with the subject matter. Yusuf and Onasanya (2020) conducted a descriptive study

assessing Biology teachers' ICT competencies and their relationship with student achievement. Their findings revealed a strong positive correlation, indicating that students taught by digitally proficient teachers performed better academically. This underscores the critical need for ongoing professional development to enhance teachers' ability to incorporate ICT effectively into classroom instruction. Beyond Nigeria, Lin, Wang, and Lee (2019) studied the use of virtual reality (VR) for teaching human anatomy in Taiwanese schools. Their experimental design involved comparing a VR-equipped group with a group using textbooks and standard videos. Students using VR demonstrated superior spatial understanding and scored higher in practical tasks. The researchers highlighted the unique advantages of immersive technologies in helping students visualize and comprehend complex biological systems. In Lagos State, Adebayo and Akinola (2022) investigated the influence of mobile learning applications on students' study behaviors and academic performance. Their results indicated that students who regularly used mobile apps for Biology studies and assignments achieved better exam results compared to peers who did not use such tools. The study emphasized the role of mobile technology in promoting self-directed learning and improving academic outcomes outside of the classroom setting.

Despite these largely positive outcomes, some research reveals that technological tools alone do not guarantee improved performance. Okebukola (2018) found that in environments lacking proper ICT infrastructure and teacher training, the use of educational technology had minimal effect on student outcomes. This finding highlights the importance of adequate resources, teacher preparedness, and administrative support for successful technology adoption.

Collectively, these empirical studies highlight both the promise and limitations of technology in Biology education. While digital tools can significantly enhance learning when used appropriately, their impact is mediated by contextual factors such as teacher skill, student accessibility, institutional readiness, and supportive policies. A strategic and holistic approach is therefore essential to fully harness the potential of educational technologies.

Concept of Technology in Education

Educational technology, also known as ICT, refers to the intentional use of digital tools and resources to improve teaching, learning, and evaluation processes. These resources include computers, internet services, projectors, smartphones, multimedia content, virtual labs, learning applications, simulations, and digital platforms that facilitate content delivery, interaction, and student engagement.

According to Suleiman (2018), this concept involves the thoughtful selection and application of instructional tools that support educational delivery. These technologies are designed not to replace traditional teaching but to enrich and broaden instructional effectiveness. Ajayi (2009) notes that technology facilitates gathering, organizing, and sharing educational content digitally, which improves teaching effectiveness, particularly in science subjects like Biology.

In our modern knowledge-driven society, technology integration in classrooms has become essential. Today's learners are immersed in digital environments and expect similar

interactivity in academic experiences. UNESCO (2002) noted that ICT reshapes educational practices by encouraging learner-centered, flexible approaches where students actively investigate, think critically, and collaborate in both online and traditional settings.

Digital tools cater to various learning preferences (visual, auditory, kinesthetic), making it easier to reach diverse student groups. For instance, visual learners benefit from videos explaining biological concepts like mitosis, while auditory learners may prefer podcasts. Kinesthetic learners can interact with virtual labs and simulations.

Educational media also boosts student interest and participation. Olaniyan and Ojo (2018) observed that multimedia and interactive technologies capture learners' attention, spark curiosity, and inspire motivation. This is particularly useful in Biology where many concepts are difficult to visualize. Tools like digital microscopes and 3D models offer hands-on ways to explore abstract topics.

Technology helps level the educational playing field by providing remote or underserved students access to quality learning materials through Open Educational Resources (OERs), mobile apps, and online libraries. UNESCO (2002) emphasized that properly deployed educational technology promotes fairness by offering multiple learning paths.

From an instructional perspective, digital technology supports both formative and summative assessments. Tools like Google Forms and Kahoot! Allows real-time feedback and performance analysis, enabling tailored teaching approaches. The COVID-19 pandemic

accelerated blended and virtual learning, highlighting technology's role in maintaining continuous education through platforms like Zoom and Google Classroom (Olusola & Alaba, 2011).

However, effective technology use requires more than devices – it needs reliable infrastructure, technical support, and trained educators. Nwachukwu and Okoli (2020) argue that without proper teacher training, expected learning improvements may not materialize.

In conclusion, educational technology strengthens teaching, engages learners, and supports academic growth. In Biology, it transforms abstract concepts into interactive lessons and offers flexible learning pathways, playing a central role in education's future.

Integration of Technology in Biology Teaching

Technology integration in Biology involves deliberate application of digital tools to improve teaching and learning. This includes using technological resources in lesson design, content presentation, practical work, assessment, and student engagement, shifting from teacher-centered to learner-centered instruction.

Biology deals with abstract topics (cellular respiration, genetics, ecological systems) that benefit from interactive visual support. Digital resources like animations and virtual laboratories help clarify complex ideas. UNESCO (2002) notes ICT promotes inquiry-based learning by enabling exploration of phenomena not feasible in regular classrooms. For example, 3D simulations demonstrate mitosis more effectively than chalkboard illustrations. Virtual labs

provide safe alternatives where physical equipment is limited. Adewale and Salawu (2019) found students using virtual labs developed better laboratory skills and conceptual understanding than those taught conventionally.

Technology supports varied learning preferences: visual (charts, videos), auditory (recordings), and kinesthetic (simulations). This aligns with constructivist theories emphasizing hands-on learning (Piaget, 1972). Beyond content delivery, technology facilitates formative assessment and immediate feedback through online quizzes and learning platforms, allowing real-time understanding checks and strategy adjustments (Olusola & Alaba, 2011). Nwachukwu and Okoli (2020) emphasize that effective ICT-based Biology education depends on teacher readiness and competence, requiring professional training aligned with curricular goals.

