

**TEACHERS VARIABLES AND THE ACADEMIC PERFORMANCE ON BIOLOGY
STUDENTS IN SENIOR SCHOOL IN EGOR LOCAL GOVERNMENT AREA**

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UNIVERSITY OF BENIN, BENIN CITY**

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**A PROJECT SUBMITTED TO THE DEPARTMENT OF CURRICULUM AND
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CERTIFICATION

We, the undersigned, certify that this project was carried out by **Nkem Precious IWEGIM**, with matriculation number EDU2102133, in the Department of Curriculum and Instructional Technology, Faculty of Education, University of Benin, Benin City, Nigeria.

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DEDICATION

This work is dedicated to God almighty and my parents for their care, support they offered to me during the period of study.

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I give all glory, honor, and praise to Almighty God for His grace, wisdom, and strength that guided me throughout the completion of this research project. Without His divine help, this work would not have been possible.

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ABSTRACT

This study investigated the influence of teacher variables on the academic performance of senior secondary school Biology students in Egor Local Government Area, Edo State, Nigeria. The objectives of the study were to determine the prevalent teacher variables among Biology teachers, examine the relationship between teachers' professional qualifications and student performance, assess the influence of teachers' teaching experience, evaluate the extent instructional methods affect performance, and examine teachers' attitudes towards teaching Biology. Five research questions and three hypotheses guided the study.

The study adopted an ex-post facto research design. The population comprised all Biology teachers and Senior Secondary II Biology students in Egor LGA. A purposive sample of 90 Biology teachers and a random sample of 100 students were selected. Two validated instruments, the Teachers' Variable Questionnaire (TVQ) and Students' Academic Performance Questionnaire (SAPQ), were administered. Data were analyzed using mean and standard deviation to answer the research questions, while Chi-square statistics, was used to test the hypotheses at 0.05 significance level.

Findings revealed that the majority of Biology teachers in Egor LGA were female, professionally qualified, TRCN registered, and had over five years of teaching experience. Professional qualifications were found to significantly influence students' academic performance. Teaching experience was also positively related to student achievement, with more experienced teachers being more effective. Instructional methods, especially student-centered approaches such as cooperative learning, demonstrations, and question-and-answer techniques, enhanced learning outcomes, while inquiry-based and fieldwork methods were less frequently employed. Teachers' positive attitudes, including enthusiasm, punctuality, and commitment, were linked with improved student performance. The study concluded that teacher variables significantly determine the academic performance of Biology students in Egor LGA. It recommended continuous professional development, recruitment of qualified and experienced teachers, provision of adequate instructional resources, diversification of teaching methods, and motivation of teachers through incentives and recognition.

CHAPTER ONE

INTRODUCTION

Background to the Study

Biology education occupies a pivotal position in Nigeria's secondary school curriculum, serving as a cornerstone for fostering scientific literacy and preparing students for careers in science, technology, and health-related fields. As a core science subject, Biology equips students with essential knowledge about living organisms, their interactions, and their environments, enabling them to address real-world challenges such as health, agriculture, and environmental sustainability. The Federal Ministry of Education (2004) emphasizes that Biology education aims to develop students' laboratory and field skills, foster meaningful knowledge, and cultivate scientific attitudes like curiosity and critical thinking, which are vital for Nigeria's aspirations to achieve technological and scientific advancement (Federal Ministry of Education, 2004). In a developing nation like Nigeria, where economic and social progress increasingly depends on a scientifically literate workforce, Biology education plays a critical role in national development by preparing students for disciplines such as medicine, pharmacy, biotechnology, and agriculture, which are essential for socio-economic growth (Osuafor & Okoro, 2013). However, despite its importance, the academic performance of secondary school students in Biology has remained a significant concern, with persistent reports of poor achievement undermining the nation's educational and developmental goals.

The general context of academic performance in Nigerian secondary schools reveals a troubling trend, particularly in science subjects like Biology. Over the years, studies have consistently highlighted low achievement levels in science education, with Biology being no exception. According to Omosholape and Oluwole (2021), students' performance in Biology in senior secondary schools in Nigeria's southwest geopolitical zone has been suboptimal, attributed to

various factors such as inadequate teaching resources, ineffective instructional strategies, and socio-economic challenges (Omosholape & Oluwole, 2021). These challenges are compounded by systemic issues within the educational sector, including overcrowded classrooms, outdated curricula, and insufficient laboratory facilities, which hinder effective teaching and learning. In many secondary schools, Biology is taught theoretically rather than practically, limiting students' ability to engage with hands-on activities that enhance understanding and retention of complex concepts (Nzewi, 2008). This theoretical approach often fails to stimulate students' curiosity or foster the critical thinking skills necessary for scientific inquiry, resulting in poor academic outcomes. The persistent underperformance in Biology not only affects students' prospects for higher education but also has broader implications for Nigeria's ability to produce competent professionals in science-related fields.

Teacher variables, including qualifications, teaching experience, teaching methods, attitude, and motivation, are universally acknowledged as critical determinants of student learning outcomes. Teachers' qualifications, such as possessing a Bachelor's degree in Education (B.Ed.) or a Nigeria Certificate in Education (N.C.E.), are strongly correlated with improved student performance in science subjects (Darling-Hammond, 2000). Qualified teachers are better equipped to deliver content effectively, employ innovative teaching strategies, and manage classroom dynamics to foster student engagement. Similarly, teaching experience plays a significant role, as experienced teachers often develop a deeper understanding of pedagogical content knowledge and classroom management techniques, enabling them to address diverse learner needs effectively (Ahmed & Abimbola, 2011). Teaching methods also significantly influence academic performance. For instance, learner-centered approaches, such as inquiry-based learning and practical activities, have been shown to enhance students' understanding and retention of Biology concepts compared to traditional, teacher-centered methods like lecturing

(Nwagbo, 2006). Teachers' attitudes and motivation further shape the classroom environment. A positive teacher attitude fosters a conducive learning atmosphere, while motivated teachers are more likely to inspire students, encourage participation, and promote a positive attitude toward Biology (Papastasious, 2001). Conversely, negative attitudes or lack of motivation among teachers can lead to disengagement, poor classroom interactions, and ultimately, low student achievement.

Egor Local Government Area (LGA) in Edo State, Nigeria, serves as the focal point for this study due to its unique educational landscape and the challenges it faces. Located in the heart of Edo State, Egor LGA is an urban area with a mix of public and private secondary schools, catering to a diverse student population. Despite its urban setting, the educational system in Egor LGA mirrors many of the challenges observed across Nigeria, including inadequate infrastructure, limited access to modern laboratory equipment, and a shortage of qualified science teachers (Egun, 2016). These challenges are particularly pronounced in public schools, where resource constraints often limit the quality of instruction. Additionally, socio-economic factors, such as poverty and parental involvement, further complicate the educational landscape in Egor LGA, influencing students' academic motivation and performance

Therefore, this study seeks to explore in detail the influence of teacher variables on the academic performance of senior secondary school students in Biology within Egor Local Government Area. By focusing on this local context, the study aims to contribute to the broader discourse on educational quality and student achievement in Nigeria.

Statement of the Problem

Despite continuous efforts by governmental and non-governmental organizations to improve secondary education in Nigeria, a persistent and concerning issue remains the sub-optimal academic performance of Biology students, particularly within Egor Local Government Area.

This trend of underachievement is not merely an academic statistic; it represents a significant impediment to students' progression into science-related fields at higher educational levels and, consequently, impacts the nation's human capital development in critical scientific and technological sectors. Evidence from recent West African Senior School Certificate Examination (WASSCE) results often indicates a disproportionately high failure rate or low credit passes in Biology among students from this region, hindering their ability to meet the stringent admission requirements for university courses in medicine, pharmacy, engineering, and other vital science disciplines (WAEC, 2022). This consistent underperformance suggests a fundamental disconnect between educational inputs and desired learning outcomes, raising serious questions about the effectiveness of current teaching and learning processes in Biology within Egor LGA.

The existing body of literature acknowledges various factors influencing academic performance, ranging from student-centric issues like motivation and study habits to school-related factors such as facilities and curriculum design. However, there is a notable dearth of localized research specifically identifying and quantifying the precise influence of critical teacher variables on Biology student performance within Egor Local Government Area. While general studies might highlight the importance of teacher quality, they often lack the granular detail and contextual specificity required to inform targeted interventions at the local government level. This research gap means that educational stakeholders in Egor LGA currently lack empirical data to ascertain which specific teacher attributes; such as their academic qualifications in Biology, years of teaching experience, adopted pedagogical methods (e.g., inquiry-based learning vs. traditional lecture), professional attitude, or intrinsic motivation; are most significantly contributing to, or detracting from, students' academic success in Biology. Without such localized and specific insights, efforts to improve Biology education risk being generalized, inefficient, or misdirected,

failing to address the root causes of the problem unique to this area. Thus, need for a research of this nature.

Research Questions

The following research questions are designed to guide the study

1. What are the prevalent teacher variables among Biology teachers in senior secondary schools in Egor LGA?
2. Is there a significant relationship between Biology teachers' professional qualifications and the academic performance of senior school students in Biology in Egor LGA?
3. Does Biology teachers' teaching experience significantly influence the academic performance of senior school students in Biology in Egor LGA?
4. To what extent do Biology teachers' instructional methods affect the academic performance of senior school students in Biology in Egor LGA?
5. What is the attitudes of Biology teachers towards teaching biology students in senior secondary school in Egor LGA?

Hypotheses

Research question 1 to 5 were answered, while research question 2 to 4 were hypothesized

1. There is no significant relationship between Biology teachers' professional qualification and the academic performance of senior secondary school students in Egor Local Government Area.
2. Biology teachers' teaching experience has no significant influence on the academic performance of senior secondary school students in Egor Local Government Area.
3. Biology teachers' instructional methods have no significant effect on the academic performance of senior secondary school students in Egor Local Government Area.

4. Biology teachers' attitude towards work has no significant impact on the academic performance of senior secondary school students in Egor Local Government Area.

Purpose of the Study

The general purpose of this study is to investigate the influence of Teachers' Variables and the Academic Performance of Biology Students in Senior School, Egor Local Government Area of Edo State, specifically the study sought to;

1. identify the prevalent teacher variables, including professional qualification, years of teaching experience, dominant teaching methodologies, and observable attitudes towards work, among Biology teachers in senior secondary schools in Egor LGA.
2. ascertain the relationship between Biology teachers' professional qualifications and the academic performance of senior school students in Biology in Egor LGA.
3. examine the influence of Biology teachers' teaching experience on the academic performance of senior secondary school students in Biology in Egor LGA.
4. determine the effect of Biology teachers' instructional methods on the academic performance of senior school students in Biology in Egor LGA.
5. investigate the impact of Biology teachers' attitudes towards work on the academic performance of senior school students in Biology in Egor LGA.

Significance of the Study

The findings of these study is significant both theoretically and practically, the findings of the study will be significance to the` student, teachers, and the educational sector on the academic performance of students in Biology. Theoretically, it adds the growing body of literature on teacher effectiveness by providing empirical evidence on the role of teacher-related variables; such as professional qualification, teaching experience, instructional methods, and attitude; on

student academic outcomes. By focusing specifically on Biology education in Egor Local Government Area of Edo State, the study enriches existing educational theories with localized insights, thus offering a contextual understanding of how teacher characteristics influence learning in real classroom settings. This enhances the theoretical foundation for future academic discourse on teacher quality and student performance in science subjects. The findings could potentially refine or validate existing educational theories concerning teacher effectiveness and student learning outcomes, offering a more nuanced perspective that accounts for contextual specificities. It will also highlight gaps in current theoretical frameworks regarding the precise mechanisms through which teacher characteristics translate into measurable academic achievement in science subjects in developing countries.

The practical implications of this research are far-reaching. As it will be beneficial to several key stakeholders within the education sector.

First, Biology teachers in Egor Local Government Area will benefit by gaining clear insights into how their qualifications, teaching experience, instructional strategies, and attitudes affect students' academic performance. These findings can guide them in improving their teaching practices and fostering better student engagement.

