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CHALLENGES BESETTING THE EFFECTIVE TEACHING AND LEARNING OF BIOLOGY AT SENIOR HIGH SCHOOLS IN THE LEDZOKUKU MUNICIPALITY

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DECLARATION

CANDIDATE'S DECLARATION

I, Mabel Baah, declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE: …….

DATE: …….

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis as laid down by the University of Education, Winneba.

NAME OF SUPERVISOR: DR. CHARLES KOOMSON

SIGNATURE: …….

DATE: …….

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DEDICATION

I dedicate this work to my mother Madam Emma Afriyie, my sister Stella Baah.

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ABBREVIATIONS

ESL	ENGLISH AS A SECOND LANGUAGE
G.E.S	GHANA EDUCATION SERVICE
HOD	HEAD OF DEPARTMENT
J.H.S	JUNIOR SENIOR HIGH SCHOOL
MOE	MINISTRY OF EDUCATION
NaCCA	NATIONAL COUNCIL FOR CURRICULUM AND ASSESSMENT
P.A	PARENTS‟ ASSOCIATION
S.H.S	SENIOR HIGH SCHOOL
S.S.C.E	SENIOR SECONDARY CERTIFICATE EXAMINATION
WAEC	WEST AFRICA EXAMINATION COUNCIL
WASSCE	WEST AFRICA SENIOR SECONDARY CERTIFICATE EXAMINATION

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ABSTRACT

The study was designed to investigate the causes of poor performance in Biology at two Senior High Schools in the Ledzokuku Municipal Assembly. The main objective of the study was to investigate the challenges affecting the teaching and learning of Biology and suggest ways for mitigating them. Seven teachers from O'Reilly Senior High School and Teshie Presbyterian Senior High School were purposively sampled for the study. The study used a case study design. Data was collected through semi-structured interviews, document analysis and observation. These instruments were analysed qualitatively using thematic analysis and validated by the researcher's supervisor. From the findings of the study, it was revealed that performance of students in Biology was affected by institutional, technical, parent, learner and teacher related factors. The study concluded that the provision of adequate teaching and learning resources, team work, devising appropriate teaching methods, in-service training for teachers are some measures that can be used to improve performance of Biology students. The study suggests that school management addresses the challenges militating against the effective teaching and learning of Biology thus improving students' performance in the Ledzokuku Municipality.

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CHAPTER ONE

INTRODUCTION

1.0 Overview

Chapter one deals with the background to the study, statement of the problem, purpose of the study, research objectives, research questions, significance of the study, delimitations and limitations and ends with organisation of the study.

1.1 Background to the Study

The world has been interested in the quality of education, which has made it possible for the resolution that requires countries to increase budgets to 6% by the year (UNDP, 2006). Kola (2013) explained that science education is instrumental in the development of any nation that is why every nation must take it very seriously in all institutions of learning. Development in science over the years has influenced and dominated every aspect of human endeavour such that any individual lacking in scientific literacy finds it very hard to survive in contemporary society. With global scientific and technological growth occurring rapidly, declination of students‟ interest in science courses is a worldwide concern that has prompted science education reform efforts on an international scale (Owen, Toepperwein, Lichtenstein, Blalock, Liu, Pruski & Grimes, 2008).

Science has many branches including biology that deals with the study of living things. Biology is a natural science that deals with the living world, how the world is structured, how it functions and what these functions are, how it develops, how living things came into existence, and how they react to one another in their environment (Umar, 2011). It is a prerequisite subject for many fields of learning that contributes immensely to the technological growth of the nation (Ahmed, 2008). This includes

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medicine, pharmacy, nursing, agriculture, forestry, biotechnology, nanotechnology, among others (Ahmed & Abimbola, 2011). Many societal issues are biology-based. These are biodiversity, genetically modified organisms, reproductive technologies, tourism industry (biological gardens), food production and processing. The main objectives of biology education are to prepare students to acquire: adequate laboratory and field skills in biology, meaningful and relevant knowledge in biology, the ability to apply scientific knowledge to everyday life in a matter of personal and community health, agriculture and to acquire reasonable and functional scientific attitudes (Teaching Syllabus-Biology, 2010). The knowledge acquired in the study of biology helps to check environmental issues such as desertification, erosion and pollution that are wide-reaching problems capable of influencing the health of humans.

However, there has been a lot of discussion about secondary school learners‟ poor science achievement in general and Biology in particular. Several scientists and educators have given various explanations for why students perform poorly in school. The students‟ performance (academic achievement) plays an important role in producing the best quality graduates who will become great leaders and manpower for the country thus responsible for the country‟s economic and social development (Ali, Jusoff, Mokhtar & Salamat 2009).

There is therefore the need to rethink the teaching and learning process of science and how to make it more effective. Effective teaching evolves from experiences and beliefs about teaching because beliefs are part of the foundation upon which behaviours are based (Lumpkin, 2020). The difficulties in defining effective science teaching are embedded in the numerous characteristics and roles of the classroom teacher. The effectiveness of learning and teaching depends on many factors such as

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the environment, classroom conditions and most importantly, the individual styles of learning as well as teachers. Cimer (2007) lists the following as the main principles of effective teaching in science especially biology; dealing with students‟ existing ideas and conceptions, encouraging students to apply new concepts or skills, encouraging students‟ participation in lessons and encouraging students‟ inquiry.

McTighe and Wiggins (2005) suggested that when teaching for conceptual understanding in biology, teachers need to first understand students‟ prior knowledge, identify issues that may cause confusion and then create opportunities for the students to integrate the old and new ideas. Quality teaching in science is crucial to developing scientifically literate citizens and improving economic productivity for sustainable development.