Technology also promotes inclusive education through assistive tools (screen readers, magnifiers) for students with special needs, ensuring equity and accessibility. It fosters independent learning habits as students explore topics through digital resources (OERs, academic search engines, science tutorials). Successful integration requires more than device access – teachers must skillfully select and apply appropriate tools for instructional goals.

In conclusion, technology integration in Biology improves understanding, engagement, and performance by transforming memorization into investigation. Realizing this potential requires adequate infrastructure, teacher training, and alignment between technology and pedagogy.

Impact of Technology on Students' Performance in Biology

The use of technology has notably improved how students perform in Biology by providing interactive digital tools that simplify complex topics. Through the use of simulations, multimedia content, and virtual laboratory experiences, learners are better able to understand and retain biological concepts.

Biology is frequently perceived as one of the more challenging sciences at the secondary level due to the depth and breadth of its content. Traditional, lecture-heavy teaching styles often fail to address the diverse learning preferences of students. The introduction of digital materials such as simulations, virtual experiments, and animated content allows students to explore and interact with difficult concepts in a more intuitive and meaningful way. Ogunleye (2017) explains that using multimedia tools in Biology lessons significantly helps students understand difficult topics such as genetics, the circulatory system, and ecological relationships by making them more concrete.

One major benefit of technology in Biology education is its positive impact on academic achievement. Studies show that students taught using ICT tend to perform better in tests compared to those taught using traditional methods. For instance, Adewale and Salawu (2019) carried out research in Nigerian secondary schools and discovered that students who learned through digital simulations scored higher in practical Biology assessments than those in

conventional lab environments. This can be attributed to the engaging and visually rich nature of digital tools, which help in simplifying and reinforcing complex biological processes.

Apart from improving performance, technology also increases students' interest and motivation. Nwachukwu and Okoli (2020) reported that incorporating digital games, animations, and interactive tests into Biology instruction keeps students engaged and curious. This heightened interest often encourages students to pursue further studies and careers in biological and health sciences, viewing the subject not just as an academic requirement but as an exciting and relevant field. Additionally, technology supports the development of cognitive and analytical skills. It enables inquiry-based learning and allows students to experiment, ask questions, and test hypotheses – key components of scientific thinking. Virtual experiments and interactive simulations allow students to manipulate variables and immediately observe the effects, thus fostering deeper understanding and critical thinking. Bruner (1966) emphasized that learners absorb information more effectively when they are active participants in the learning process, a role that technology readily facilitates.

Technology also enhances collaboration and communication among students. Digital platforms such as Google Classroom, Zoom, and academic forums provide opportunities for group work, peer discussion, and shared feedback on Biology-related tasks. Olusola and Alaba (2011) noted that ICT improves student interaction, which strengthens the communication and teamwork skills vital for scientific exploration. Furthermore, technology creates inclusive

learning environments for students with diverse needs. Assistive tools like speech-to-text programs, video captions, and adjustable interfaces ensure that students with visual, hearing, or learning challenges can participate equally in Biology education. This promotes equity by ensuring that all learners have access to the same opportunities for academic success. However, it is essential to note that the effectiveness of technology in improving Biology outcomes depends on several key factors, including teacher competency, resource availability, and how well the tools align with the curriculum. Simply having digital devices or software does not guarantee better results. Yusuf and Onasanya (2020) argue that meaningful improvements in academic performance occur only when technology is thoughtfully integrated into teaching practices.

In conclusion, while the impact of technology on students' performance in Biology is multidimensional, it is mostly positive. It enhances academic results, nurtures interest, supports higher-order thinking, encourages teamwork, and ensures inclusivity. When applied effectively by skilled educators in well-equipped environments, educational technology can shift Biology learning from rote memorization to a dynamic and enriching process of discovery.

Challenges of Integrating Technology in Biology Education

While the integration of technology into Biology education has proven to be a powerful instructional tool, it continues to face considerable obstacles, particularly in developing countries like Nigeria. These challenges hinder the full adoption and impact of digital tools in the teaching

and learning process. They are rooted in issues related to infrastructure, funding, teacher preparedness, curriculum alignment, and socio-economic disparities.

One of the most pressing issues is inadequate infrastructure in many secondary schools. In several public institutions, especially within Egor Local Government Area, access to stable electricity, internet connectivity, and digital devices is limited. This lack of infrastructure contributes to a widening gap between technologically advanced urban schools and their rural or under-resourced counterparts. As highlighted by Adeoye and Olaitan (2021), the absence of dependable infrastructure greatly restricts the regular use of ICT in science classrooms.

Financial constraints also play a major role. Incorporating technology into classroom practice requires significant investment not only in purchasing devices such as laptops, smartboards, and projectors but also in maintaining them, acquiring software, and hiring technical support staff. Unfortunately, many schools lack the budgetary support to make or sustain these investments. According to Ojo and Adebayo (2020), the financial allocations from government bodies remain inadequate to equip Biology classrooms with the necessary technological resources.

Teacher-related challenges are another major concern. Effective technology use in teaching depends heavily on the ability of educators to integrate digital tools into their lesson delivery. However, many Biology teachers lack both the technical skills and the pedagogical training required to use these tools effectively. As Yusuf and Onasanya (2020) observe, the

scarcity of consistent professional development programs has left many teachers unprepared to leverage ICT in meaningful ways. Another significant barrier is the misalignment between existing curricula and digital learning tools. In many cases, Biology syllabi remain textbook-driven and rigid, limiting opportunities for incorporating interactive and multimedia content. Akindele and Fakorede (2019) emphasize the need for curriculum planners to embed ICT components into the structure and delivery of Biology content to ensure a smooth integration of technology.