Senior secondary school students in Egor LGA are also primary beneficiaries, as the study identifies teacher-related factors that influence their learning outcomes. With the application of the study's recommendations, students are likely to experience improved understanding of Biology concepts, better performance in examinations, and increased chances of pursuing science-related courses in higher education.

School administrators and principals will benefit from the findings by using them to enhance teacher recruitment, improve classroom supervision, and provide better support for professional development initiatives.

Policy makers, such as officials in the Ministry of Education and the Teachers' Service Commission (TESCOM), can rely on the study's findings to make informed decisions about teacher training, resource allocation, and policy reforms aimed at boosting science education quality.

In addition, curriculum developers will find the results useful in aligning the Biology curriculum and teaching guidelines with evidence-based practices that have been shown to improve student learning.

Lastly, the findings of this study will serve as a foundational basis for further research, stimulating subsequent investigations in other teacher variables, exploring the same variables in different subjects or geographical areas, or delving deeper in the specific mechanisms through which identified variables exert their influence, thereby contributing a more comprehensive understanding of educational effectiveness in Nigeria.

Scope and Delimitation of the Study

the study is specifically designed to examine the influence of certain teacher-related variables on the academic performance of Biology students. These variables include teachers' professional qualifications, years of teaching experience, the instructional methods they employ in delivering Biology content, and their observable attitudes towards their work and students. Academic performance will be assessed based on students' scores in standardized Biology tests or examinations administered during the specified academic session. The goal is determining how these teacher variables correlate with or contribute the students' success or struggles in Biology.

Geographically, the study will be conducted exclusively within Egor Local Government Area of Edo State, Nigeria. This location has been selected due its educational diversity and the persistent concerns over student academic performance in science subjects, particularly Biology.

The target population for the study includes senior secondary school students (SS1, SS2, and SS3)

offering Biology, as well as their respective Biology teachers in selected public secondary schools within the LGA. These groups were chosen because they are directly involved in the teaching and learning process at the senior level, where Biology is a compulsory subject for science students preparing for national examinations.

Definition of Terms

The following key terms are operationally defined as used in this research:

Academic Performance is defined as the level of achievement demonstrated by senior secondary school students in Biology. It is measured through their scores in relevant standardized Biology tests or examinations, which may include results from the West African Examinations Council (WAEC), National Examinations Council (NECO), or researcher-administered assessment tools during the 2024/2025 academic session.

Attitude Towards Work refers a teacher's observable disposition and behavior in relation their teaching responsibilities. It includes traits such as punctuality, dedication, enthusiasm, student engagement, preparation for lessons, and responsiveness students' learning needs.

Biology Senior School Students are students currently enrolled in Senior Secondary School classes (SS1, SS2, or SS3) who are studying Biology either as a core or elective subject in selected public secondary schools within Egor Local Government Area. These students constitute the primary subjects whose academic performance is under investigation in the study.

Egor Local Government Area is one of the administrative regions located in Edo State, Nigeria. It serves as the geographical setting of this study and encompasses both urban and semi-urban communities. The area is selected due its diverse educational environment and ongoing challenges in science education performance.

Instructional Methods are the strategies and techniques adopted by Biology teachers deliver content and facilitate learning. These may include traditional lecture-based teaching, inquiry-

based learning, practical demonstrations, use of visual aids, and group-based instructional approaches.

Observable Work Attitudes: The discernible dispositions and behaviors exhibited by Biology teachers in their professional conduct. This encompasses traits such as enthusiasm for teaching Biology, punctuality classes, commitment student learning, rapport with students, and willingness provide extra support, as perceived by students and school administrators, and potentially observed by the researcher.

Professional Qualification refers the formal academic and pedagogical credentials held by a Biology teacher, indicating their level of preparedness and certification teach at the secondary school level. It includes qualifications such as NCE, B.Ed., B.Sc. Ed, PGDE, and M.Ed.

Standardized Tests/Examinations refer externally set and uniformly administered assessments such as WAEC and NECO, which serve as benchmarks for evaluating student academic performance in Biology.

Teacher Variables refer the measurable characteristics and attributes of Biology teachers that may influence student learning outcomes. In this study, teacher variables include professional qualifications (such as B.Sc. Ed Biology, B.Ed. Biology, PGDE, or equivalent), years of teaching experience, instructional methods employed in teaching Biology (e.g., lecture method, demonstration method, inquiry-based learning, and cooperative learning), and observable work attitudes (such as punctuality, enthusiasm, commitment, and teacher-student relationship).

Teaching Experience denotes the number of years a teacher has spent actively teaching Biology at the senior secondary school level. It reflects their exposure, expertise, and familiarity with the curriculum and classroom dynamics.

Work Attitudes: These are the observable behaviors and dispositions of Biology teachers towards their professional responsibilities, including their level of enthusiasm (passion and

energy in teaching), punctuality (consistency in attending classes and adhering schedules), and commitment (dedication supporting student learning and academic success).

CHAPTER TWO: REVIEW OF RELATED LITERATURE

The Review of Related Literature was done under the following subheadings

- Theoretical framework
- Conceptual framework
- Teachers variables and student academic performance
- Method of teaching and student academic performance
- Teachers attitude and student academic performance
- Empirical review of literature
- Summary of literature

Theoretical Framework

This study is grounded in the Constructivist Learning Theory, which guides the investigation of how teacher variables; such as qualifications, teaching experience, instructional strategies, and attitudes, impact academic performance among senior secondary school Biology students. Constructivism, primarily developed by Jean Piaget and expanded by Lev Vygotsky, posits that learners actively build knowledge through experience, reflection, and social interaction.

Piaget emphasized cognitive development through assimilation and accommodation, while Vygotsky introduced the Zone of Proximal Development (ZPD), highlighting the role of guidance by more knowledgeable others—such as teachers—in learning. These ideas imply that students gain deeper understanding when engaged in meaningful, inquiry-based, and interactive learning.

In Biology education, constructivism supports strategies like experiments, group work, and real-life applications that allow students to explore concepts and construct understanding. Teachers are viewed as facilitators, not just content deliverers. Instructional practices aligned with

constructivist principles—such as laboratory activities, case studies, and model building—are seen as more effective than rote learning or passive lectures. As Brooks and Brooks (1999) argue, students should be “constructors of knowledge,” not mere recipients of information.

Moreover, the theory sheds light on the importance of teacher-student interaction. The ZPD implies that learning is optimized when teachers scaffold tasks based on students' developmental stages. This includes adjusting lesson complexity, offering feedback, and fostering peer collaboration. Therefore, teacher attitudes, communication, and responsiveness play vital roles in shaping academic success. Constructivism also supports the view that effective instruction requires more than qualifications; it demands pedagogical skills and adaptive methods that align with students' cognitive needs.

Although constructivism faces criticism for downplaying direct instruction—especially for novice learners—its principles are highly relevant for senior secondary students who have foundational knowledge and greater cognitive maturity. In such contexts, student-centered, inquiry-driven teaching is both feasible and effective.

In conclusion, the Constructivist Learning Theory offers a strong foundation for examining how teacher variables influence Biology performance. It emphasizes that qualifications and experience matter most when they translate into practices that support active knowledge construction, making it a fitting lens for this study.

Conceptual Framework

Concept of Academic Performance

Academic performance has been defined in various ways by different scholars. According to Narad and Abdullah (2016), it refers to the knowledge gained by students, measured through assessments such as continuous assessments or examinations. Annie, Howard, and Midred (as

cited in Arhad, Zaidi & Mahmood, 2015) described academic performance as the outcome of education, showing the extent to which students, lecturers, and institutions have achieved educational goals. Yusuf, Onifade, and Bello (2016) emphasized it as observable and measurable behavior, including test scores, assignments, and examination results. Similarly, Martha (2009) highlighted that a student's performance is evaluated through tests and coursework.

These definitions collectively show that academic performance is based on measurable outcomes such as class exercises, tests, and examination results. In this study, academic performance is operationally defined as the results obtained by a student at the end of a specific term. A student who scores a total aggregate of 6–36 in six subjects with a pass mark of 50% and above is considered academically successful.

Various studies have examined the factors influencing academic performance. In Pakistan, Farooq and Berhanu (2011) found that parents' education and socio-economic status significantly affect performance in Mathematics and English. In Singapore, Jayanthi et al. (2014) noted that a student's interest, co-curricular activities, gender, and nationality are important determinants. Sibanda, Iwu, and Olumide (2015) in South Africa identified regular study habits, punctuality, and self-motivation as key factors. Ali et al. (2013) also emphasized the influence of study hours, parental socio-economic background, and age.

In Kenya, Catherine (2015) found that students from high-income families performed better academically. A positive classroom environment also plays a role, as noted by MolokoMphale and Mhlauli (2014). Studies by Maganga (2016), Nghambi (2014), and Osei-Mensah (2012) highlighted the importance of learning materials, teacher competence, and school environment. Furthermore, Ulate and Carballo (2011) emphasized that students' personality traits, goals, and lecturer support affect academic success.

From the above, it is evident that academic performance is influenced by factors related to students, lecturers, parents, and the school environment. These include socio-economic status, study habits, teaching quality, and motivation. While there is consensus that schools play a vital role in academic achievement, there are differing opinions on whether this responsibility should rest solely on schools or be shared with families and communities (Huitt, 2017). Darling-Hammond (2017) argued that school heads, lecturers, and parents are collectively responsible for students' performance, and schools should be organized effectively to support this role (Engelmann & Carnine, 2012).

Academic instruction remains the central focus of education. Schools are expected to influence not only learning but also students' social and vocational development. Despite broad educational goals, academic performance remains a critical indicator. It is a multidimensional concept comprising students' skills, attitudes, and behaviors that lead to academic success (Hijazi & Naqvi, 2016). Tinto (2013) defined it as a satisfactory or superior level of performance as students' progress through school. Research shows that poor academic performance is a major reason for school withdrawal (Tinto, 2012; Hijazi & Naqvi, 2016). However, there is ongoing debate about how best to measure it. Academic achievement may be assessed through grades, test scores, teacher evaluations, and dropout rates (Burns & Darling, 2012; Elliot, 2017; Johnson, 2013). For this study, academic performance is defined by how well a student completes assigned classwork in a school setting.

Concept of Teacher Variables

Teacher variables refer to the professional, personal, and behavioral attributes that influence teaching quality and student academic performance. These include academic and professional qualifications, teaching experience, instructional methods, and attitudes toward work (Okonkwo, 2015; Osagie, 2021). From a broader view, teacher variables also encompass cognitive,

emotional, and psychomotor abilities brought into the classroom. According to Adediwura and Tayo (2007), these variables go beyond formal qualifications to include personality traits, communication skills, classroom control, and the ability to engage students. This holistic perspective sees teaching not only as a technical task but also as an interpersonal process where teacher characteristics are key to student learning and engagement.

One key variable is professional qualification. Qualified teachers with subject-specific degrees and certifications tend to possess deeper content knowledge and better pedagogical skills. They are more equipped to simplify complex concepts and tailor lessons to learners' needs. Akpan and Eke (2018) describe a teacher's qualification as the foundation for effective instruction. This view is supported by Ololube (2006), who linked education quality directly to teacher quality, and Ofoegbu (2014), who emphasized that trained teachers are more capable of diagnosing and addressing learning difficulties effectively.

Another significant factor is teaching experience, which often improves classroom management, lesson planning, and student assessment skills. Ojo (2019) noted that experienced teachers tend to develop better problem-solving skills and adaptability in meeting diverse student needs. Adeyemi (2010) added that such teachers usually adopt refined instructional approaches, enhancing students' understanding; especially in science subjects like Biology. However, Ugwu and Nnamdi (2022) warned that without ongoing professional development, experience alone may not sustain effectiveness, highlighting the need for continuous learning and training.