Although many factors are associated with what goes into the determination of what quality education is, the most reliable term that expresses the direction to improvement or decline of quality of education is the expression made through examinations (Kinchin, 2017).

There is sufficient evidence in the literature that the performance of Senior High School students in Biology is on the decline and the reasons given for this are well documented (Fido & Gayford, 2016; Kinchin, 2017; Fisher, 2019; Tilling, 2015). Findings from these studies identified among other factors; poor quality of students joining secondary education, the incongruence of teacher versus student number, absence of biology teachers in Senior High Schools, and low motivation to biology teachers as the key challenges that beset the teaching and learning of biology.

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However, it appears there is information gap on challenges that affect the teaching and learning of Biology since no such study had been conducted within the Ledzokuku municipality. There is a need for research to establish whether similar trends are affecting teaching and learning of biology within the municipality hence, this study.

1.2 Statement of the Problem

Despite the desire for technological development that needs science education, there is the persistent poor academic performance of students in the subject. According to Harb and El-Shaarawi (2006), determinants of students‟ performance have been the subject of ongoing debate among educators, academics and policymakers and implementers. O‟Connor (2002) identified the use of inappropriate teaching methods as one of the factors that contribute to the low participation and performance of students in science.

Students‟ achievement in Senior High School science in Ghana concerning biology has not been encouraging. The quality of science teaching and learning in basic, Senior High Schools and tertiary institutions in Ghana has therefore been criticized by parents, science educators, technocrats and the government (Anamuah- Mensah, Mereku & Ampiah, 2010; Ndago, 2012). There is a lack of effective teaching in biology and this has led to students‟ weaknesses in biology in the West African Senior Secondary Certificate Examination (WASSCE) in which Senior High Schools in the Ledzokuku municipality are not an exception. This is evident in the students‟ WASSCE results analysis made by the schools (Appendix A).

Fisher (2019) explained that poor performance in Biology denies students the opportunity to pursue courses such as medicine, microbiology, and other Biology

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oriented courses which are instrumental in the development of a nation. Science educators have put up efforts aimed at identifying the problems associated with the teaching and learning of Biology. Despite all these noble efforts, the poor achievement has continued to rear its head. This study, therefore, seeks to investigate the challenges that beset the teaching and learning of Biology within the Ledzokuku municipality and suggest remedial actions for mitigating the problem thus improving students‟ performance.

1.3 Purpose of the Study

The purpose of the study was to identify the challenges affecting teaching and learning of Biology.

1.4 Objectives of the Study

The study seeks to:

1. To investigate the factors that negatively affect students‟ performance in Biology at S.H.S in the Ledzokuku municipality.
2. To identify the challenges affecting the teaching and learning of Biology in the Ledzokuku municipality.
3. To suggest strategies that can be made to attenuate the negative impact of the factors affecting the academic achievement of students.

1.5 Research Questions

The following questions guided this study:

1. What factors negatively affect students‟ performance in Biology at S.H.S in the Ledzokuku municipality?
2. What challenges affect the teaching and learning of biology in the Ledzokuku municipality?

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3. What suggested views can be made to attenuate the negative impact of the factors that affect the academic achievement of students?

1.6 Significance of the Study

Findings from this study will orient Biology teachers and school administrators on the challenges militating against the effective teaching and learning of biology at S.H.S in the Ledzokuku municipality for the needed intervention to be taken. The study will enhance professional development in the field of Biology education through the identification of teachers‟ concerns. This improvement can translate into better teaching, and in due course impact student achievement in Senior High Schools in Ghana.

The study will also provide current literature on the topic for future researchers who wish to conduct similar studies.

This research will also be used as a guide for policy-makers, decision-makers and educational investors and other stakeholders to make well-informed decisions about policies in science and investment in science resources with regards to education at the secondary level.

The outcomes of this evaluation study will shed light on the current situation and provide important recommendations based on the findings.

1.7 Limitations of the Study

Limitations are aspects of the study that negatively affect the generalization of the results of the study but which the researcher has no direct control over. The study was constrained by some limitations. To begin with, the schedule of the teachers and the academic calendar made the collection of information difficult. To protect their

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schools, some respondents answered in a socially acceptable direction. To combat this, the researcher employed as many research instruments as feasible to increase the quality of the study's findings. The small sample size also affected the study.

1.8 Delimitations of the Study

The study focused on the challenges influencing the teaching and learning of biology in selected Senior High Schools in the Ledzokuku Municipality, hence it confined itself to the challenges influencing the teaching and learning of Biology only without looking into other subjects which may also be experiencing some challenges. Although there are several Senior High Schools within the Ledzokuku municipality, only the public schools were involved in the study. Thus the information gathered does not include respondents from private institutions.

1.9 Organization of the Study

The study is organized into five chapters. The first chapter is the introductory part of the study, consisting of the background of the study, statement of the problem, the purpose of the study, objectives of the study, research questions, hypothesis, significance of the study, operational definition of terms and organization of the study. The second chapter deals with a review of literature relevant to the study. Chapter three describes the methodology of the study. This is followed by chapter four which presents the results and discussion of findings. The fifth chapter provides a summary of the findings, conclusions and recommendations.