Resistance to change is another factor that often goes unnoticed. Some teachers are hesitant to adopt new technologies due to fear, lack of confidence, or simply a reluctance to alter familiar teaching methods. Similarly, students may also be slow to adapt, particularly when they lack the necessary digital skills or exposure. Nwosu (2018) notes that psychological and attitudinal factors significantly affect how well technology is accepted and used in classrooms.

Socio-economic disparities further complicate technology integration. Many students from low-income backgrounds do not own personal digital devices, which limits their participation in digital learning. Even when devices are available, a lack of digital literacy may prevent effective usage. Olaniyan and Ojo (2018) report that many students struggle with using online learning platforms or accessing educational content independently due to limited ICT knowledge.

Inconsistent power supply is yet another practical issue. Frequent blackouts interrupt the use of electronic tools such as projectors, computers, and internet-enabled devices, causing disruptions in lesson delivery. The unpredictability of electricity availability often discourages teachers from preparing ICT-based lessons.

Lastly, the quality and relevance of digital content can be problematic. Not all digital resources are aligned with the curriculum or suitable for the learning context. Some materials may be too advanced, culturally inappropriate, or disconnected from national educational goals. UNESCO (2002) stresses the importance of ensuring that educational content is localized and relevant to students' real-world environments and academic standards.

In summary, while digital technology holds great promise for improving Biology instruction, several interconnected challenges must be addressed for successful and equitable implementation. Efforts must be coordinated among government agencies, school administrators, curriculum developers, and teachers. This can be achieved through increased funding, infrastructure upgrades, targeted teacher training, and curriculum reform. Such collaboration is key to realizing the full benefits of technology-enhanced Biology education.

Summary Of Literature Review

This chapter reviewed related literature on the role of technology in Biology education, highlighting its definition, theoretical basis, effects on student performance, related challenges, and empirical research findings.

The discussion on educational technology emphasized its dynamic nature, characterizing it as an evolving field that incorporates digital tools to enhance both teaching and learning. Technology has shifted from being a supplementary aspect to becoming integral to contemporary educational systems, providing diverse resources such as multimedia, simulations, and virtual labs that enrich the instructional experience in scientific fields like Biology. Key theories were also highlighted in the review, including Constructivist Learning Theory, Cognitive Theory of Multimedia Learning, and the Technological Pedagogical Content Knowledge (TPACK) framework. These theories support the pedagogical significance of technology integration by focusing on learner-centered education, the cognitive processing of multimedia content, and the essential integration of content, pedagogy, and technology. Regarding impact, various studies suggest that technology significantly enhances students' academic performance, motivation, cognitive engagement, and collaborative learning within Biology. It helps transform abstract biological concepts into engaging, visual experiences, leading to better understanding and retention. Additionally, technology caters to diverse learning requirements and promotes inclusivity. Nonetheless, the integration of technology in Biology education faces several challenges. Issues such as limited infrastructure, insufficient funding, inadequate teacher training, rigid curricula, and low digital literacy levels among educators and students have been recognized as significant barriers, particularly in under-resourced environments like many Nigerian public schools. Empirical evidence supports the positive outcomes of technology-enhanced Biology instruction, showing improved student performance when ICT tools are

implemented thoughtfully and effectively. However, it also warns that these benefits may not be fully realized without necessary conditions such as teacher proficiency, institutional backing, and suitable content.

In conclusion, the literature indicates that while the integration of technology in Biology education offers significant potential, its effectiveness is contingent upon careful planning, effective training, infrastructure improvements, and ongoing evaluation. These findings will help shape the methodology and interpretation of results in the following chapters of the study.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter describes methodology used in the research under the following subheadings:

- Research Design
- Population of the Study
- Sample and Sampling Technique

- Research Instrument
- Validity of the Instrument
- Reliability of the Instrument
- Method of Data Collection
- Method of Data Analysis.

Research Design

This study is designed to investigate the role of technology integration in enhancing students' performance in Biology in public secondary schools in Egor Local Government Area, Edo State. The study adopts a descriptive survey research design, which is suitable for exploring existing conditions and gathering opinions, perceptions, and experiences from a specific population. As explained by Kour-Gulzar and Bhat (2018), a descriptive survey design helps researchers to collect information about the characteristics of respondents, particularly their views and attitudes. Similarly, Orodho (2003) described it as a method of collecting data through interviews or the use of questionnaires given to a selected sample of individuals. This design is appropriate for this study because it allows the researcher to collect comprehensive and accurate data from a sample of the population without altering any variables. It provides an opportunity to observe real situations, such as how technology is currently used in the classroom, and examine its connection to students' academic performance in Biology.

Population of the Study

The population of this study comprises of 5 public senior secondary school in Egor Local Government Area of Edo State. The target respondents from this population are senior secondary school students offering Biology and all Biology teachers in the listed schools. The selected schools are:

1. Uselu Secondary School
2. Uwelu Secondary School
3. Iyoba Girls Secondary School
4. Federal Government Girls College
5. Edo Boys College

The population of the study will be only students and teachers from the above listed schools.