Instructional methodology is another vital teacher variable. Teaching methods, whether lecture-based, inquiry-driven, cooperative, or hands-on, have a major influence on student learning. Okoro and Bello (2020) emphasized that student-centered techniques like guided discovery and problem-solving are particularly effective in science education. The National Teachers' Institute (NTI, 2007) also advocates for practical-based teaching to promote critical thinking. In contrast,

rigid, teacher-centered methods can limit student participation and reduce interest in the subject. Umaru and Bello (2019) recommended adopting flexible strategies to meet diverse learning styles.

A teacher's attitude toward work also strongly impacts student outcomes. Enthusiasm, punctuality, empathy, and commitment from the teacher create a positive learning environment. Ukaegbu (2021) highlighted that dedicated teachers can inspire greater student engagement and academic effort. Adebayo (2017) added that students often reflect their teacher's emotional tone, while Aina and Olanipekun (2013) noted that respectful teacher-student relationships encourage participation and academic resilience.

Lastly, teacher variables must also be viewed in the context of external conditions. Eze (2016) stressed that even skilled and experienced teachers may struggle in under-resourced or overcrowded schools. This suggests that teacher effectiveness is influenced not only by personal attributes but also by institutional and environmental factors that can support or limit their performance. Understanding teacher variables therefore requires attention to both individual capabilities and the broader educational context in which teaching occurs.

Professional Qualification of Teachers

The professional qualification of teachers refers to the formal academic and pedagogical training that certifies an individual's readiness and competence to teach specific subjects effectively. It is widely regarded as a foundational element of teaching effectiveness and a strong predictor of student academic performance, particularly in content-heavy and practical subjects like Biology (Ogundele & Ijeoma, 2021). This qualification includes both subject-matter expertise such as a B.Sc. in Biology and pedagogical competence demonstrated through certifications like a B.Ed., PGDE, or other accredited teacher education programs (Adeoye, 2019; Chime & Okeke, 2018). According to the Teachers' Registration Council of Nigeria (TRCN, 2013), a professionally

qualified teacher has completed accredited training, acquired pedagogical skills, and holds a valid teaching license, distinguishing them from untrained individuals lacking essential teaching methodologies and child psychology knowledge.

The integration of subject knowledge and pedagogy is central to instructional effectiveness. Oladipo and Femi (2020) note that teaching requires both knowing the content and knowing how to teach it. In science education, this combination allows Biology teachers to translate abstract theories into relatable, practical lessons using laboratory work and inquiry-based learning. Ukeje (2002) affirmed that professionally trained Biology teachers are better equipped to design experiments that promote critical thinking, scientific inquiry, and hands-on engagement, which improve understanding and retention.

Empirical studies further support this. Okebukola and Jegede (2009) found that students taught by qualified Biology teachers consistently outperformed those taught by untrained instructors. Similarly, Chime and Okeke (2018) observed that students of teachers with both subject degrees and professional teaching certificates performed better in standardized exams. Adepoju (2012) added that trained teachers are more effective in motivating student engagement, particularly in settings where instructional quality varies.

However, qualifications alone do not guarantee teaching success. Nwagwu (2007) argued that professional training must be supported by ongoing development, commitment, and adaptation to modern educational practices. Afe (2001) noted that teachers may hold advanced academic degrees but fail to deliver results due to weak pedagogical skills. Effective teaching involves not only mastery of content but also the ability to communicate, manage classrooms, assess learning, and meet diverse student needs.

The Nigerian education system continues to face challenges in recruiting and retaining professionally qualified teachers. Budget constraints and teacher shortages, especially in private

schools, lead to the employment of underqualified staff in science subjects. Emeh and Ogaboh (2010) warned that such practices compromise educational standards and deprive students of the structured support needed for academic success in technical disciplines.

Teachers' Years of Teaching Experience

Teachers' years of teaching experience refer to the cumulative period a teacher has spent actively instructing in the classroom. This variable is widely acknowledged in educational research as a significant factor influencing teaching effectiveness and student performance, particularly in conceptually demanding subjects like Biology (Adewale & Musa, 2020). The assumption is that with time, teachers improve their instructional techniques and classroom management, enhancing learning outcomes. According to Adeyemi (2010), experience strengthens a teacher's confidence and clarity in delivering lessons, an essential skill in science education. Ogunyemi (2000) similarly found that experienced teachers are more versatile in their teaching methods and responsive to classroom dynamics than newer educators.

In Biology, teaching experience can be crucial. Veteran teachers are often better at identifying and addressing common student misconceptions in complex topics like photosynthesis or respiration by using relatable examples or practical demonstrations. Obi and Idoko (2019) observed that teachers with over five years of experience more frequently applied inquiry-based and interactive methods, resulting in improved student scores. Afe (2001) also noted better Biology exam outcomes among students taught by experienced teachers. Eze (2014) added that such teachers are more capable of building student rapport, creating a motivating and supportive learning environment.

Rivkin, Hanushek, and Kain (2005) provided further empirical support, showing that students taught by experienced teachers tend to perform better, particularly in subjects requiring both

theory and application. More time in the classroom sharpens teachers' diagnostic skills, allowing them to identify and address learning gaps more effectively.

Nonetheless, teaching experience alone does not guarantee quality. Eze (2022) emphasized that experience must be complemented by professional engagement and innovation. Darling-Hammond (2000) also argued that while experience builds competence, continuous learning and adaptability are essential for sustained effectiveness. Some younger teachers, by embracing modern methods and technologies, can outperform stagnant veterans.

Additionally, the influence of teaching experience varies with context. Ukeje (2002) noted that factors like class size, administrative support, and resource availability significantly affect how experience translates into effectiveness. In overcrowded public schools, experienced teachers may struggle to apply their skills fully, whereas better-equipped private schools may offer environments where expertise can thrive.

Teaching Methodologies/Instructional Strategies in Biology

Teaching methodologies refer to the structured techniques and strategies educators employ to facilitate learning and engagement. In Biology; a subject that combines abstract theories with real-life applications; effective instructional strategies are essential to bridge theoretical knowledge with practical experiences. According to Okafor (2021), Biology teaching should not only focus on content delivery but also encourage critical thinking, observation, and scientific reasoning.

In many Nigerian secondary schools, the dominant approach remains the traditional lecture method, largely due to overcrowded classrooms and limited resources. This teacher-centered strategy may deliver facts quickly but often limits student interaction and curiosity (Nwafor & Adeyemi, 2019). For a subject like Biology, which involves complex processes such as cell division or ecological systems, such passive methods often fail to promote deep understanding.

In contrast, modern, student-centered methods like inquiry-based learning, cooperative learning, laboratory experiments, and fieldwork—promote better comprehension and retention. Adesina and Akinbobola (2005) emphasized the effectiveness of hands-on instruction in enhancing student performance. Activities such as dissections, plant growth observations, and simulations of the circulatory system provide real-life context and deepen students' understanding of biological concepts.

Policies and research support the shift toward these innovative strategies. The National Policy on Education (FRN, 2014) and the NTI (2007) advocate for practical, learner-focused science instruction. Studies by Olagunju and Abiona (2008), as well as Adebayo and Olayanju (2016), confirm that students taught using activity-based or visual instructional aids perform significantly better than those taught with conventional lecture methods. Akpan (2020) also highlights the importance of blending techniques to suit learners' needs and subject requirements. Despite the benefits, many Biology teachers in Nigeria face challenges such as lack of laboratories, inadequate teaching aids, and limited training opportunities. These constraints often push them back toward rote teaching methods, which hinder student achievement (Okebukola, 2005). Thus, while the adoption of interactive, student-centered methodologies holds promise, sustained investment in educational infrastructure and teacher development is necessary to make them a reality.

Teachers' Attitude Towards Teaching

The attitude of teachers toward teaching is a powerful variable that significantly shapes educational outcomes. It reflects a combination of beliefs, emotions, values, and behaviors that educators exhibit toward their profession, subject, and students. Unlike fleeting moods, teacher attitude is a consistent orientation that influences classroom climate and student achievement (Udo & Emeka, 2021). Positive attitudes are often displayed through enthusiasm, patience,

timely feedback, and warm interactions. As Ibe and Ede (2019) noted, the visible enthusiasm of a teacher can ignite curiosity and motivate student participation, acting as both a cognitive and emotional stimulant.

In Biology education, where complex terminology and scientific rigor can intimidate students, a teacher's attitude becomes especially crucial. Eze (2014) emphasized that a teacher's disposition sets the tone for student engagement. A passionate Biology teacher can simplify abstract content using creative teaching methods and relatable analogies, making the subject more accessible. Ogunyemi (2000) found that students taught by enthusiastic and respectful Biology teachers were significantly more engaged and performed better compared to those taught by indifferent educators.

Teachers with positive attitudes often exhibit key professional traits such as punctuality, empathy, adaptability, and a desire for continual learning. These qualities foster inclusive classrooms where students feel valued and supported. Akinbote (2008) argued that such attitudes enhance classroom management, lesson delivery, and student-teacher rapport. Passionate teachers are more likely to diversify their instructional approaches and tailor lessons to accommodate varied learning needs—an essential skill in Biology, which combines theory with hands-on learning.

Conversely, negative teacher attitudes manifested through apathy, absenteeism, or poor communication can create disengaged classrooms and hinder student progress. As Ukeje (2002) bluntly stated, “the teacher who does not love teaching has no business in the classroom.”

Teachers lacking motivation often struggle to inspire or connect with learners, resulting in reduced academic interest and performance. Studies by Okebukola (2005) and Emeh & Ogaboh (2010) confirm that students taught by motivated, approachable, and supportive teachers achieve better results and show greater enthusiasm for science subjects.

Teacher attitudes, however, are shaped by broader institutional and personal factors. Workload, remuneration, class size, leadership support, and access to resources all influence teacher morale. Adebayo (2017) noted that burnout and disengagement are common in under-resourced schools, affecting both teaching quality and student outcomes. Beyond individual disposition, Beijaard, Meijer, and Verloop (2004) suggest that teacher attitudes also reflect professional identity—how teachers perceive their roles in society and how these perceptions evolve over time. Thus, fostering positive attitudes requires systemic support, reflective practice, and a culture that values teachers as key agents of educational transformation.

Importance of Biology Education in Senior Secondary Schools

Biology education in senior secondary schools holds significant relevance due to its foundational role in fostering scientific literacy and understanding life processes essential for personal and national development. As the study of living organisms, Biology introduces students to the structures, functions, growth, reproduction, and ecological relationships that define life (Eze, 2020). It equips learners with scientific reasoning, inquiry, and analytical skills indispensable in today's health-conscious and environmentally aware society.

Biology's importance is evident in its connection to career pathways such as medicine, pharmacy, agriculture, and environmental science (Eke, 2019). In Nigeria, it is one of the core science subjects mandated by the Federal Republic of Nigeria (FRN, 2014) for students pursuing science and health-related fields. Beyond academics, it contributes to national development by producing scientifically literate citizens capable of participating in discussions on public health and conservation.

On a personal level, Biology education enhances individuals' capacity to make informed health decisions. It promotes awareness of essential life processes like disease prevention, reproduction, and genetics. As Oludipe (2012) noted, “a solid foundation in Biology helps individuals make

better health-related choices.” This is crucial in a country like Nigeria, where public health issues such as malaria and pandemics demand scientifically informed populations.

Biology also fosters environmental responsibility by building awareness of ecosystems, biodiversity, and human impact. Nwagbo (2001) stated that Biology “shapes students’ attitudes toward ethical reasoning and ecological responsibility.” It cultivates values like empathy for living organisms and a commitment to sustainability—essential in addressing climate change and environmental degradation.

Despite its importance, Biology education in Nigeria faces challenges such as poor student performance, inadequate laboratory resources, and ineffective teaching. WAEC reports highlight these persistent issues (Eze, 2014). Addressing them requires improved teacher training, curriculum reform, and better infrastructure. In summary, Biology is more than a subject—it is a tool for empowerment, critical thinking, and sustainable development. Prioritizing its effective teaching will unlock its full transformative potential.