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CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter provides a review of relevant literature on the topic under study. It critically discusses existing research that is significant to this current study. The literature was reviewed under the following strands:

- Conceptual Framework
- The Rationale for Teaching Elective Biology
- Senior High School Biology Instruction
- The Concept of Quality Education
- The Concept of Academic Performance
- Academic performance in Biology
- Challenges Affecting Teaching and Learning of Biology
- Factors Influencing Performance of Students in Biology
- Measures to Improve Performance of Students in Biology
- Empirical literature

2.1 Conceptual Framework

In the light of literature review, a conceptual framework has been developed (Figure1). The framework indicates the relationship between learning goals, teaching and learning activities and assessment learning. These three have a vital contribution to the effectiveness of the teaching and process in particular and the quality of education. Learning goals or objectives are expected behavioural outcomes at the end of an instructional process and help a teacher to plan instruction, guide students‟

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learning, and provide criteria for assessing students‟ outcomes. In an educational setting, the assessment and learning activities are based on the learning goals stated. The teaching and learning methods used by the teacher are directed towards the goal and are likely to ensure that the learning objectives are achieved. The learning goals are logically and closely linked to assessment since one critical role of assessment is to determine how well students have achieved the intended learning objectives. The assessment tasks mirror the learning goals which is the curriculum. Good assessment has a closer relationship with learning objectives and provides feedback to the students about their learning and teachers about their instruction thus serving as an indicator for learning.

These three independent variables in consideration of situational factors affecting students‟ learning have to be closely aligned to reinforce each other to enhance performance in Biology.

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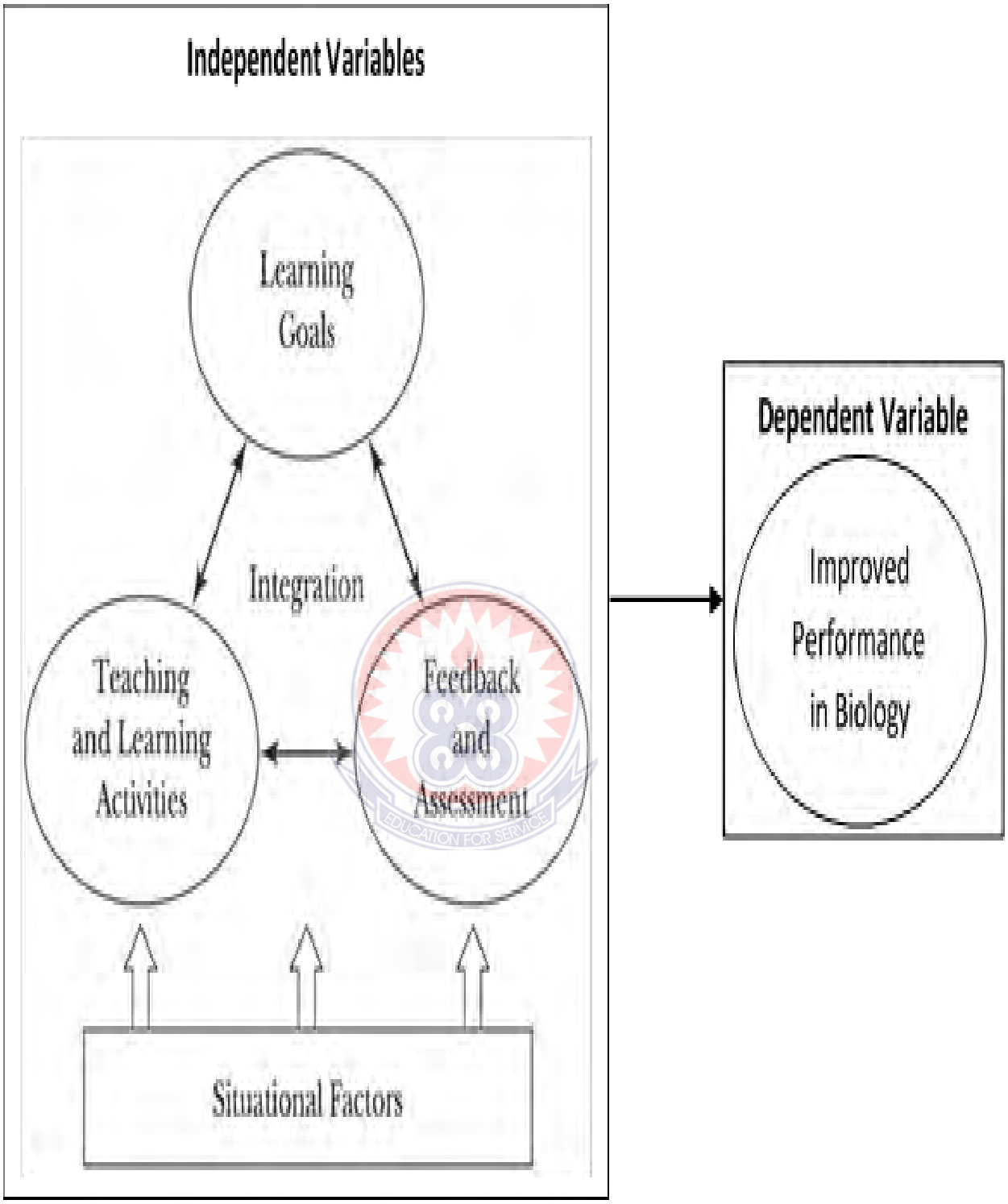

Figure 1: Diagrammatic Representation of Factors Affecting Teaching and Learning of Biology (Researcher made).

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2.2 The Rationale for Teaching Elective Biology at Senior High School

Biology is a branch of natural science that is devoted to the study of life and the activities of all living things from bacteria to plants and animals. The survival of humans depends greatly on the knowledge and understanding of the structure and functions of organisms and how they interact with one another and the environment. This invariably leads to the conservation of living things and other natural resources.