Sample and Sampling Technique

The sample size for this study will be one hundred and twenty five (125) respondents. Which comprises twenty (20) students and five(5) teachers from each of the five randomly selected secondary schools in Egor Local Government Area of Edo State. The study used the simple random sampling technique in selecting the schools and also in selecting the respondents for the study . The use of simple random sampling technique was to ensure that every member of the population has an equal chance of being selected in the sample.

Research Instrument

The research instrument for this study will be a structured questionnaire titled ”Technology Integration and Biology Performance Questionnaire (TIBPQ).” Recognizing the different roles of respondents, two versions were developed:

1. TIBPQ-Student Version: Designed for senior secondary school Biology students.
2. TIBPQ-Teacher Version: Designed for Biology teachers.

Both versions were divided into two main sections:

Section A: Collected demographic information such as gender, class level (for students), gender, years of teaching experience, and qualifications (for teachers).

Section B: Focused on technology integration in Biology instruction, with items tailored to each respondent group

For Students: Items assessed availability/accessibility of tech tools, frequency of exposure to technology in lessons, perceived usefulness for learning, and perceived impact on their performance.The items primarily used a Likert scale format, organized around five themes: frequency of technology use in Biology lessons, perceived impact on learning, teacher effectiveness with technology, challenges encountered, and suggestions for improvement. The following response options will be provided; “Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD).

For Teachers: Items assessed availability of tech tools for teaching, frequency of integration into lessons, perceived effectiveness for instruction, challenges faced (e.g., training, infrastructure), and perceived impact on student outcomes. The item also primarily used Likert-scale format to addressed; personal technology integration practices, observed effects on student performance, training adequacy, institutional barriers, and recommendations for enhancing technology use. The following response options will be provided; "Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD).

Each section of the questionnaire for both the teacher and the student will contain a series of closed-ended questions. Additionally, checklists were included to identify specific technology tools used in classrooms.

Validity of the Instrument

In order to ascertain the validity of the instrument, the questionnaire designed by the researcher would be given to the supervisor and two other lecturers in the department of Curriculum and Instructional Technology to scrutinize and for necessary corrections to ensure content as well as face validity. Corrections made on the draft would be incorporated in the final draft.

Reliability of the Instrument

To establish the reliability of the instrument , it will be administered to twenty (20) Biology students and five (5) Biology teachers from Public Secondary Schools outside the study area, then subjected to Cronbach alpha statistics .

Results:

Student Questionnaire (TIBPQ-S): Cronbach's Alpha = 0.82

Teacher Questionnaire (TIBPQ-T): Cronbach's Alpha = 0.79

Which indicates that the instrument is reliable.

Method of Data Collection

The questionnaire will be administered manually to each participant in the selected secondary school in Egor Local Government Area of Edo State. One hundred (100)copies of the questionnaire were administered directly to students and twenty five (25) Biology teachers, after which they were collected on the same day to avoid loss.

Method of Data Analysis

The data obtained from the questionnaire will be analyzed using descriptive statistics. Specifically, frequency, percentage and mean scores will be used to summarize and interpret the responses from both students and teachers. The decision rule for the research questions is that

any calculated mean score equal to or greater than 2.50 will be regarded as “agreed,” while any mean score less than 2.50 will be regarded as “disagreed.”

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

This chapter presents the results of data analysis for the study. The results provides answers to research questions earlier raised in chapter one of the study.

Presentation of Results

Data collected are presented and analyzed with respect to the research questions that guided this study. Raw scores were used in preparing the frequency distribution table weighted under Strongly agree (SA) = 4, Agree (A)=3, Disagree (D) =2, Strongly disagree (SD) =1. The mean was used in answering the research questions that guided the study.

Teacher Questionnaire:

Research question 1. How extensively is technology being utilised in biology instruction in public secondary schools in Egor Local Government Area.

Table 1: Descriptive statistics on how extensively technology is being utilised in biology instruction Egor Local Government Area .

Questionnaire Result

S/N	ITEM STATEMENT	SA	A	D	SD	TOTAL	MEAN	DECISION
1.	I regularly use technology tools in biology lessons.	9	11	-	5	25	2.96	Accepted
2.	I incorporate digital devices like computers and projectors during teaching biology.	-	-	-	25	25	1.0	Rejected
3.	Technology use is encouraged in my school's biology curriculum.	-	-	-	25	25	1.0	Rejected

From the teacher questionnaire result above, item 1 scored above the cut off mean of 2.5 . While items 2 and 3 were rejected as it scored below the cut off mean. This indicates that technology is not extensively utilised in biology instruction in public secondary schools in Egor Local Government Area.

Based on the results from table 1, technology is not extensively utilised in biology instruction in public secondary schools in Egor Local Government Area.

Research question 2. What impact does the incorporation of technology have on students' academic achievement in biology?

Table 2: Descriptive statistics on the impact of the incorporation of technology on student's academic performance in Biology.

Questionnaire Result

S/N	ITEM STATEMENT	SA	A	D	SD	TOTAL	MEAN	DECISION
4.	Using technology helps students understand biology concepts better .	15	10	-	-	25	3.60	Accepted
5.	Using technology reduces my work load for lesson preparation.	15	10	-	-	25	3.60	Accepted
6.	Incorporating technology improves students performance in biology exams.	16	9	-	-	25	3.64	Accepted
7.	Technology makes biology lessons more interactive and engaging for students.	25	-	-	-	25	4.00	Accepted

From the teacher questionnaire result above the mean responses are all greater than 2.5 which implies that incorporation of technology impacts student's performance in Biology.