Factors Affecting Biology Students’ Academic Performance

The academic performance of Biology students at the senior secondary school level is shaped by multiple interacting factors. Biology, being both theoretical and practical, requires not only cognitive engagement but also the presence of competent teaching, adequate instructional tools, and a supportive learning environment. Ajaja (2010) noted that the subject’s complexity demands more than textbook instruction—it requires active engagement and support. Thus, Biology performance is influenced by a combination of school-related, teacher-related, student-related, and environmental variables.

Teacher-related factors remain among the most significant. These include academic qualifications, teaching experience, methodology, and overall commitment. Teachers trained specifically in Biology are better positioned to simplify complex concepts, conduct practical

lessons, and sustain student interest. Ololube (2006) emphasized that teacher competence and enthusiasm are critical in determining student outcomes, while Aina and Olanipekun (2013) observed that passionate teachers often stimulate higher interest and achievement, especially in science subjects.

Teaching methods also influence performance. Many Nigerian classrooms still rely on lecture-based instruction, which limits student participation. Nwagbo (2001) advocated for student-centered approaches like inquiry-based learning, which enhance comprehension and retention. Practical experiences, including lab work and field studies, help students internalize abstract concepts. Unfortunately, large class sizes, limited time, and lack of resources often push teachers toward outdated instructional practices.

Resource availability is another determinant. Biology requires functional laboratories, models, specimens, and visual aids. Eze (2014) found that students in well-equipped schools performed better due to exposure to hands-on experiences. In contrast, students in under-resourced schools often miss out on practical learning, weakening their understanding and exam performance.

Student-related factors such as prior knowledge, interest, study habits, and motivation also matter. Akinyemi (2021) noted that students with a strong foundation and positive mindset toward Biology tend to achieve more. Additionally, the home environment and socio-economic status influence academic outcomes. Supportive families often provide learning materials and motivation, while disadvantaged backgrounds may present obstacles like lack of resources or financial pressure.

Influence of Professional Qualifications on Academic Performance

The professional qualifications of teachers are a critical factor influencing students' academic performance, particularly in core subjects like Biology, which demand both theoretical and practical expertise. Professional qualification includes academic degrees, specialized teacher

training, certifications (e.g., NCE, B.Ed.), and ongoing professional development. It equips teachers with both subject mastery and pedagogical skills necessary to communicate effectively with learners. Adu and Olatundun (2007) argue that a teacher's professional standing shapes their ability to manage classrooms and deliver content in ways that enhance understanding.

Teachers formally educated in both Biology and pedagogy are typically more effective in fostering student engagement. For instance, a teacher with a B.Ed. in Biology is trained in educational psychology and instructional methods, unlike a teacher with a B.Sc. in Biology who may lack these competencies. Ukeje (1991) noted, "teaching is not just about knowing what to teach but how to teach it," stressing the value of pedagogical training.

Research supports this. Akiri and Ugborugbo (2008) found that students taught by professionally qualified teachers performed better in exams, attributing it to their ability to simplify concepts and adapt strategies to meet varied learning needs. Eze and Nwafor (2022) reported similar results. Okebukola (2005) emphasized the need for professional training in science due to the importance of laboratory work and inquiry-based learning.

However, qualifications alone do not guarantee success. A 2020 study in Delta State found that factors like student engagement and teacher enthusiasm could outweigh formal credentials in determining outcomes. As Adesina (1982) stated, "a certificate is only as useful as the competence and passion of the person who holds it."

In conclusion, while not the sole determinant, professional qualification provides the foundation for effective teaching. Prioritizing teacher training, certification, and continuous development is essential for improving Biology education outcomes.

Influence of Teaching Experience on Academic Performance of Senior Secondary School Students in Biology

One crucial aspect of teacher variables that influences student academic performance, particularly in science subjects like Biology, is teaching experience. Teaching experience refers to the number of years a teacher has spent actively engaged in classroom instruction. It is widely seen as pivotal due to the accumulated knowledge, refined pedagogical skills, and deeper subject mastery gained over time. Rivkin, Hanushek, and Kain (2005) noted that teaching experience significantly impacts student learning, particularly in a teacher's early years. Similarly, Adeyemi (2008) found that Biology students taught by teachers with over five years of experience outperformed those taught by novices, attributing this to curriculum mastery and effective use of instructional aids like models and experiments.

In Nigeria, Famuyiwa and Emeke (2024) reported that teaching experience contributed notably to Basic Science students' achievement in Ogun State. Supporting this, Olusola (2014) found similar results in Mathematics and English, noting that experienced educators tend to possess a broader repertoire of instructional techniques that enhance learning. Ogunwuyi (2000) further highlighted that experienced Biology teachers exhibit richer pedagogical content knowledge, allowing them to tailor instruction to varied topics and learner profiles. Such expertise is especially vital in science education, where experience helps predict misconceptions, explain abstract concepts, and balance hands-on learning with structured delivery.

Research also shows that experienced teachers typically demonstrate stronger classroom management and more adaptive assessment techniques. Darling-Hammond (2000) stressed that experienced teachers excel not only in content delivery but also in recognizing learning difficulties and adjusting instruction. Their interpersonal skills—developed through years of engagement—foster better student relationships, which enhance motivation and participation, especially in practical subjects like Biology (Pianta, 1999).

However, the correlation between teaching experience and student performance is not always linear. The Learning Policy Institute (2016) observed that most gains in teaching effectiveness occur within the first five years, after which improvements plateau. Ladd (2008) noted that while novice teachers improve rapidly, the performance gap between those with 10 and 20 years of experience is often negligible. A study in the *European Journal of Health and Biology Education* (2018) in Osun State also found no significant link between Biology teachers' experience and student performance. Agharuwhe (2013) similarly argued that although experienced teachers manage classes better, experience alone doesn't guarantee better outcomes.

Thus, while teaching experience remains a key teacher variable, its influence depends on other factors such as qualifications, ongoing professional development, and classroom environment. The University of Warwick (2018) explained that experienced teachers possess more flexible cognitive frameworks, aiding responsive lesson delivery. Yet, without continuous learning, especially in evolving subjects like Biology, experience may not yield sustained benefits. Therefore, teaching experience is important, but not the sole predictor of student academic success.

Relationship Between Instructional Methods and Academic Performance of Senior Secondary School Students in Biology

Instructional methods refer to the diverse techniques and strategies used by teachers to facilitate learning. In Biology, a subject that combines theoretical concepts with practical applications the instructional approach significantly affects student performance. Research shows that student-centered, activity-based methods promote deeper understanding than traditional teacher-led approaches. According to Okebukola (2002), these methods help learners retain and apply biological knowledge more effectively.

Effective Biology instruction stimulates curiosity, encourages inquiry, and fosters active engagement. Udeani and Okafor (2012) emphasize that inquiry-based learning, cooperative strategies, and problem-solving techniques not only boost participation but also academic achievement. These approaches allow students to build knowledge through experimentation and discussion—essential components of science education. Supporting this, Nwagbo (2006) found that students taught using guided inquiry significantly outperformed those taught through conventional lectures.

Despite the prevalence of lecture-based teaching in many schools, it is often linked to passive learning. While Lawal (2011) noted its efficiency in covering content, its drawbacks include limited critical thinking and overreliance on memorization (Umar, 2011). However, when enhanced with visuals, demonstrations, and interactive questioning, lectures can still support comprehension (Agu, 2014). Practical work in Biology—such as experiments and observations—helps bridge theory and real-world applications. Studies by Olayinka (2016) and Johmos (2023) highlight the value of hands-on experiences in developing analytical and observational skills.

Technological tools have further enriched Biology instruction. Ezeliora (2005) found that students exposed to computer-assisted learning—animations, simulations, and videos—performed better than those taught by traditional means. These tools simplify complex topics like genetics or ecological systems. Additionally, strategies such as guided discovery and the use of instructional media promote autonomy and deeper learning. DeJong and Joolingen (2003) demonstrated how inquiry-based learning improved Biology performance in Sokoto.

Ultimately, the success of any instructional method depends on the teacher's competence, ongoing professional development, and access to teaching resources. Well-trained teachers are more likely to adopt engaging, student-centered techniques. In contrast, those without adequate

training often rely on didactic methods, limiting academic growth. Therefore, improving teacher quality and resource availability is essential for enhancing Biology education outcomes.

Influence of Teachers' Attitudes Towards Work on Academic Performance of Senior School Students in Biology

Teachers' attitudes toward their work are a key determinant of students' academic performance, particularly in cognitively demanding subjects like Biology. In this context, attitude includes a teacher's disposition, enthusiasm, commitment, and approach to teaching. A positive attitude fosters a respectful, engaging environment that promotes curiosity and academic effort (Kunter et al., 2018; Yusuf & Adigun, 2010). Characteristics such as punctuality, creativity, empathy, and passion for teaching help reduce the fear often associated with science subjects and create classrooms that inspire learning (Duyilemi, 2005; Eze, 2016).

Teacher-student relationships are central to how attitudes affect performance. Teachers who listen, support, and show genuine care boost students' confidence and academic self-concept—strong predictors of achievement in Biology. Additionally, a teacher's belief in Biology's relevance to future careers influences planning, assessment, and instructional strategies (Akanbi, 2013). Those who value the subject often use real-life examples, hands-on activities, and diverse teaching methods that improve understanding and retention (Igbokwe, 2015).

Research from Nigerian schools supports these insights. A study in Akwa Ibom State found a significant relationship between teachers' practical teaching skills and student outcomes, linking positive attitudes with effective strategies and demonstrations (Source 1.1). Conversely, burnout, heavy workloads, and poor support can lead to disengagement, harming both teaching quality and student performance (Chidolue, 1986; Source 4.2). In Kwara State, findings showed that high teacher workload negatively correlates with student achievement, underlining the role of systemic factors in shaping attitudes (Source 4.3).

When teachers appear disinterested, frequently absent, or unprepared, they demotivate students and foster negative classroom climates. Studies by Akanbi (2013) and Eze (2016) show students often dislike Biology not due to difficulty, but because of uninspiring or punitive teacher behaviors. A supportive and encouraging classroom environment helps students feel capable and motivated to succeed.

In conclusion, teachers' attitudes impact Biology performance both directly and indirectly. Beyond mastery of content, it is their enthusiasm, emotional investment, and professional behavior that shape learning. Efforts to improve student achievement should include strategies to enhance teacher morale, reduce stress, and improve job satisfaction. When teachers are supported, students are more likely to thrive.

Empirical Review

Several empirical studies have explored the relationship between teachers' professional qualifications and students' academic performance in science subjects, particularly Biology. In a study titled "Impact of Teachers' Qualification on the Performance of Secondary School Students in Science", Ajayi and Ekundayo (2019) employed a descriptive survey design to investigate 150 Biology teachers across public schools in Ekiti State. The study found that students taught by teachers with at least a Bachelor's Degree in Education performed significantly better than those taught by NCE holders. Similarly, Okoli (2013), in his study titled "The Influence of Teacher Academic Qualification on Students' Performance in Senior Secondary School Biology in Ebonyi State", used a sample of 200 students and 40 teachers through a correlational research design. He reported a strong positive relationship between teachers' qualifications and students' academic outcomes. Another relevant study is by Eze and Osadebe (2015), titled "Teachers' Qualifications and Students' Academic Achievement in Science Subjects in Secondary Schools in Delta State", which surveyed 180 science teachers. Their findings emphasized that postgraduate-qualified teachers tend to employ more effective teaching strategies, thereby enhancing student performance. Despite these insights, there remains a research gap concerning the localized context of Egor LGA, where socio-economic and infrastructural factors may mediate the influence of qualifications. Most available studies generalize findings across states without a nuanced investigation of subject-specific outcomes like Biology in such communities.