The need to teach Biology is to explain the living world in terms of scientific principles although appreciating that organisms behave in ways that often seem beyond the capabilities of their parts. It is also to guide and inculcate in the learner skills in observing and measuring, formulating a hypothesis, predicting and designing, investigating, recording data and interpreting results, drawing conclusions and communicating them.

The knowledge, skills and attitudes acquired through the study of Biology are to provide the learner with the necessary basic skills for employment in laboratory, industry, agriculture, horticulture, forestry, health care, work with animals, marine and freshwater biology, information science, management and teaching. It equips the learner for further studies and research in pure and applied science and technology that are vital areas for the advancement of society. Teaching elective biology in totality guides the learner and makes him/her capable of critical thinking, to make meaningful decisions and solve problems (Teaching syllabus for biology, 2010).

2.3 Senior High School Biology Instruction

Biology instruction is done mainly through practicals and theory. The practical is done in the laboratory or on the field involving different habitats. At the secondary level, laboratory activities are designed and conducted to engage students

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individually, or in small groups and large demonstration settings (Hofstein and Mamlok-Naaman, 2007).

The WAEC biology syllabus for SHS has over the years recommended that the teaching of the subject should be student centred and activity-oriented (Teaching syllabus for Biology, 2010). The syllabus suggests that the provision of well-equipped laboratories will enhance teaching and learning Biology. It further suggests that well trained laboratory technicians be made available to play a complementary role to the teacher. The syllabus emphasizes that for one to become a good biologist, it is needful to develop both practical and experimental skills.

In view of the importance of the skills to the biologist, the syllabus has a unit in almost each section called scientific enquiry skills, to help the teacher teach effectively and facilitate certain activities to help the student develop these skills. An essential aspect of the syllabus in which instruction and assessment are based is the profile dimension. In Biology, the profile dimensions are three and these are :

- Knowledge and Comprehension 30%
- Application of Knowledge 40%
- Practical and Experimental Skills 30%

The profile dimension enables the teacher to vary his or her teaching methods and help students to apply the knowledge acquired to solve problems. Thes should reflect in teaching/ learning and testing.

2.4 The Concept of Quality Education

Previously, the focus of education was on expansion. The quality of education is now critical because it establishes the standards that define the intellectual environment,

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which influences the vision and capacity of schools and graduates, as well as a nation‟s ability to effectively manage its affairs (Lebata, 2014). According to Bergmann (1996), a definition of the term educational quality is difficult to come by. The most common implicit meaning, according to Burchfield, Chapman and Snyder (1993), is students‟ achievement.

Quality education consists of two notions (Otieno, 2014). The first is the amount of knowledge and skills that society expects schools to instil in students. This component of education determines quality by examining the level of performance in either academic achievement or values. The features of the educational environment that develop skills, knowledge, and values through the teaching and learning process are the second factor. In this sense, education is considered as a business with input, process, and output that determine its effectiveness.

Bergmann (1996) argues that the notion of educational quality must take into account its systematic structure because education is a subsystem of human behaviour. He discovered that breaking down the term into components is helpful, and he believes that depending on which components are prioritized, there could be competing or complementary definitions of educational quality. Therefore, he defined educational quality as the quality of the system components, where the overall definition of educational quality is the quality of these components.

Selecting or designing a range of education indicators as explicit and measurable presentations of quality in education can, therefore, determine the quality of education.

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The quality of education can be determined by assessing educational indicators over time. Educational indicators can be used to determine the quality of education across time. However, evidence from educators, teachers, students, and parents must be reinforced by proof of quality. Quality education, on the other hand, cannot be attained if no decisions are made on who should be authorized to teach. Accepting that teaching is a profession and adhering to ethical standards is one method to ensure that the country‟s educational system is of high quality.

2.5 The Concept of Academic Performance

Babyegeya (2002) also revealed several factors that affect students‟ academic performance; one of the factors is how students learn or intend to learn and what teachers teach. In his view, other factors like shortage of books and materials, teaching and teacher education affect students‟ academic performance. He indicated that lack of motivation and professional commitment produce poor attendance and unprofessional attitudes towards students which in turn affect the performance of students academically. Babyegeya (2002) adds that the type of teachers, their experience professional, qualifications and commitment to work may contribute to the students‟ achievements. In addition to his findings, he insisted on instruction time, in which students spend in actual learning activities.

2.6 Academic Performance in Biology

Lloyd, Newman and Thomas (2009) were of the view that the failure of learners is due to a lack of confidence in the knowledge they possess which in turn could affect their level of activity in the classroom, and this results in poor attendance. They argued that learners‟ academic problems arise from personal inadequacies such as low ability, negative self-concept, anxiety, maladjustment, environmental inadequacies

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such as poor classroom conditions, curricular inadequacies, peer groups, and lack of home support. Poor teaching methods adopted by teachers at the senior secondary school level in Nigeria have been identified as one of the major factors contributing to the poor performance of students in biology (Ahmed, 2011; Kareem, 2003; Umar, 2011). According to Nnamonu (2003), despite the numerous policies by educational authorities to improve teaching and learning, students‟ performance has consistently been below expectation and unimpressive.

The West Africa Examination Council (WAEC) Chief Examiners‟ Reports (2016-2019) in Biology for the West Africa Senior Secondary Certificate Examination (WASSCE) over the years have elaborated some weaknesses exhibited by students, these include:

i. Wrong spelling of technical terms and scientific words.
ii. Candidates exhibited little knowledge of tools used for collecting specimens.
iii. Candidates failure to go by the rubrics regarding biological drawings as in question.