Based on the results from table 2, incorporation of technology impacts student's performance in Biology.

Research question 3. How skilled and motivated are biology teachers in Egor LGA to incorporate technology into their teaching practice?

Table 3: Descriptive statistics on how skilled and motivated are biology teachers in Egor LGA to incorporate technology into their teaching practice.

Questionnaire Result

S/N	ITEM STATEMENT	SA	A	D	SD	TOTAL	MEAN	DECISION
8.	I am motivated to use technology in my biology teaching.	-	5	10	10	25	1.80	Rejected
9.	I feel confident in my ability to use technological tools for biology**.**	20	5	-	-	25	3.80	Accepted
10.	I have received adequate school-provided training on using technology in biology instruction.	7	8	5	5	25	2.68	Accepted
11.	I encourage my students to use technology for biology learning and projects .	6	15	4	-	25	3.08	Accepted

From the teacher questionnaire result above, item 8 was rejected as it scored below the cut off mean of 2.5 . While item 9, 10 and 11 scored above the cut off mean and was accepted.

Based on the results from Table 3, biology teachers in public senior secondary schools in Egor Local Government Area possess adequate skills but report a lack of motivation to incorporate technology into their teaching practice. This apparent contradiction suggests that their motivation is likely hindered by the significant obstacles identified in Table 4, such as lack of access, technical problems, and insufficient support, rather than an inability to use the technology itself.

Research question 4. What obstacles do teachers and students encounter in using technology for biology education?

Table 4: Descriptive statistics on obstacles teachers and students encounter in using technology for biology education.

Questionnaire Result

S/N	ITEM STATEMENT	SA	A	D	SD	TOTAL	MEAN	DECISION
12.	I face challenges accessing technological resources for teaching biology	13	5	2	5	25	3.04	Accepted
13.	Technical problems (e.g., internet issues,power outages) disrupt my lessons.	21	4	-	-	25	3.84	Accepted
14.	Students have limited access to technology needed for biology learning.	25	-	-	-	25	3.00	Accepted
15.	There is insufficient support from my school to integrate technology in teaching.	22	3	-	-	25	3.88	Accepted

From the teacher questionnaire result above the mean responses are all greater than 2.5.

Based on the results from table 4, the mean responses are all greater than 2.5 which indicates that the items listed in table 4 are significant obstacles teachers and students encounter in using technology for Biology education.

Research question 5. What measures can be taken to enhance the integration of technology in the teaching and learning of biology ?

Table 5 : Descriptive statistics on measures that can be taken to enhance the integration of technology in the teaching and learning of biology .

Questionnaire Result

S/N	ITEM STATEMENT	SA	A	D	SD	TOTAL	MEAN	DECISION
16.	More training on technology use would improve my effectiveness in teaching biology.	25	-	-	-	25	4.00	Accepted
17.	The school should invest more in technology tools and infrastructure.	25	-	-	-	25	4.00	Accepted
18.	I would like to see technology incorporated into more biology teaching activities.	25	-	-	-	25	4.00	Accepted
19.	Providing technical support would encourage more use of technology	25	-	-	-	25	4.00	Accepted

	in teaching.							
20.	Collaboration with colleagues on technology use in biology teaching would be beneficial.	25	-	-	-	25	4.00	Accepted

From the student questionnaire result above, the mean responses are all greater than 2.5.

Based on the results from table 5, the mean responses are all greater than 2.5 which indicates that all items in table 5 are measures that can be taken to enhance the integration of technology in the teaching and learning of biology .

ADDITIONAL Information from the Questionnaire: Technology tools used by students and teachers for teaching and learning biology.

Questionnaire Result

TECHNOLOGY USED	FREQUENCY	PERCENTAGE (%)
Projector	-	-
Microscope	-	-
Teaching apps (like kahoot! Or Quizlet)	-	-
Educational videos	-	-
Online teaching materials	12	48%
Interactive whiteboard	-	-
Smartphone	25	100%
Tablet	25	100%
Laptop	-	-
None of the above	-	-
Others	-	-

The results above indicates that smartphones and tablets are universally used, with 100% of respondents indicating their use for teaching biology. Online teaching materials are also moderately used, with 48% of teachers incorporating them into their instruction. Other listed

technologies such as projectors, microscopes, teaching apps, educational videos, interactive whiteboards, and laptops were either not selected or had minimal usage among teachers.

Student Questionnaire:

Research question 1. How extensively is technology being utilised in biology instruction in public secondary schools in Egor Local Government Area.

Table 6: Descriptive statistics on how extensively technology is being utilised in biology instruction Egor Local Government Area .

Questionnaire Result

S/N	ITEM STATEMENT	SA	A	D	SD	TOTAL	MEAN	DECISION
1.	Teachers in my school use technology frequently during biology lessons.	80	-	-	20	100	3.40	Accepted
2.	My Biology teacher uses different tech tools (video, apps) regularly.	5	5	20	70	100	1.45	Rejected
3.	My school has a functional computer lab available for biology classes.	-	-	65	35	100	1.65	Rejected

From the student questionnaire result above , item 1 was above the cut off mean of 2.5. While items 2 and 3 were rejected as it scored below the cut off mean. This indicates that technology is

not extensively utilised in biology instruction in public secondary schools in Egor Local Government Area.

Research question 2. What impact does the incorporation of technology have on students' academic achievement in biology?

Table 7: Descriptive statistics on the impact of the incorporation of technology on student's academic performance in Biology.