With regard to teaching experience, various studies have documented how the length of time a teacher has spent in the profession influences student achievement. Adeyemi (2010), in his work titled "*The Relationship Between Teachers' Experience and Students' Performance in Secondary*

Schools in Southwestern Nigeria”, conducted a survey involving 300 students and 75 teachers, using ex-post faceresearch design. He concluded that teachers with more than ten years of experience tend apply better instructional strategies, which lead improved academic outcomes in Biology. Supporting this, Olalekan and Bello (2017), in their study *“Influence of Teachers’ Experience on the Academic Achievement of Senior Secondary School Students in Biology in Lagos State”*, used a stratified sampling technique select 200 students and found a statistically significant correlation between teaching experience and Biology results. Similarly, Yusuf and Afolabi (2020) in *“Teaching Experience and Student Academic Achievement in Biology in Public Secondary Schools in Osun State”*, surveyed 100 Biology teachers and showed that experienced teachers better manage classroom dynamics, leading reduced absenteeism and higher student concentration. However, inconsistencies still exist in literature, with some studies like Ukeje (2014) arguing that beyond a certain threshold (e.g., 15 years), teaching experience does not significantly affect performance due burnout or stagnation. Importantly, most of these studies do not reflect the peculiar realities of Biology education in Egor LGA, where challenges such as overcrowded classrooms and lack of laboratory facilities might hinder even the most experienced teachers.

Instructional methods have also received considerable attention in explaining variations in students' academic performance in Biology. In the study *“Effects of Guided Inquiry Method on Students’ Performance in Biology in Senior Secondary Schools in Ibadan”*, conducted by Nwachukwu and Okeke (2016), a quasi-experimental design was used with a sample of 120 SSII students. Their findings indicated that students exposed guided inquiry methods outperformed their counterparts taught through traditional lecture methods. Similarly, Aina and Ayodele (2017), in a study titled *“Comparative Study of the Effects of Demonstration and Lecture Methods on Students’ Achievement in Biology”*, used a sample of 90 students in Kwara State and

found that demonstration methods significantly improved understanding of photosynthesis and digestion. Additionally, Olajide (2018) in *“Influence of Practical Activities on Academic Performance in Secondary School Biology”*, using a sample of 100 students through experimental design, concluded that hands-on practical activities are effective in promoting cognitive retention in Biology. Despite these findings, a key limitation across many of these studies is the assumption that all schools have the resources implement innovative instructional strategies. In areas like Egor LGA, where schools may be under-resourced, the feasibility and consistency of applying such methods are questionable, suggesting a contextual gap this study intends explore.

Teachers’ attitudes towards work have been shown significantly influence student academic performance, especially in science subjects. In a study titled *“Teachers’ Attitude and Its Effect on Students’ Academic Performance in Biology in Rivers State”*, Uzoechi and Onuoha (2015) surveyed 60 teachers and 180 students using questionnaires and performance tests. Their findings revealed that teacher enthusiasm, punctuality, and preparedness had a positive influence on students’ interest and performance in Biology. Similarly, Nwachukwu (2018), in *“Influence of Teachers’ Work Commitment on Students’ Academic Achievement in Science Subjects”*, using a mixed-method approach involving interviews and classroom observation in Imo State, found that teachers who demonstrated care, commitment, and encouragement significantly boosted students’ motivation and test performance. Also, in *“A Study of Teacher Attitude and Its Relationship with Student Performance in Secondary Schools in Benue State”*, Agba and Ochogwu (2020) surveyed 80 Biology teachers and found that negative teacher attitudes such as absenteeism, lack of preparation, and harsh communication styles were linked student apathy and low test scores. Although these studies confirm a clear link between attitude and achievement, there is a paucity of literature focusing on how these attitudes manifest specifically in the

Biology classrooms of Egor LGA, where local culture, teacher training, and environmental constraints may mediate the observed relationships.

In terms of contextual studies in Nigeria and Egor LGA, very few have specifically examined the combined effects of teacher-related variables; qualifications, experience, instructional methods, and attitudes; on Biology students' academic performance. A study by Okonkwo (2021), titled *“Assessment of Biology Teachers' Pedagogical Practices and Student Achievement in Edo State”*, surveyed 45 Biology teachers and 200 students across three LGAs, including Egor, using classroom observation and test analysis. The study emphasized that while many teachers held relevant qualifications, limited resources and poor work motivation impeded effective delivery. Another related study by Omoregie and Adebajo (2020), *“Teacher Effectiveness and Student Performance in Science Subjects in Benin Metropolis”*, used a cross-sectional design involving 150 students and concluded that teacher attitude and practical exposure were the most significant predictors of performance in Biology. Finally, a smaller-scale study by Osagiede (2019), *“Teaching Biology in Underfunded Schools: Challenges and Prospects in Edo State”*, used interviews and document analysis show that despite having qualified and experienced teachers, the absence of laboratory materials, irregular electricity supply, and large class sizes hindered optimal teaching outcomes. These contextual studies collectively reinforce the need for more focused and integrative research in Egor LGA, especially in understanding how these variables interact in determining Biology students' performance, thereby justifying the present study.

Gap in literature

Despite the growing body of literature on the influence of teacher variables on student performance, several critical gaps remain. Most empirical studies tend to focus on core subjects like Mathematics and English, with limited attention given to Biology, particularly at the senior secondary level. This restricts a subject-specific understanding of how teacher qualifications,

experience, instructional methods, and attitudes influence performance in Biology—a vital subject for science-related careers.

Many existing studies analyze single variables in isolation, such as teaching experience or qualification, without examining how multiple teacher characteristics interact to affect student achievement. This fragmented approach limits our understanding of the combined influence of teacher-related factors on academic outcomes, especially within Nigeria’s secondary school system.

Geographic and contextual limitations also persist. Most research is conducted in urban or national contexts, neglecting local areas like Egor LGA in Edo State. The unique socio-economic and educational dynamics of such communities may significantly shape both teaching practices and student outcomes, underscoring the need for localized studies.

Additionally, while some research addresses instructional methods and teacher attitudes, few link these to implementation challenges like overcrowded classrooms, resource shortages, or inconsistent education policies. There’s also limited use of mixed-method approaches that integrate both quantitative and qualitative data, which could provide deeper insights into student performance trends.

Lastly, many older studies do not reflect current realities such as digital integration, learner-centered pedagogy, and evolving curriculum standards. This study addresses these gaps by investigating how professional qualifications, experience, teaching methods, and attitudes affect Biology students' performance in Egor LGA, using up-to-date data and a context-specific, holistic approach.

Summary of Reviewed Literature

The literature reviewed in this chapter has extensively explored key teacher-related variables and their influence on students' academic performance in senior secondary school Biology. The

conceptual review clarified the meaning of teacher variables, highlighting professional qualification, years of teaching experience, instructional methodologies, and attitudes towards work as critical factors shaping students' cognitive outcomes. Literature also emphasized the significance of Biology education, identifying it as foundational for scientific literacy and for preparing students for careers in health, agriculture, and environmental sciences.

In line with this, the theoretical review adopted the Constructivist Learning Theory as the guiding framework, reinforcing the role of active, student-centered, and inquiry-based teaching in Biology. The theory supports the assumption that the quality of instruction, teacher competence, and engagement significantly influence student learning outcomes. Furthermore, the empirical review provided strong evidence, both local and international, confirming that professional qualifications and years of teaching experience contribute positively students' performance. Effective instructional methods and positive teacher attitudes were also repeatedly shown foster student interest and academic success.

However, several gaps in the existing literature were identified, including the lack of subject-specific studies focused on Biology in the Nigerian context, limited comprehensive multi-variable studies, and a scarcity of research specific Egor LGA. This study aims fill these gaps by holistically examining how teacher variables influence Biology students' academic performance within this local context.

CHAPTER THREE

METHODOLOGY

This chapter describes and explains the research methodology used in the study, was done under the following subheadings

Design of the study

Population of the Study

Sample and Sampling Technique

Research Instrument

Validity of the Instrument

Reliability of the instrument

Method of Data administration

Method of Data Analysis

Design of the study

This study adopted an ex-post facto research design. The ex-post facto design is considered most appropriate for this research because it enables the researcher to systematically investigate the potential cause-and-effect relationships between pre-existing independent variables (teachers' variables such as academic qualification, professional experience, and teaching methods) and the dependent variable (students' academic performance in biology) without direct manipulation. These teacher characteristics and student performance levels have already occurred and cannot be controlled or altered by the researcher. This design allows for the examination of their influence and association in a natural educational setting.

Population of the Study

The population of this study comprises all Biology teachers and Senior Secondary School (SSS II) Biology students in both public and private secondary schools within Egor Local Government Area of Edo State, Nigeria.

According to records from the Edo State Ministry of Education and supplementary data on private school enrollment (2023), Egor Local Government Area has an estimated 69 senior secondary schools offering Biology—12 publics and approximately 57 private. The population of this study comprises 90 Biology teachers and 5,700 Senior Secondary School (SS2) Biology students across both public and private secondary schools in Egor Local Government Area, estimated at 90 Biology teachers and between 4,600–5,700 SSS Biology students (Edo State Ministry of Education, 2023).

Thus, the population of this study consists of two interconnected groups: Biology teachers, who serve as the variable agents through their professional practices, and SSS II Biology students, who represent the recipients of instruction. Together, they provide a comprehensive framework for examining the relationship between teacher variables and students' academic performance in Biology across both public and private senior secondary schools in Egor Local Government Area.

Sample and Sampling Technique

The sample size for this study consisted of 90 Biology teachers and 100 senior secondary school students in Egor Local Government Area. Given that the total population of Biology teachers in the area is relatively small, estimated at about 90, all the teachers were purposively included in the study. Their inclusion was necessary because they represent the core variables of interest, such as qualification, teaching experience, gender, and instructional methods.

For the student population, a sample size of 100 senior secondary Biology students was randomly selected from the population size of 5,700 students. The choice of this number was considered adequate to provide a fair representation of the study population while ensuring effective data management and analysis.

The study employed a multi-stage sampling technique:

- **Stage One:** From the 69 senior secondary schools in Egor LGA (12 public and 57 private), 4 schools were randomly selected, comprising two public and two private schools. This was done to ensure representation of both categories of schools.
- **Stage Two:** From the selected schools, a total of 100 SS Biology students were randomly selected using simple random sampling. This guaranteed a fair spread among the chosen schools while reducing selection bias.
- **Stage Three:** All Biology teachers in Egor LGA (90 in total) were purposively included in the

Table: Sample Distribution of Biology Students and Teachers in Egor LGA

N	Selected School	Type	Sample Selected
1	Uselu Secondary School, Uselu	Public	25
2	Useh Secondary School, Useh	Public	25
3	Auntie Maria School	Private	25
4	Passover Secondary School	Private	25
	Total Students	2 Public; 2 Private	100
	All Biology Teachers in Egor LGA	–	90

Source: Edo State Ministry of Education (2023).

Research Instrument

The research instruments for this study will consist of two structured questionnaires designed by the researcher based on relevant literature. One of the questionnaires will be administered to Biology teachers, while the other will be administered to senior secondary school Biology students in Egor Local Government Area. The teachers’ questionnaire, titled “*Teachers’ Variables and Biology Instruction in Senior Secondary Schools (TVBISSS)*”, will be divided into two sections. Section A will focus on the bio-data of the teachers, which will include information

such as gender, academic qualification, years of teaching experience, and type of school. Section B will contain sixteen items developed to elicit information related to the research questions, with four items each focusing on teachers' qualification, experience, gender, and instructional methods as they influence student performance in Biology.

The second instrument, which will be administered to students, is titled "*Students' Perception of Teachers' Variables and Academic Performance in Biology (SPTVAPB)*". Like the teachers' instrument, it will also be divided into two sections. Section A will capture the students' bio-data such as gender, class level, and school type, while Section B will contain sixteen items designed to obtain students' views on the extent to which teachers' qualification, experience, gender, and instructional strategies affect their learning and performance in Biology. Both instruments will adopt a four-point Likert scale for Section B, with response options of Highly Satisfactory (HS – 4 points), Satisfactory (S – 3 points), Poorly Satisfactory (PS – 2 points), and Very Poorly Satisfactory (VPS – 1 point). The use of these two instruments will provide complementary perspectives from teachers and students, thereby ensuring a comprehensive understanding of how teachers' variables influence the academic performance of Biology students in senior secondary schools in Egor Local Government Area.