The report concluded that these weaknesses affect students‟ performance in Biology. Nwosu (2006) observed that Biology provides a platform for teaching students to develop the ability to apply science concepts and principles in solving everyday life problems. With knowledge explosion all over the world via the Internet, biological knowledge has also expanded. There are advances recorded in fields such as Biochemistry, Physiology, Ecology, Genetics and Molecular biology that have made the subject a central focus in most human activities including problems like food scarcity, pollution, population, radiation, disease, health, hygiene, family life,

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management and conservation of natural resources as well as Biotechnology and Ethics.

However, the West African Examination Council (WAEC) Chief Examiner for Biology (2018-2020) reported students‟ weaknesses in scientific skills such as planning, performing, reasoning and predicting. Saddler and Tai (2001) asserted that the low performance of students in the reasoning task could be attributed to over-reliance on a model isolationist pedagogy with an excessive amount of reliance on textbooks and rote problem solving, even though this type of isolated learning are detrimental to the success of students in science.

In Nigeria, Adeyemi (2010) revealed that there was a decline in learners‟ performance in Senior Secondary Certificate Examinations (SSCE). He reported that in topics where teachers found it difficult to teach, learners tend to perform below expectations.

2.7 Factors Influencing the Performance of Students in Biology

2.7.1 Institutional factors

2.7.1.1 Classroom environment

The school is a unique social place where correct training methods, adequate physical space, and a pleasant psychological environment are used to establish and run the education, training, and personality development of children who are the community‟s future assets (Raccoon, 2018). To improve their performance, students in the process of socialization require a healthy atmosphere and role models (Gilavand, 2015).

The classroom environment plays a significant role in determining students‟ level of academic achievement and enhancing their holistic growth. For students, the classroom is not just an intellectual space, but also a social, emotional and physical

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environment (Umar, 2011). A classroom setting comprises a physical component and a human component. The physical component consists of all the physical objects present in the classroom for example whiteboard, furniture, lightings, projector, books, computers whereas the human component comprises the teachers and students. It generally involves the nature of the interaction of teachers with students. Renchelor (1992) is of the view that an effective school and classroom can be described as a place that naturally motivates students to learn.

Students and teachers work well in a school culture where academic success and the motivation to learn, are expected, respected and rewarded. Such a conducive atmosphere where students learn to love learning results in better academic achievement.

2.7.1.2 Physical Facilities

Biology is demanding and it is taught best by involving learners. Akiri and Nkechi (2009) suggest that ineffective teaching is due to conditions such as lack of resources facilitating teaching, and this results in a negative influence on the student‟s performance. Physical facilities are materials that enable a teacher to achieve a level of instructional effectiveness. They further explained that physical facilities refer to the school plant, movable and immovable items like buildings, classrooms, library, laboratories, toilets facilities, offices, furniture and other materials and infrastructures likely to motivate students towards learning. Their importance in the teaching/ learning process is not to be over-emphasized. Brown (2000) summarized the role of instructional materials as follows:

i. promotes meaningful communication, hence effective learning
ii. ensures retention, thus making learning more permanent.

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iii. helps to overcome the limitation of the classroom by making the inaccessible accessible is

iv. they provide a common experience upon which other learning can be developed.

In the absence of laboratories and other instructional materials, the transformation process gets affected and this affects the whole system as goals set would not be achieved. Therefore, the unavailability of resources such as equipped laboratories contributes to poor performance since Biology is learned better through hands-on activities. Learners recall easily, things they have seen with their own eyes. Biology requires the use of various standard Biology textbooks to enhance the understanding of learners. For the school to operate as expected there must be enough physical resources enabling the transformation process to occur easily. Biology is learned better through involving learners and this is achieved only by letting learners carry out practicals on their own.

Jackson (2009) supported this by saying that many of the laboratories in some schools are inoperative because of a lack of equipment to carry out practical exercises. Therefore, lack of resources such as equipped laboratories contribute to poor performance. Words alone are insufficient to explain concepts to learners to capture and retain their attention and interests.

2.7.2 Technical factors

2.7.2.1 Language of instruction

Language plays an important role in the learning of science, and this is even more so when learners are second language learners. There has been much concern about underachievement in science in primary schools, junior, and senior secondary schools

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(Lebata, 2014). Since Biology is descriptive, learners need to have sufficient language proficiency to understand the concepts. Research studies have shown that learners encounter enormous problems learning Biology in English and this is particularly so for those who are the second language, English as a Second Language (ESL) learners as in the case of Bruneian learners (Yong, 2003). Yong (2003) and Mohudiu (2008) reported that ESL learners encounter many problems in learning Biology in English and among them are:

A. Lack of Language Proficiency of ESL Learners

Many ESL learners did not have the necessary linguistic tools to construct advanced science concepts. Learners with limited English proficiency seemed to have a weaker knowledge of science and this inevitably affected their achievement test scores in science. They reasoned that those learners had difficulty reading science textbooks and deriving meaning from analogies and metaphors that are frequently used in science. Another problem that was faced by ESL learners was their inability to understand the teacher‟s discourse during instruction. This prevented them from understanding the content presented to them.

B. Language Used in Science Textbooks

The language used in many science textbooks exceeds the normal experience of many elementary and high school learners for whom they were written. It was reported that the language used in some African textbooks for science in some African Schools was too advanced for many of the learners (Jackson, 2009).