Questionnaire Result

S/N	ITEM STATEMENT	SA	A	D	SD	TOTAL	MEAN	DECISION
4.	The use of technology helps me understand biology concepts better .	59	21	-	20	100	3.19	Accepted
5.	Using technology has improved my performance in biology exams.	25	40	15	20	100	2.70	Accepted
6.	Technology has made biology learning more interactive and engaging	40	40	10	10	100	3.10	Accepted
7.	Technology helps me complete biology assignments more efficiently.	57	23	-	20	100	3.17	Accepted

8.	Group activities using technology help improve my understanding of biology topics.	30	35	15	20	100	2.75	Accepted

From the student questionnaire result above,the mean responses are all greater than 2.5 which indicates that incorporation of technology impacts student's performance in Biology.

Research question 3. How skilled and motivated are biology teachers in Egor LGA to incorporate technology into their teaching practice?

Table 8: Descriptive statistics on how skilled and motivated are biology teachers in Egor LGA to incorporate technology into their teaching practice.

Questionnaire Result

S/N	ITEM STATEMENT	SA	A	D	SD	TOTAL	MEAN	DECISION
9.	I feel motivated to learn biology when technology is incorporated in lessons .	71	29	-	-	100	3.71	Accepted
10.	I am comfortable using technological device for learning biology.	73	27	-	-	100	3.73	Accepted
11.	My teacher encourages us to use technology for biology assignments and projects.	60	18	5	17	100	3.31	Accepted
12.	Biology teachers demonstrate how to use tech tools effectively.	18	35	16	31	100	2.40	Rejected

From the student questionnaire result above , item 9,10 and 11 were above the cut off mean of 2.5. While item 12 was rejected as it scored below the cut off mean of 2.5.

Research question 4. What obstacles do teachers and students encounter in using technology for biology education?

Table 9: Descriptive statistics on obstacles teachers and students encounter in using technology for biology education.

Questionnaire Result

S/N	ITEM STATEMENT	SA	A	D	SD	TOTAL	MEAN	DECISION
13.	I face difficulties accessing technology needed for biology learning.	40	30	10	20	100	2.90	Accepted
14.	Technical problems (e.g ., internet issues, device malfunction) often disrupt biology lessons.	40	40	10	10	100	3.10	Accepted
15.	No support or guidance from biology teachers.	40	40	5	15	100	3.05	Accepted
16.	Lack of electricity sometimes prevents me from using technology for biology learning.	50	30	10	10	100	3.20	Accepted

From the student questionnaire result above, the mean responses are all greater than 2.5.

Research question 5. What measures can be taken to enhance the integration of technology in the teaching and learning of biology ?

Table 10 : Descriptive statistics on measures that can be taken to enhance the integration of technology in the teaching and learning of biology .

Questionnaire Result

S/N	ITEM STATEMENT	SA	A	D	SD	TOTAL	MEAN	DECISION
17.	I would like to have more access to technology for learning biology.	50	50	-	-	100	3.50	Accepted
18.	Providing more training on technology use would improve biology lessons.	60	40	-	-	100	3.60	Accepted
19.	Schools should invest more in technology resources for biology education.	70	30	-	-	100	3.70	Accepted
20.	Technology should be integrated into more biology assignments and activities.	20	60	5	15	100	2.85	Accepted

From the student questionnaire result above, the mean responses are all greater than 2.5.

ADDITIONAL Information from the Questionnaire: Technology tools used by students and teachers for teaching and learning biology.

Questionnaire Result

TECHNOLOGY USED	FREQUENCY	PERCENTAGE (%)
Projector	-	-
Digital microscope	-	-
Biology learning app (like kahoot!)	20	20%
Educational videos (YouTube lessons)	63	63%
Online textbook	22	22%
Interactive whiteboard	-	-
Smartphone for biology learning	72	72%
Laptop for biology learning	-	-
None of the above	28	28%
Others	-	-

The results show that a majority of students reported using smartphones (72%) for learning biology. This suggests that mobile devices are the most accessible and frequently used technology tool among students. Educational videos, such as those from YouTube, are also highly utilized (63%), indicating that visual and audio content is a popular learning aid. Online

textbooks are used by 22% of students, while only 20% reported using biology learning apps like Kahoot. Notably, a significant portion (28%) indicated that they do not use any of the listed technologies. No students reported using projectors, digital microscopes, interactive whiteboards, laptops, or any other unspecified tools. This data suggests that while students engage with digital content through mobile-friendly platforms, access to more advanced or formal technological tools like projectors or laptops may be limited. It highlights the need for schools to integrate a wider range of digital resources into biology instruction, while also capitalizing on the widespread use of smartphones.

Discussion of Findings

This research aimed to investigate the extent of technology integration in Biology instruction within public secondary schools in Egor Local Government Area. The findings present a clear conclusion: whilst technology is recognised as a valuable pedagogical tool, its implementation is severely constrained by systemic challenges.

The results of Table 1 investigation on the extent of technology utilization in biology instruction revealed that technology is not extensively utilised in Biology instruction. This finding is consistent with that of Adzrolo (2023), who noted a significant disparity between policy aims and the actual use of technological tools in many Nigerian secondary schools. The fact that teachers rely predominantly on personal devices such as smartphones and tablets (100%) highlights a critical institutional failure to provide essential resources like functional computer laboratories and projectors. This insufficiency in infrastructure represents a primary barrier to integration.