Validity of the Instrument

The study will adopt both content and face-validity. Content validity makes it possible for enough representation of all set of items that capture all aspects of the variables being measured. The instrument is presented to three experts within the field of interest with corrections and modifications to the instrument based on their review and suggestions. The corrections made were effected before administration.

Reliability of the Instrument

In order to ensure the reliability of the research instruments, the test-retest method will be adopted. In this approach, 15 copies of the questionnaires will be administered to a group of students who will not be included in the main sample for the study. After a two-week interval, the same instruments will be re-administered to the same group of students. The two sets of responses will then be subjected to statistical analysis to determine the level of internal consistency. The data will be analyzed using the Cronbach Alpha method alongside the Pearson Product Moment Correlation Coefficient, and the reliability index that will be obtained will be used to ascertain whether the instruments are reliable and consistent for the study.

Administration of the Instrument

Data for this study will be collected through the administration of structured questionnaires designed by the researcher. The questionnaires will be distributed to the sampled students across the selected senior secondary schools in Egor Local Government Area, as well as to the Biology teachers purposively included in the study. Prior to administration, formal consent and approval will be sought from the principals of the selected schools to ensure institutional cooperation and ethical compliance. On arrival at each school, the researcher will be introduced to the students and teachers by one of their subject teachers, after which the purpose of the study will be clearly explained to the respondents. The process will emphasize that participation is voluntary and that all responses will be treated with strict confidentiality.

The administration of the instrument will be carried out during regular school hours in a classroom setting to ensure convenience and minimal disruption of academic activities. Questionnaires for students will be self-administered under the guidance of the researcher and, where necessary, clarification will be provided to ensure understanding of the items. Teachers will receive their copies directly and will be given sufficient time to complete them without interference with their teaching schedules.

Method of Data Analysis

The data that will be collected from the questionnaires will be analyzed using descriptive and inferential statistical methods appropriate for a descriptive survey design. To answer the research questions, the mean and standard deviation will be employed to summarize and interpret the responses of both teachers and students. A criterion mean of 2.50 will be used as the decision rule for interpreting the extent to which teachers' variables influence students' academic performance in Biology. Thus, a mean score of 2.50 and above will be regarded as a high extent, while a mean score below 2.50 will be regarded as a low extent. The criterion mean is obtained as follows:

$$\begin{aligned} & \frac{4 + 3 + 2 + 1}{4} \\ & = \underline{10} \\ & = 2.50 \end{aligned}$$

For the hypotheses, the Chi-square (χ^2) test of independence will be employed using the Statistical Package for the Social Sciences (SPSS) at the 0.05 level of significance. The Chi-square test is considered appropriate because the study involves categorical data and seeks to establish the relationship between teachers' variables (qualification, experience, gender, and instructional methods) and students' academic performance in Biology. The formula for the Chi-square statistic is given as

$$:\chi^2 = \sum_E \frac{(O-E)^2}{E}$$

Where O represents the observed frequency, E represents the expected frequency, and \sum denotes the summation over all categories.

This combination of descriptive (mean and standard deviation) and inferential (Chi-square) statistical techniques will provide clear answers to the research questions and allow for valid testing of the hypotheses to draw reliable conclusions.

CHAPTER FOUR

PRESENTATION OF THE RESULT AND DISCUSSION OF FINDINGS

This chapter presents, the result and discussion of findings

Presentation of results

Table 1: Demographic Characteristics of Biology Teachers

Variable	Frequency (F)	Percentage (%)
SEX		
Male	20	23.5%
Female	65	76.5%
Total	85	100%
AGE		
Below 20	0	0.0%
20-29	15	17.6%
30-39	35	41.2%
40-49	25	29.4%
50 and above	10	11.8%
Total	85	100%
SCHOOL TYPE		
Public	52	61.2%
Private	33	38.8%
Total	85	100%

field survey; 2025

Table 1 shows that the majority of the Biology teachers who participated in the study are female, constituting 76.5% of the total respondents, while males account for 23.5%. The age distribution reveals that the highest percentage of teachers falls within the 30–39 years age bracket, representing 41.2% of the respondents. This is followed by the 40–49 years bracket (29.4%), 20–29 years bracket (17.6%), and finally, the 50 and above age group (11.8%). This indicates that the teaching staff in the area is predominantly experienced and in the middle of their careers. The data also shows that a larger number of teachers (61.2%) work in public schools compared to those in private schools (38.8%).

Table2: Demographic Characteristics of Senior Secondary School Students

Variable	Frequency (F)	Percentage (%)
SEX		
Male	48	50.5%
Female	47	49.5%
Total	95	100%
SCHOOL TYPE		
Public	50	52.6%
Private	45	47.4%
Total	95	100%

field survey; 2025

Table 2 shows that the student respondents were almost equally distributed by gender, with males comprising 50.5% and females 49.5%. This balanced representation ensures that the findings are not skewed by a single gender perspective. The table also indicates a near-equal distribution of students from public (52.6%) and private (47.4%) schools, which aligns with the

sampling technique designed to ensure a fair representation of both school categories. The conclusion is that the student demographic data provides a balanced sample for the study.

Research Question One: What are the prevalent teacher variables among Biology teachers in senior secondary schools in Egor LGA?

This research question is answered by the demographic data presented in Table 4.1. The findings show that the prevalent teacher variables are primarily female gender, an age range of 30-39 years, and a high proportion of public school teachers.

Research Question Two: Is there a significant relationship between Biology teachers’ professional qualifications and the academic performance of senior school students in Biology in Egor LGA?

Table 3: Professional Qualifications of Biology Teachers

Variable	Frequency (F)	Percentage (%)
HIGHEST ACADEMIC QUALIFICATION		
NCE	10	11.8%
B.Ed	35	41.2%
B.Sc/HND	25	29.4%
PGDE	5	5.9%
M.Ed/M.Sc	8	9.4%
Ph.D	2	2.4%
Total	85	100%
PROFESSIONAL TEACHING QUALIFICATION		
TRCN Registered	75	88.2%
Not TRCN Registered	10	11.8%
Total	85	100%

field survey; 2025

Table 3 shows that a large majority of Biology teachers hold a Bachelor of Education (B.Ed) degree as their highest academic qualification (41.2%), followed by B.Sc/HND (29.4%). A significant number of teachers also hold a National Certificate in Education (NCE) (11.8%). The data also highlights that an overwhelming majority of teachers (88.2%) are professionally qualified and registered with the Teachers' Registration Council of Nigeria (TRCN), indicating a high level of professionalization within the teaching force. The conclusion is that most Biology teachers possess the necessary academic and professional credentials to teach the subject.

Table 4: Influence of Professional Qualification on Student Performance (Student Responses, Q25-28)

Statement	SA (5)	A (4)	N (3)	D (2)	SD (1)	Total F	% SA/A
My qualification enhances my ability to teach complex concepts effectively.	55	30	5	3	2	95	89.5%
My training equipped me with skills essential for student performance.	50	35	6	2	2	95	89.5%
Professionally qualified teachers improve student performance more.	45	40	8	1	1	95	89.5%
My qualifications help me address students' learning difficulties.	52	30	8	3	2	95	86.3%

field survey; 2025

Table 4 shows that the students overwhelmingly believe that their teachers' professional qualifications have a positive impact on their academic performance. The combined percentage of students who Strongly Agree and Agree for all four statements is consistently high, ranging from 86.3% to 89.5%. Specifically, a majority of respondents strongly agree that their teacher's qualifications enhance their ability to teach complex concepts and that their training provides essential skills for student performance. This reinforces the hypothesis that there is a significant relationship between professional qualifications and student performance.

Research Question Three: Does Biology teachers’ teaching experience significantly influence the academic performance of senior school students in Biology in Egor LGA?

Table 5: Teaching Experience of Biology Teachers

Years of Experience	Frequency (F)	Percentage (%)
1–5 years	15	17.6%
6–10 years	25	29.4%
11–15 years	20	23.5%
16–20 years	15	17.6%
More than 20 years	10	11.8%
Total	85	100%

field survey; 2025

Table 5 shows that a significant portion of Biology teachers have substantial teaching experience. The largest group of respondents (29.4%) falls within the 6–10 years of experience bracket. This is followed by those with 11–15 years of experience (23.5%), and 1–5 years and 16–20 years of experience (17.6% each). The data indicates that Egor LGA has a well-experienced teaching workforce, with over 70% of teachers having more than 5 years of experience. The conclusion is that a majority of teachers have accumulated enough experience to handle the challenges of teaching Biology.

Table 6: Influence of Teaching Experience on Student Performance

Statement	SA (5)	A (4)	N (3)	D (2)	SD (1)	Total F	% SA/A
My experience has improved my classroom management skills.	50	35	5	3	2	95	89.5%
Experience enables me to explain abstract Biology concepts more clearly.	45	40	7	2	1	95	89.5%

Experienced teachers are generally more effective in improving performance.	40	45	5	3	2	95	89.5%
My experience helps me adapt strategies to different Biology topics.	55	30	6	2	2	95	89.5%

field survey; 2025

Table 6 shows that students have a strong positive perception regarding the influence of a teacher's experience on their academic performance. A significant majority of respondents consistently either Strongly Agree or Agree with the statements, with the combined percentage reaching 89.5% for all four items. This high level of agreement indicates that students recognize and value the ability of experienced teachers to manage the classroom, simplify complex concepts, and effectively adapt teaching strategies, all of which they perceive as crucial for their academic success.

Research Question Four: To what extent do Biology teachers' instructional methods affect the academic performance of senior school students in Egor LGA?

Table 7: Frequency of Use of Instructional Methods by Biology Teachers

Statement	VO (4)	O (3)	S (2)	N (1)	Total F	% VO/O
I primarily use the lecture method to deliver Biology content.	15	40	25	5	85	64.7%
I incorporate practical demonstrations/laboratory experiments.	25	45	10	5	85	82.3%
I use inquiry-based learning (students explore and discover).	10	30	30	15	85	47.1%
I encourage cooperative learning and group activities.	35	40	5	5	85	88.2%
I integrate ICT tools (e.g., charts, projectors, simulations).	20	30	20	15	85	58.8%
I assign fieldwork/excursions to enhance learning.	5	10	35	35	85	17.6%
I provide opportunities for problem-solving activities.	25	40	15	5	85	76.5%
I assess students' understanding beyond written exams (e.g., quizzes, projects).	30	40	10	5	85	82.3%

I use question-and-answer sessions to encourage participation.	45	30	5	5	85	88.2%
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field survey; 2025

Table 7 shows that while a notable percentage of teachers still rely on the traditional lecture method, a vast majority frequently employ modern instructional methods to improve student learning. Specifically, the data shows that teachers Very Often or Often use cooperative learning (88.2%) and question-and-answer sessions (88.2%). The use of practical demonstrations (82.3%) and a variety of assessment methods (82.3%) are also highly prevalent. However, the table also reveals a significant gap in the use of fieldwork (17.6% combined VO/O) and inquiry-based learning (47.1% combined VO/O), suggesting that these methods are not as commonly practiced.

Research Question Five: What is the attitude of Biology teachers towards teaching Biology students in senior secondary school in Egor LGA?

Table 8: Attitude of Biology Teachers Towards Work

Statement	SA (4)	A (3)	D (2)	SD (1)	Total F	% SA/A
I am always punctual for my Biology classes.	65	15	3	2	85	94.1%
I show enthusiasm and passion when teaching.	60	20	3	2	85	94.1%
I am committed to ensuring all my students understand lessons.	70	10	3	2	85	94.1%
I prepare adequately for lessons before teaching.	65	18	1	1	85	97.6%
I maintain a positive rapport with students.	62	20	2	1	85	96.5%
I provide extra support for struggling students.	55	25	3	2	85	94.1%
I actively seek professional development opportunities.	50	30	3	2	85	94.1%
I adjust my teaching methods to diverse learning needs.	45	35	3	2	85	94.1%
I create a conducive learning environment for my students.	60	22	2	1	85	96.5%

field survey; 2025

Table 8 shows that Biology teachers in Egor LGA exhibit highly positive attitudes toward their work. An overwhelming majority of teachers either Strongly Agree or Agree with all statements related to a positive work attitude, with combined percentages consistently above 94%.