C. Nature of the Written Text in School Biology Textbooks

Unlike Chemistry and Physics, Biology is more descriptive (Mohidiu 2008). Biology textbooks are often found to consist of long and complex sentences that are laden with

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facts. Such structural complexities impose considerable cognitive demands on ESL learners. Lock and Richardson (2000) point out that Biology contains many technical terms in describing its concepts, principles and theories, and is, therefore, more susceptible to reading difficulties than other natural sciences.

2.7.3 Learner related factors

2.7.3.1 Study Habits of learners

Sternberg and Wagner (2005) divide intelligence into three categories: academic problem solving, practical intelligence, and creative intelligence, each of which has a distinct impact on performance. They show that academic success is contingent not only on intelligence and hard work but also on good study strategies. A good study habit entails the ability to understand and apply what is being read or studied. Only after recognizing learners‟ areas of weakness and acceptable levels of academic competence for their grade level can study techniques be properly taught. They can be given enrichment or development exercises to help them improve their existing abilities or learn new ones. According to Balbalosa (2010), strong study habits aid critical reflection and skills including selecting, analyzing, evaluating, and synthesizing. Learners who have good study habits tend to perform better than those who do not. This is shown in some Lesotho high schools where learners with good study habits were compared with learners without good study habits (Lebata, 2014). It was revealed that learners from schools who performed challenging tasks had good study habits as compared with learners who did less.

2.7.3.2 Learners' Attitude towards Biology

Attitude is important in understanding human behaviour. To define what exactly an attitude is, many attempts have been made in the literature. Generally, it is defined as

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a complex mental state involving beliefs (Ali, Hussain, Khan, Qadeer & Ramzan, 2011). It is an individual‟s prevailing tendency to respond favourably or unfavourably to an object, person, or group of people, institutions or events (Munck, 2007). Even though science informs our thoughts and behaviours, many people do not seem to place a high value on science. Munck (2007), stated further that the public do not generally have positive feelings towards science and scientists.

Attitudes toward biology can have statistically significant relationships with student achievement and gains in content knowledge which may be a direct effect or be indirect through the influence of attitude on students‟ engagement, motivation, or persistence with the academic study of science (Simpson & Talton,2007).

Attitudes can be positive (values) or negative (prejudice). Attitude towards science denotes interest or feeling towards studying science. It is the student‟s disposition towards like or dislike in science. Attitude in science means the scientific approach assumed by an individual for solving problems, assessing ideas and making decisions in the sciences (Olatunde, 2009).

The learner‟s beliefs and attitudes have the potential to either facilitate or inhibit learning. Studies carried out have also shown that the teacher‟s method of teaching science and his personality greatly accounted for students‟ positive attitude towards the subject and that, without interest and personal effort in learning science by the students, they can hardly perform well (Olatunde, 2009).

Empirical studies have revealed the influence of methods of instruction on students‟ attitudes towards science. Gibbons, Kimmel and O‟Shea (1997) reported that students‟ attitudes about the value of learning science may be considered as both an

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input and outcome variable because their attitudes towards the subject can be related to educational achievement in ways that reinforce higher or lower performance. This means that those students who do well in a subject generally have more positive attitudes towards that subject and those who have more positive attitudes towards a subject tend to perform better in the subject (Olatunde, 2009). Attitude as an affective construct has been described as the basis for both intellectual preparedness and motivation in learning (Osborne, Simon & Collins, 2003).

2.7.4 Teacher-related factors

2.7.4.1 Teaching methods

It is believed that persistent poor academic performance by the majority of learners is due to use of ineffective instructional strategies by teachers to transfer knowledge to the learners (Adunola, 2011). Research on the effectiveness of the instructional strategies shows that the worth of teaching is reflected by the performance of learners (Ayeni, 2011). Therefore, teachers are responsible to be conversant with several teaching strategies that can make them transfer knowledge on various concepts to be covered. How a lesson is presented determines its effectiveness and the level of understanding by the learners who are being taught (Mwenda, Gitaari, Nyaga, Muthaa & Reche, 2013). The application of outdated teaching methods contributes directly to the poor performance of learners in science subjects (Makgato & Mji, 2006). In their research findings, Makgato and Mji (2006) argue that poor teaching methods have a direct influence on the poor performance of learners in science subjects.

Educators and scholastic psychologists have made intense struggle at evolving psychological basis that is crucial for answering the question, how Science should be taught to ensure effective and expressive learning (Adunola, 2011). As a result of this,

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several instructional strategies have been established based on the theory that meaningful learning takes place when the learners are actively involved in the knowledge-getting process than being passive (Njoku, 2004). These include peer tutoring, project and inquiry-based teaching strategies.

2.7.4.2 Teacher knowledge of subject matter and experience

Teachers have the authority to direct all activities in the classroom hence have an imperative role in influencing the academic performance of the students. They need to possess an approachable nature, listen and provide solutions to the problems experienced by the students. They should possess adequate knowledge and information regarding Biology, usage of technology, modern and innovative methods in the teaching and learning processes, managing discipline and directing all of the classroom as well as school activities and functions in a well-organized manner. The main objective of the teachers should be to enhance the academic performance of the students and lead to their effective development (Maina, 2010).

The teachers are the facilitators who are to impart knowledge to the students. Teachers play a crucial role in educational attainment because the teacher is ultimately responsible for translating policy into action and principles based on practice during interaction with the learners. The quality of education depends on teachers as reflected in the performance of their duties. Learners‟ academic performance in examinations has been used to determine excellence in teachers and teaching. Ineffectiveness of teachers in classroom interaction with the learners could be responsible for the observed poor performance of learners and the widely acclaimed fallen standard of education.