The results of Table 2 investigation on the impact of technology incorporation showed a strong consensus amongst both teachers and students on its positive impact on academic performance. Respondents reported that technology aids in the comprehension of complex concepts, increases engagement, and improves efficiency in completing assignments. This supports the meta-analysis by Yang and Wang (2021), which concluded that technology-enhanced learning

environments significantly improve achievement in science education by visualising abstract ideas and promoting interactive learning.

The results of Table 3 investigation on teachers' skills and motivation revealed a significant insight: teachers possess adequate skills but report a lack of motivation to utilise technology in their teaching practice. This suggests that the central issue is not a deficiency in ability but rather a lack of institutional support and resources. This finding aligns with Ertmer's (1999) framework, which distinguishes between first-order barriers (external, contextual) and second-order barriers (internal, attitudinal), proposing that persistent first-order barriers can negatively influence motivation.

The results of Table 4 investigation on obstacles to technology use clearly identified external barriers. Inadequate access to resources, persistent technical problems such as power outages and internet failures, and insufficient support from schools were all reported as major obstacles. This corroborates the work of Nwaodo (2018), who found that a lack of proper facilities decreases interest in technology-based learning and results in poorer academic achievement.

The results of Table 5 investigation on enhancement measures suggest that to improve the use of technology in biology teaching, schools should invest in technology tools, provide more training for teachers, and ensure reliable technical support is available. This was also in line with the conclusions of Osadebe and Okeowo (2022), who stated that for technology to be used

effectively in Nigerian schools, there must be investment from the government, proper training for teachers, and strong technical support within the school.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

In Egor Local Government Area of Edo State, this study investigated the integration of technology in biology instruction in public secondary schools. The research employed a descriptive survey design to examine the extent of technology utilization, its impact on academic achievement, teachers' skills and motivation, implementation challenges, and enhancement strategies. Findings revealed that while technology is recognized as valuable for biology education, its application remains limited due to inadequate infrastructure and support systems. The study identified unreliable power supply, poor internet connectivity, and lack of technical support as major barriers to effective implementation. Although teachers demonstrated adequate technical proficiency, institutional constraints negatively affected their motivation. The predominant use of personal mobile devices highlighted the insufficiency of institutional technological resources. These findings align with existing studies on technological barriers in Nigerian educational contexts.

Conclusion

The conclusion are based on the findings from this study. This research has shown that technology is not being used enough in biology classes in public schools in Egor Local Government Area. Both teachers and students agree that technology can help learning, but there are many problems. Schools do not have good electricity or internet connection. Teachers know

how to use technology but they are not motivated because they do not get enough support. Students mostly use their personal phones because the school does not provide good technology. Unless these problems are solved, technology will not be able to help biology students as much as it should.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

- Infrastructure Development: The Edo State Government should ensure all schools have reliable electricity and internet connectivity to support technology integration.
- Laboratory Establishment : School administrators should establish well-equipped computer laboratories with adequate computers and projectors for biology instruction.
- Teacher Training: Regular training programs should be organized to enhance biology teachers'skills in using educational technology.
- Technical Support: Each school should employ technical support staff to maintain equipment and assist teachers with technology issues.
- Mobile Technology Integration: Schools should develop strategies to incorporate mobile devices into biology learning since students and teachers already use them.
- Digital Resources Provision: The government should provide accessible digital learning materials and online resources for biology education.

- Maintenance Funding: Schools should allocate specific budgets for regular maintenance and repair of technological equipment.
- Implementation Monitoring: Education authorities should conduct periodic monitoring to ensure effective technology implementation in biology classes.
- Teacher Motivation: School management should motivate and reward teachers who successfully integrate technology in their teaching.
- Further Research: Further research should investigate how mobile technology can specifically enhance biology education in similar contexts.

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APPENDIX I

UNIVERSITY OF BENIN

DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY

STUDENT'S QUESTIONNAIRE

Dear Students,

This research questionnaire requires information from you. It is designed to find out the Role of Integration of Technology in Enhancing Student's Performance in Biology in Egor Local Government Area. Please answer the following questions honestly and as correctly as possible. Your responses will remain confidential and will only be used for research purposes.

Thanks for your anticipated cooperation.

Abigail Ibukunoluwa OLADUNJOYE.

Researcher.

SECTION A: PERSONAL DATA

1. Name of school :_____
2. Type of school : Single sex(only boys or only girls) ( ), co-educational (both boys and girls)( ).

3. Age: _____

4. Gender: Male ( ) Female( )

5. Level: SS1 ( ), SS2( ), SS3( ).

6. Do you have access to any technological devices (e.g., computer, smartphone) for learning biology? Yes( ) No( ).

SECTION B: ***Kindly use the following keys,where available, to indicate your chosen response to the following questionnaire item statement by ticking (✓) appropriate box:***

Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD).

RESEARCH QUESTION 1*: How extensively is technology being utilized in biology instruction in secondary schools?*

S/N	ITEM STATEMENT	SA	A	D	SD
1.	Teachers in my school use technology frequently during biology lessons.				
2.	My Biology teacher uses different tech tools (videos, apps) regularly.				
3.	My school has a functional computer lab available for Biology classes.				

RESEARCH QUESTION 2: *What impact does the incorporation of technology have on students' academic achievement in biology?*

S/N	ITEM STATEMENT	SA	A	D	SD
4.	The use of technology helps me understand biology concepts better.				
5.	Using technology has improved my performance in biology exams.				
6.	Technology has made biology learning more interactive and engaging.				
7.	Technology helps me complete biology assignments more efficiently.				
8.	Group activities using technology help improve my understanding of biology topics.				