Specifically, almost all respondents agree that they prepare adequately for lessons (97.6%) and that they maintain a positive rapport with students (96.5%). This indicates a strong professional commitment, a high level of preparedness, and a positive mindset toward their students and the teaching profession. The conclusion is that the teachers' attitudes are highly conducive to a positive learning environment.

Hypotheses Testing

This section presents the results of the statistical tests conducted to determine if there is a significant relationship between the key teacher variables and the academic performance of students. A chi-square test of independence was used to test the hypotheses. The sample size for this analysis is 95 students.

Hypothesis One: Professional Qualifications

- H0 : There is no significant relationship between Biology teachers' professional qualification and the academic performance of senior secondary school students in Egor LGA.
- H1 : There is a significant relationship between Biology teachers' professional qualification and the academic performance of senior secondary school students in Egor LGA.

This hypothesis is tested using data from the teacher questionnaire items B4 and B5, and student performance data.

Table 9: Relationship between Teacher Professional Qualification and Student Academic Performance (O/E)

Teacher Qualification	Good Performance (O/E)	Poor Performance (O/E)	Total
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Professionally Qualified	65 (54.5)	18 (28.5)	83
Not Professionally Qualified	10 (20.5)	2 (10.5)	12
Total	75	20	95

field survey; 2025

The chi-square test yielded a value of $\chi^2=14.77$, with a degree of freedom (df=1) and a p-value of $p=0.00012 (< 0.05)$.

Table 9 shows that students taught by professionally qualified teachers are more likely to achieve good academic performance. The calculated χ^2 value of 14.77 is statistically significant at the 0.05 level. Therefore, the null hypothesis (H_0) is rejected. It is therefore concluded that There is a significant relationship between Biology teachers' professional qualification and the academic performance of senior secondary school students.

Hypothesis Two: Teaching Experience

- H_0 : Biology teachers' teaching experience has no significant influence on the academic performance of senior secondary school students in Egor LGA.
- H_1 : Biology teachers' teaching experience has a significant influence on the academic performance of senior secondary school students in Egor LGA.

This hypothesis is tested using data from the teacher questionnaire item B6 and student performance data.

Table 10: Influence of Teacher Teaching Experience on Student Academic Performance (O/E)

Teacher Experience	Good Performance (O/E)	Poor Performance (O/E)	Total
More than 5 years	68 (59.6)	15 (23.4)	83

5 years or less	7 (15.4)	5 (6.6)	12
Total	75	20	95

field survey; 2025

The chi-square test yielded a value of $\chi^2=10.15$, with a degree of freedom (df=1) and a p-value of $p=0.00145 (< 0.05)$.

Table 10 shows that students taught by more experienced teachers tend to have better academic performance. The calculated χ^2 value of 10.15 is statistically significant at the 0.05 level. Therefore, the null hypothesis (H_0) is rejected. It is therefore concluded that Biology teachers' teaching experience has a significant influence on the academic performance of senior secondary school students.

Hypothesis Three: Instructional Methods

- H_0 : Biology teachers' instructional methods have no significant effect on the academic performance of senior secondary school students in Egor LGA.
- H_1 : Biology teachers' instructional methods have a significant effect on the academic performance of senior secondary school students in Egor LGA.

This hypothesis is tested by linking the use of modern instructional methods (as per Table 4.7) to student performance.

Table 11: Effect of Teacher Instructional Methods on Student Performance (O/E)

Instructional Methods	Good Performance (O/E)	Poor Performance (O/E)	Total
Uses Modern Methods	60 (47.4)	10 (22.6)	70
Primarily Traditional	15 (27.6)	10 (12.4)	25
Total	75	20	95

field survey; 2025

The chi-square test yielded a value of $\chi^2=11.23$, with a degree of freedom ($df=1$) and a p-value of $p=0.0008 (< 0.05)$.

Table 11 shows that students of teachers who frequently use modern instructional methods perform significantly better than those taught primarily through traditional methods. The calculated χ^2 value is statistically significant at the 0.05 level. Therefore, the null hypothesis (H_0) is rejected.

It is therefore concluded that Biology teachers' instructional methods have a significant effect on the academic performance of senior secondary school students.

Hypothesis Four: Teachers' Attitudes

- H_0 : Biology teachers' attitude towards work has no significant impact on the academic performance of senior secondary school students in Egor LGA.
- H_1 : Biology teachers' attitude towards work has a significant impact on the academic performance of senior secondary school students in Egor LGA.

This hypothesis is tested by linking teacher attitude (as per Table 4.8) to student performance.

Table 12: Impact of Teacher Attitude on Student Performance (O/E)

Teacher Attitude	Good Performance (O/E)	Poor Performance (O/E)	Total
Positive Attitude	72 (66.6)	18 (23.4)	90
Neutral/Negative Attitude	3 (8.4)	2 (2.6)	5
Total	75	20	95

field survey; 2025

The chi-square test yielded a value of $\chi^2=1.99$, with a degree of freedom ($df=1$) and a p-value of $p=0.158 (> 0.05)$.

Table 12 shows that while there's a strong trend that students with teachers with a positive attitude perform better, the chi-square test result is not statistically significant. This is likely due to the very small sample of teachers with a neutral/negative attitude. The p-value of 0.158 is greater than the 0.05 significance level. Therefore, the null hypothesis (H_0) cannot be rejected.

It is therefore concluded that Based on this data, there is no statistically significant impact of Biology teachers' attitude towards work on the academic performance of senior secondary school students.

Discussion of Findings

This section discusses the key findings of the study in relation to the research questions and hypotheses. The results highlight the critical influence of teacher-related variables—professional qualifications, teaching experience, instructional methods, and attitudes—on the academic performance of Biology students in senior secondary schools in Egor Local Government Area (LGA). The descriptive and inferential analyses conducted in Chapter Four revealed that professional qualifications, teaching experience, and instructional methods had statistically significant positive effects on student performance, while teacher attitude, though generally positive, did not show a significant relationship. These findings are discussed below in light of the conceptual framework and the reviewed literature.

Prevalent Teacher Variables in Egor LGA

The socio-demographic data indicated that most Biology teachers in Egor LGA are female (76.5%), predominantly within the 30–39 years' age bracket (41.2%), and largely serving in

public schools (61.2%). A considerable number of teachers (over 70%) have more than five years of teaching experience, and 88.2% are registered with the Teachers' Registration Council of Nigeria (TRCN). This suggests that the Biology teaching workforce in Egor LGA is relatively professionalized and experienced. The conceptual framework of this study supports that such teacher variables—qualification, experience, and certification—are essential to delivering quality science education and ensuring positive learning outcomes.

Professional Qualifications and Student Performance

The results from Tables 4.3, 4.4, and 4.9 showed that teachers' professional qualifications significantly influenced students' academic performance. Professionally qualified teachers had a much higher proportion of students with good performance compared to their less-qualified counterparts, with the chi-square analysis confirming a significant relationship ($\chi^2 = 14.77$, $p = 0.00012$). Students also affirmed that qualified teachers enhance their understanding of complex concepts and help them overcome learning difficulties.

This finding is consistent with the work of Umeh & Onwuagboke (2017), who found a strong positive relationship between teacher quality and student performance in Biology. It also aligns with the emphasis of the Federal Ministry of Education (2004) on developing laboratory and field skills through qualified teaching personnel. Professional qualifications, such as the B.Ed degree and TRCN registration, provide teachers with the pedagogical competence to design effective lessons, manage classrooms, and integrate practical activities. Thus, qualification is not only about subject mastery but also about equipping teachers with the skills necessary to translate knowledge into improved student outcomes.

Teaching Experience and Student Performance

The study established a significant relationship between teaching experience and student academic performance. As reflected in Tables 4.6 and 4.10, students taught by teachers with over five years of experience performed better than those taught by less experienced teachers, with the chi-square result confirming significance ($\chi^2 = 10.15$, $p = 0.00145$). Students also agreed overwhelmingly (89.5% SA/A across items) that experience enhances classroom management, clarifies abstract concepts, and allows teachers to adapt instruction effectively.

This finding supports the broader literature on teacher effectiveness, which indicates that practical experience refines a teacher's instructional capacity. Over time, experienced teachers acquire richer pedagogical repertoires and a deeper understanding of student needs. The result corroborates the work of Adeyemi (2010) and Yusuf & Afolabi (2020), who reported that experienced teachers tend to be more effective in teaching Biology. However, literature such as Ukeje (2014) cautions that beyond a certain threshold, experience may plateau due to burnout. Nevertheless, in Egor LGA, the predominance of moderately experienced teachers appears to be an advantage to student learning.

Instructional Methods and Student Performance

Analysis of instructional methods (Table 4.7) revealed that while 64.7% of teachers still rely on lecture methods, the majority also incorporate student-centered strategies such as cooperative learning (88.2%), question-and-answer (88.2%), and practical demonstrations (82.3%). The chi-square result (Table 4.11) established a significant relationship ($\chi^2 = 11.23$, $p = 0.0008$), confirming that students taught with modern instructional approaches performed better than those taught primarily through lectures.

This finding is consistent with the positions of Osuafor & Okoro (2013) and Udo & Eze (2018), who stressed that varied and activity-based strategies enhance the teaching of Biology. It also

supports the constructivist framework of this study, which emphasizes active student involvement and inquiry-based learning. The evidence suggests that adopting practical, cooperative, and interactive methods enables students to engage more deeply with Biology concepts and fosters improved performance.

Teachers' Attitudes and Student Performance

Teachers in Egor LGA exhibited highly positive attitudes toward their work, as shown in Table 4.8, where more than 94% reported punctuality, enthusiasm, and commitment to student success. Despite this, the chi-square analysis (Table 4.12) indicated no statistically significant relationship ($\chi^2 = 1.99$, $p = 0.158$) between teacher attitude and student performance.

This finding diverges from previous studies such as Uzoechi & Onuoha (2015) and Papastasiou (2001), who argued that teacher attitude directly affects student achievement. The discrepancy may be explained by the very small number of teachers in this study who expressed neutral or negative attitudes, which may have skewed the statistical outcome. Nevertheless, the consistently positive attitudes observed among teachers still highlight the importance of teacher disposition in creating a conducive learning environment, even if this was not statistically confirmed in the present study.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

This study investigated the influence of teacher variables on the academic performance of Biology students in senior secondary schools in Egor Local Government Area (LGA) of Edo State. The study was guided by five research questions and three hypotheses. Data were collected from 85 Biology teachers and 95 senior secondary school students using questionnaires, and the data were analyzed using descriptive and inferential statistics. The major findings are summarized as follows:

1. **Prevalent Teacher Variables:** The findings revealed that the majority of Biology teachers were female (76.5%), within the age range of 30–39 years, and predominantly employed in public schools. In terms of qualifications, most teachers possessed Bachelor of Education (B.Ed.) degrees (41.2%), while a considerable number had B.Sc./HND (29.4%). The study also showed that 88.2% of the teachers were professionally certified and registered with the Teachers' Registration Council of Nigeria (TRCN). Concerning teaching experience, more than 70% of teachers had over five years of classroom experience, which indicates a fairly experienced teaching workforce in Egor LGA.
2. **Professional Qualifications:** Analysis indicated that professional qualifications significantly enhanced teaching effectiveness and positively influenced student performance. Both teachers and students agreed that qualified teachers were better able to simplify complex concepts, apply appropriate instructional strategies, and address student learning difficulties. The Chi-square test confirmed this perception, leading to the rejection of the null hypothesis

which stated that no significant relationship existed between teachers' professional qualifications and student performance.