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Akiri and Nkechi (2009) were of the view that poor academic performance of learners can be linked to poor teachers‟ performance in terms of accomplishing the teaching tasks, negative attitudes to work and poor teaching habits which have attributed to poor motivation. The professional qualities of a well-trained teacher (Ajayi & Adeosun 2009) include mastery of the subject matter, sense of organisation, ability to clarify ideas, ability to motivate students, good imagination, ability to involve the students in meaningful activities throughout teaching, management of the details of learning and frequent monitoring of students‟ progress through tests and examinations.

2.7.4.3 Teacher attitude

Teachers attitude have a significant impact on the classroom environment, which determines a student‟s self-efficacy and, as a result, behaviour. All of these factors which can be loosely categorized as environment, personal factors, and behaviour interact and play off each other in a cyclical way (Woolfolk, 2016). Teachers serve as role models for children, who swiftly mimic their acts.

What teachers like or dislike, approve of or disapprove of, and how they feel about their learning or studies may have a significant influence on their students. By extension, how teachers teach, how they behave and how they interact with students can be more paramount than what they teach (Kwale, 2006).

2.7.5 Parent factor

The major role of parents in education is to provide for the needs of their wards. However, when this role is not played as expected it affects Biology performance negatively. Nzelum and Okafor (2010) explained that parental involvement in children‟s education has a definite impact on learners‟ level of academic success.

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Barrow and Rouse (2006) have also observed that economically disadvantaged parents are less able to afford the cost of education for their children and learners do not do their work to their fullest potential. The current policy on senior high school education is to provide free education. That is free tuition, no library fee, no boarding fee, no science laboratory fee, no examination fee, no utility fee, free meals for both boarders and day-students no Parents Association (PA) fee and free textbooks for all at the senior high level (Duku, Janus, Offord, Viverios & Walsh, 2007). The policy aimed to increase enrollment, improve quality through academic performance and most importantly to reduce the burden on parents from paying their children fees.

However, the home from where the learner is brought up is a place where the foundation of learning and education takes place. The home is a source of security, encouragement and helps children in providing solutions to their problems. To produce good academic outcomes, the parents, children and other family members need to encourage a learning atmosphere within homes. Norlin (2010) said for the school to achieve good results, people involved including parents should work together. Parents play an important role in leading to the operative growth and development of their children (Kudari, 2016).

A study carried out by Duku et al. (2007) found that schools with the highest number of children with low school readiness were from areas of high social risk and poverty. Another study indicated that children from high-income families perform better than children from needy families in areas such as communication skills, knowledge of numbers, ability to concentrate and in playing with other children in a cooperative manner (Thomas, 2007). For instance, when students experience problems in learning, then parents or guardians are responsible for assisting. In schools, whatever problems

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that children go through regarding academics and other areas, are normally communicated to their parents. In contrast, it has been found that internationally, poor academic performance is a problem that manifests itself not only in poor communities but also in countries that are classified as developed (Otilie, 2018).

2.8 Challenges Affecting Teaching and Learning of Biology

2.8.1 Overload of syllabus

A syllabus is a document that outlines all the essential information about a college course. It lists the topics one will study, as well as the due dates of any coursework including tests and examinations. However, a syllabus has the power to do more than that and can articulate connections between learning outcomes, assessments, content, and pedagogical practice that is, how the course is constructively aligned in guiding students through their learning. It may prevent misunderstandings in terms of course goals and objectives, assessment and evaluation standards, grading policies, student or faculty behaviour, assignments, readings, and activities (Carlson & Slattery, 2005).

The teaching syllabus for elective biology is overloaded for the 3-year course. The bulk of biochemistry and genetics that students perceive to be difficult is treated in year three. Teachers are unable to cover all the topics within this time range. This has had an impact on the teacher‟s teaching style where they are rushing for content coverage to complete the syllabus before the final examination commences. In the quest to complete the topics, teachers do not focus on the learner‟s needs thus affecting their performance.

Textbook authors also pose problems to teachers, they alter the conceptual structure of the syllabus with the intent to enhance understanding. Some teachers follow the

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textbook order of topics in their teaching and are unable to link different sections which are related, leaving gaps in learners‟ understanding of certain concepts.

2.8.2 Students' attitude towards learning Biology

Students‟ attitude toward the learning of Biology is a factor that has long attracted the attention of researchers. Adesokan (2002) asserted that despite the realization of the recognition given to Biology among the science subjects, it is evident that students still show a negative attitude towards the subject, thereby leading to poor performance and low enrolment. According to Bassey, Umoren and Udida (2008), students‟ academic performance in Biology is a function of their attitude.

Attitudes toward science are the positive or negative opinions that individuals have about science, based on their perceptions of science as a school subject, as an aspect of society, and as a human endeavour (Osborne et al., 2003). Students‟ attitudes can either enhance or inhibit learning and affect their achievement. According to the expectancy-value theory (Eccles & Wigfield, 2002), a student‟s attitude toward science can be explained by two main factors: the student‟s expectations of success, and the value that the student places on success. George (2006) is of the view that one of the key factors in learning science is students‟ attitudes and the development of positive attitudes toward science that can motivate students‟ interest in science education and science-related careers.

Dawson (2000) was comparing changes in Australian students‟ interests and attitudes in biology over 20 years and reported that girls‟ preferences in biology lead to human biology and general biology, but boys were greatly interested in earth sciences. Most students perceive some topics in biology as difficult to learn, this includes protein synthesis, respiration, genetics and control and coordination. Experiencing difficulties

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in so many topics in biology negatively affects students‟ motivation and achievement (Ozcan, 2003). Owen et al. (2008) are of the view that students‟ attitudes toward the sciences affect the course and career choices; therefore measuring the impact of reform efforts on student attitudes is important and will require measurement tools with robust psychometric properties.