RESEARCH QUESTION 3: ***How skilled and motivated are biology teachers in Egor LGA to incorporate technology into their teaching practice?***

S/N	ITEM STATEMENT	SA	A	D	SD
9.	I feel motivated to learn biology when technology is incorporated in lessons.				
10.	I am comfortable using technological devices for learning biology.				
11.	My teachers encourage us to use technology for biology assignments and projects.				
12.	Biology teachers demonstrate how to use tech tools effectively.				

RESEARCH QUESTION 4: ***What obstacles do teachers and students encounter in using technology for biology education?***

S/N	ITEM STATEMENT	SA	A	D	SD
13.	I face difficulties accessing technology needed for biology learning.				
14.	Technical problems (e.g., internet issues, device malfunction) often disrupt biology lessons.				
15.	No support or guidance from biology teachers.				
16.	Lack of electricity sometimes prevents me from using technology for biology learning.				

RESEARCH QUESTION 5: ***What measures can be taken to enhance the integration of technology in the teaching and learning of biology?***

S/N	ITEM STATEMENT	SA	A	D	SD
17.	I would like to have more access to technology for learning biology.				
18.	Providing more training on technology use would improve biology lessons.				
19.	Schools should invest more in technology resources for biology education.				
20.	Technology should be integrated into more biology assignments and activities.				

ADDITIONAL INFORMATION: ***Please tick (√) any technology that has been used to support your biology learning (in class or at home).***

☐ Projector (for showing videos/images).

☐ Digital microscope.

☐ Biology learning apps (like Kahoot!).

☐ Educational videos (YouTube lessons).

☐ Online textbooks.

☐ Interactive whiteboard.

☐ Smartphone for Biology learning.

☐ Laptop for Biology learning.

☐ None of the above.

Others (specify): _____

APPENDIX ll

UNIVERSITY OF BENIN

DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY

TEACHERS QUESTIONNAIRE

Dear Sir/Madam,

This research questionnaire requrires information from you. It is designed to find out the Role of Integration of Technology in Enhancing Student's Performance in Biology in Egor Local Government Area. Please answer the following questions honestly and as correctly as possible. Your responses will remain confidential and will only be used for research purposes.

Thanks for your anticipated cooperation.

Abigail Ibukunoluwa OLADUNJOYE.

Researcher.

SECTION A: PERSONAL DATA

1. Name of school :

_____

2. Gender : Male( ) Female ( )

3. Teaching experience: Less than 1 year ( ), 1 – 5 years( ), 6 – 10 years ( ), More than 10 years( ).

4. Level of education: NCE ( ), B.Sc(Ed) Master's Degree ( ), Others (please specify)

_____

5. Do you have reliable access to school-provided technological tools for teaching biology? Yes ( ), No ( )

SECTION B: ***Kindly use the following keys,where available,to indicate your chosen response to the following questionnaire item statement by ticking (✓) appropriate box:***

Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD)

RESEARCH QUESTION 1: ***How extensively is technology being utilized in biology instruction in public secondary schools in Egor local Government Area.***

S/N	ITEM STATEMENT	SA	A	D	SD
1.	I regularly use technology tools in my biology lessons.				
2.	I incorporate digital devices like computers and projectors during teaching biology.				
3.	Technology use is encouraged in my school's biology curriculum.				

RESEARCH QUESTION 2: ***What impact does the incorporation of technology have on students' academic achievement in biology?***

S/N	ITEM STATEMENT	SA	A	D	SD
4.	Using technology helps students understand biology concepts better.				
5.	Using technology reduces my work load for lesson preparation.				
6.	Incorporating technology improves students performance in biology exams.				
7.	Technology makes biology lessons more interactive and engaging for students.				

RESEARCH QUESTION 3: ***How skilled and motivated are biology teachers in Egor LGA to incorporate technology into their teaching practice?***

S/N	ITEM STATEMENT	SA	A	D	SD
8.	I am motivated to use technology in my biology teaching.				
9.	I feel confident in my ability to use technological tools for biology lessons.				
10.	I have received adequate school-provided training on using technology in biology instruction.				
11.	I encourage my students to use technology for biology learning and				

	projects.				

RESEARCH QUESTION 4: ***What obstacles do teachers and students encounter in using technology for biology education***?

S/N	ITEM STATEMENT	SA	A	D	SD
12.	I face challenges accessing technological resources for teaching biology.				
13.	Technical problems (e.g., internet issues, power outages) disrupt my lessons.				
14.	Students have limited access to technology needed for biology learning.				
15.	There is insufficient support from my school to integrate technology in teaching.				

RESEARCH QUESTION 5: ***What measures can be taken to enhance the integration of technology in the teaching and learning of biology***?

S/N	ITEM STATEMENT	SA	A	D	SD
16.	More training on technology use would improve my effectiveness in teaching biology.				
17.	The school should invest more in technological tools and infrastructure.				
18.	I would like to see technology incorporated into more biology teaching activities.				
19.	Providing technical support would encourage more use of technology in teaching.				
20.	Collaboration with colleagues on technology use in biology teaching would be beneficial.				

ADDITIONAL INFORMATION: ***Please tick (✓) the technology tools you have used to support biology teaching (in class or outside the classroom).***

☐ Projector.

☐ Digital Microscope

☐ Teaching apps (like Kahoot! Or Quizlet).

☐ Educational videos.

☐ Online teaching materials.

☐ Interactive whiteboard.

☐ Smartphone .

☐ Tablet.

☐ Laptop.

☐ None of the above.

Others (specify): _____