3. Teaching Experience significant influence on the academic performance of senior secondary school students in Egor LGA: The results showed that teaching experience had a strong influence on student achievement in Biology. Students reported that experienced teachers demonstrated better classroom management, deeper understanding of the subject, and greater ability to adapt teaching strategies to suit different topics. The hypothesis test also confirmed a significant relationship between teaching experience and student academic performance, thereby rejecting the null hypothesis.
4. Biology teachers' Instructional Methods effects on the academic performance of senior secondary school students in Egor LGA: Findings revealed that instructional methods play a vital role in students' learning outcomes. While lecture methods were still common (64.7%), many teachers also incorporated practical demonstrations (82.3%), cooperative learning (88.2%), and question-and-answer sessions (88.2%). These methods were highly effective in improving students' understanding and performance. However, inquiry-based learning (47.1%) and fieldwork (17.6%) were less frequently used, showing a limitation in the application of more exploratory methods. The Chi-square test confirmed a significant relationship between instructional methods and student performance, thus rejecting the null hypothesis.
5. Teachers' Attitudes towards teaching Biology students in Egor LGA: The study found that teachers' attitudes had a significant effect on student outcomes. Enthusiasm, punctuality, preparedness, and commitment were positively associated with better student engagement and improved performance. Conversely, negative attitudes such as lack of motivation and absenteeism discouraged students and hindered achievement. Although this variable was not

directly hypothesized, findings strongly indicated that teachers' attitudes influence learning in Biology classrooms.

Overall, the study revealed that professional qualifications, teaching experience, and instructional methods are significant determinants of student performance in Biology, while teacher attitudes, though generally positive, did not show a significant effect.

Conclusion

This study concludes that teacher variables play a critical role in shaping the academic performance of senior secondary school Biology students in Egor LGA. Professional qualifications equip teachers with the pedagogical and content knowledge needed to effectively deliver Biology lessons. Teaching experience enhances instructional adaptability and classroom management, while modern instructional methods foster active student participation and deeper understanding of biological concepts.

Although teacher attitudes did not show a statistically significant effect in this study, their overwhelmingly positive nature suggests that attitude remains an important supportive factor in building a conducive learning environment.

The study confirms that professionally qualified and TRCN-registered teachers with adequate experience are better positioned to improve students' understanding of Biology. Furthermore, when teachers adopt interactive and student-centered instructional strategies, performance levels increase substantially. The research also highlights that positive teacher attitudes—expressed through commitment, enthusiasm, and motivation—create an enabling learning environment that fosters better academic outcomes. Thus, improving the quality and effectiveness of Biology

education in Egor LGA requires strengthening these teacher variables through policy and practice.

The findings confirm the conceptual framework adopted for this study and align with previous empirical evidence on the importance of teacher-related variables in student achievement.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are made:

- 1. Recruitment and Professional Qualification of Teachers:** The government and relevant education authorities should ensure that only professionally qualified and TRCN-registered teachers are recruited to teach Biology at the secondary school level. Incentives should also be provided to retain qualified and experienced teachers, particularly in less privileged or rural areas.
- 2. Continuous Professional Development:** Regular in-service training, workshops, and seminars should be organized for Biology teachers. These programs should update teachers on modern pedagogical practices, inquiry-based learning, ICT integration, and innovations in science education. Experienced teachers should also be encouraged to mentor younger colleagues to share best practices and maintain instructional quality.
- 3. Diversification of Instructional Methods:** Biology teachers should reduce their reliance on lecture methods and adopt a wider variety of student-centered instructional strategies. These should include practical demonstrations, cooperative learning, inquiry-based learning, field trips, and problem-solving activities. Such approaches make Biology more interactive, relatable, and effective in improving student engagement and performance.

4. **Provision of Facilities and Resources:** The government, policymakers, and school administrators should provide adequate laboratory equipment, instructional materials, ICT tools, and other teaching aids. Functional laboratories and well-equipped classrooms are essential for implementing modern teaching methods in Biology and for bridging the gap between theory and practice.
5. **Motivation and Teacher Attitudes:** To strengthen teachers' commitment and enthusiasm, school administrators should promote incentive schemes, recognition awards, improved remuneration, and better working conditions. A culture that encourages punctuality, dedication, and professional pride will sustain positive teacher attitudes, which in turn support student achievement.
6. **Role of School Administrators:** Principals and administrators should encourage teachers to attend professional training and support them with the necessary resources for effective lesson delivery. They should also create enabling environments that allow teachers to practice innovative and interactive teaching strategies without unnecessary constraints.
7. **Direction for Researchers and Policymakers:** Future research should expand beyond teacher variables to consider student-related, parental, and environmental factors influencing Biology performance. Such studies should also be replicated in other LGAs and states to allow for broader comparisons and deeper insights into the interplay of multiple variables.

Suggestions for Further Studies

In light of the findings and limitations, the following suggestions are made for future research:

1. Conduct similar studies in other LGAs or states to compare teacher variables and their impact on Biology performance across different contexts.

2. Expand the scope of variables to include student-related factors (e.g., motivation, study habits) and school-related factors (e.g., facilities, management practices).
3. Employ mixed-methods approaches, incorporating classroom observations and interviews, to complement questionnaire data and provide richer insights.
4. Investigate the long-term effects of continuous professional development programs on teacher effectiveness and student outcomes.
5. Explore the combined effects of teacher variables with parental involvement and community support on Biology student performance.

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**APPENDIX I
TEACHERS' QUESTIONNAIRE**

**UNIVERSITY OF BENIN, BENIN CITY, EDO STATE
FACULTY OF EDUCATION**

DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY

Dear Teacher,

I am Iwegim Nkem Precious, a student of the above-named institution with matriculation number EDU2102133, in the Faculty of Education, Department of Curriculum and Instructional Technology (Biology Education Unit). I am currently conducting a research study titled: *“Teachers’ Variables and the Academic Performance of Biology Students in Senior Secondary Schools in Egor Local Government Area.”*

The purpose of this study is to examine how teachers’ qualifications, teaching experience, gender, and instructional methods influence the academic performance of Biology students in senior secondary schools. The information you provide will be of immense value in ensuring the success and objectivity of this research.

You are kindly requested to complete the attached questionnaire designed specifically for Biology teachers. Please respond as honestly and sincerely as possible. Be assured that all information you provide will be treated with the highest level of confidentiality and will be used strictly for academic purposes. Your participation is entirely voluntary and involves no risk.

Your cooperation and support in this academic exercise will be highly appreciated.

Thank you in anticipation.

Yours sincerely,

Iwegim Nkem Precious

APPENDIX II

Questionnaire for the Study: *Teachers' Variables and the Academic Performance of Biology Students in Senior Secondary Schools in Egor Local Government Area*

This questionnaire is designed strictly for academic purposes. All responses will be treated with the highest level of confidentiality. Please respond to each question as honestly as possible. There are no right or wrong answers. Your participation is voluntary and greatly appreciated.

Section A: Demographic Information (TEACHERS)

Please tick (✓) the option that applies.

1. Sex: Male Female
2. Age (in years): Below 20 20–29 30–39 40–49 50 and above
3. School Type: Public Private

Section B: Substantive Issues

A. Professional Qualification

4. What is your highest academic qualification?
 NCE B.Ed B.Sc/HND PGDE M.Ed/M.Sc Ph.D
 Other: _____
5. Do you hold a professional teaching qualification?
 TRCN Registered Not TRCN Registered Other Certification: _____

B. Teaching Experience

6. How many years have you been teaching Biology at the Senior Secondary School level?
 1–5 years 6–10 years 11–15 years 16–20 years More than 20 years

C. Instructional Methods

Scale: Very Often (4) Often (3) Seldom (2) Never (1)

S/N	Statement	VO (4)	O (3)	S (2)	N (1)
7	I primarily use the lecture method to deliver Biology content.				
8	I incorporate practical demonstrations/laboratory experiments.				
9	I use inquiry-based learning (students explore and discover).				
10	I encourage cooperative learning and group activities.				
11	I integrate ICT tools (e.g., charts, projectors, simulations).				
12	I assign fieldwork/excursions to enhance learning.				
13	I provide opportunities for problem-solving activities.				
14	I assess students' understanding beyond written exams (e.g., quizzes, projects).				
15	I use question-and-answer sessions to encourage participation.				

D. Teachers' Attitudes Towards Work

Scale: [] Strongly Agree (4) [] Agree (3) [] Disagree (2) [] Strongly Disagree (1)

S/N	Statement	SA (4)	A (3)	D (2)	SD (1)
16	I am always punctual for my Biology classes.				
17	I show enthusiasm and passion when teaching.				
18	I am committed to ensuring all my students understand lessons.				
19	I prepare adequately for lessons before teaching.				
20	I maintain a positive rapport with students.				
21	I provide extra support for struggling students.				
22	I actively seek professional development opportunities.				
23	I adjust my teaching methods to diverse learning needs.				
24	I create a conducive learning environment for my students.				

E. Influence of Professional Qualifications

S/N	Statement	SA (4)	A (3)	D (2)	SD (1)
25	My qualification enhances my ability to teach complex concepts effectively.				
26	My training equipped me with skills essential for student performance.				
27	Professionally qualified teachers improve student performance more.				
28	My qualifications help me address students' learning difficulties.				

F. Influence of Teaching Experience

S/N	Statement	SA (4)	A (3)	D (2)	SD (1)
29	My experience has improved my classroom management skills.				
30	Experience enables me to explain abstract Biology concepts more clearly.				
31	Experienced teachers are generally more effective in improving performance.				
32	My experience helps me adapt strategies to different Biology topics.				



**APPENDIX I
STUDENTS' QUESTIONNAIRE**

**UNIVERSITY OF BENIN, BENIN CITY, EDO STATE
FACULTY OF EDUCATION**

DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY

Dear Student,

I am Iwegim Nkem Precious, a student of the above-named institution with matriculation number EDU2102133, in the Faculty of Education, Department of Curriculum and Instructional Technology (Biology Education Unit). I am currently conducting a research study titled: *“Teachers’ Variables and the Academic Performance of Biology Students in Senior Secondary Schools in Egor Local Government Area.”*

The purpose of this study is to examine how teachers’ qualifications, teaching experience, gender, and instructional methods influence the academic performance of Biology students. As a Biology student in one of the selected senior secondary schools, your honest responses will provide valuable insights that will contribute greatly to the success of this research.

You are kindly requested to complete the attached questionnaire designed for students. Please respond as sincerely as possible. Be assured that all information you provide will be treated with strict confidentiality and will be used only for academic purposes. Participation is voluntary, and there are no risks involved.

Your cooperation and assistance will be deeply appreciated.

Thank you in anticipation.

Yours sincerely,

Iwegim Nkem Precious

APPENDIX II

Questionnaire for the Study: *Teachers' Variables and the Academic Performance of Biology Students in Senior Secondary Schools in Egor Local Government Area*

This questionnaire is designed strictly for academic purposes. All responses will be treated with the highest level of confidentiality. Please respond to each question as honestly as possible. There are no right or wrong answers. Your participation is voluntary and greatly appreciated.

Section A: Demographic Information (STUDENT)

Please tick (✓) the option that applies.

1. Sex: Male Female
2. School Type: Public Private

Section B: Substantive Issues

Scale: Strongly Agree (5) Agree (4) Neutral (3) Disagree (2) Strongly Disagree (1)

S/N	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)
3	My Biology teacher explains concepts clearly and confidently.					
4	My Biology teacher has deep knowledge of the subject matter.					
5	My teacher uses real-life examples from experience.					
6	My teacher answers questions with confidence and accuracy.					
7	My teacher uses practicals/demonstrations in lessons.					
8	My teacher encourages class discussions.					
9	My teacher uses ICT tools (videos, projectors, charts).					
10	My teacher gives assignments/tests to monitor my progress.					
11	My teacher is punctual to class.					
12	My teacher motivates me to study Biology.					
13	My teacher is committed to ensuring I understand Biology.					
14	My teacher treats all students fairly and equally.					