The teacher also plays a significant role during the learning process and can directly or indirectly influence students‟ attitudes toward science which in consequence can influence students‟ achievement. Teachers are role models whose behaviours are easily mimicked by students. What teachers like or dislike, appreciate or disapprove and how they feel about their learning or studies could also have a significant effect on their students. Osborne et al. (2003) suggest that if the students change their attitude towards science subjects, the performance in their results will improve since they will dedicate more time towards learning the science subjects. The possible mechanism for such effects is that attitudes can provide indirect support by increasing students‟ willingness to spend time on and persist in learning science or have a stronger sense of the value of direct effort thus yielding higher achievement and course persistence (Dika, Granville & Singh , 2002).

2.8.3 Large class size

The number of students in a given course or classroom, specifically the number of students taught by individual teachers in a course or classroom or the average number of students taught by teachers in a school or educational system, is referred to as class size. Class size refers to an educational tool that can be used to describe the average number of students per class in a school (Adeyemi, 2008). As the world‟s population increases so do the school‟s population. When class sizes grow larger, students‟ performance becomes a concern. The introduction of free S.H.S policy in Ghana has

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increased the enrollment in schools and this called for the tracking system that is Green and Gold. The number of teachers in the schools have not increased much and Heads of Schools are always requesting for teachers. There are about 562 public Senior High Schools with 34,304 teachers catering for the needs of 837,204 students. Teachers have little or no control over class size, which is almost an administrative decision. According to Epri (2016), the quality of teaching and learning is impacted by overcrowded classrooms, teachers‟ failure to support learners with special needs, and a lack of teaching and learning tools.

Biology is a subject that requires a high concentration level. The smaller the class, the greater the likelihood is that a teacher will spend more time with individual pupils. Large classes present more challenges for classroom management, planning and assessment. Teachers are unable to vary their teaching methods and not readily identify difficulties and provide feedback in larger classes, as well as identify specific needs and tailor instruction to fit them. They cannot also set individual goals for students. Additionally, learners in overcrowded classrooms do not actively participate since teachers end up using teacher-centered teaching strategies, such as the lecture style, to teach lessons (Dabo, 2015). In this setting, learners may not receive the attention they necessary need to study effectively.

Teachers develop stronger interactions with their students and have a greater understanding of them when class size is small. Ajayi and Adeosun (2004) assert that in order to control rising capital cost of education, the average class size could be increased. This point was also supported by Montagna and Toth (2002) who reported that the increase in enrollment in many institutions which has become a major concern of students could lead to an increase in class size.

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Commeyras (2000) however, disagreed with these arguments and reported that effective teaching seems impracticable for teacher educators having large class sizes of 50, 75, 100 or more. Teaching is an interactive process involving the learner, the subject matter and the teacher in a conducive environment. The student-teacher ratio has to be considered to measure teachers‟ workloads and resources as well as the amount of individual attention towards efficient teaching and learning.

2.8.4 Inadequate teaching and learning resources

The success of teaching and learning has been linked to the availability of resources. To support poorly performing schools, educational authorities must increase student levels and competencies by use of these resources for students to be ready for National Assessments (UNESCO, 2015). This can be done through instructional material development and the allocation of resources. Teaching/learning resources have been put into three categories of material resources, physical facilities and human resources (Akungu, 2014). The study looked at material resources (textbooks, charts, computers, projectors, chemicals, etc.) and physical facilities (libraries, classrooms and laboratories) only.

According to Lyons (2012), learning is a complex activity that involves interplay of students‟ motivation, physical facilities, teaching resources, and skills of teaching and curriculum demands. Science learning employs experiments using learning materials to equip learners with appropriate knowledge, skills, attitudes and behaviours. Udoh (2015) also asserts learning requires broad-based experiences to widen students‟ knowledge in a world of abundance of choices and opportunities to give meaning to learning.

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Schools can operate effectively when physical facilities and resources are available and adequate. One of the factors affecting students‟ achievement in science is the learning environment. Physical facilities and materials help improve access and educational outcomes since students are less likely to be absent from schools that provide interesting, meaningful and relevant experiences to them (Lunsford & Bolton, 2006). Lunsford and Bolton (2006) further said that the availability of these resources promotes effective teaching and learning.

One of the aims of studying biology is to develop the practical skills required to work with scientific equipment, biological materials and living things. Over the years, many have argued that science cannot be meaningful to students without worthwhile practical experiences or practicals in the school laboratory (Hofstein & Mamlok-Naaman, 2007). They again assert that for more than a century, laboratory experiences have been purported to promote central science education goals including the enhancement of students‟ understanding of concepts in science and their applications; scientific-practical skills and problem-solving abilities; scientific habits of mind, understanding of how science and scientists work, interest and motivation. For effective teaching and learning in biology, the Ghana Education Service suggests that the school establishes a small botanical garden, animals in a cage, fishpond, the use of video clips and a well-equipped laboratory. Unavailability of these teaching/learning resources, therefore, does not enhance the effectiveness of teaching and learning as they bring about good academic performance in the students. Almost all S.H.S in Ghana have a science laboratory but how they meet the standard of a laboratory is the question. Many S.H.S are old and even though there are laboratories, they were not built to accommodate the growing number of students. The unavailability of facilities and resources affects the effectiveness of a teacher‟s lesson. Furthermore, this might

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also prevent teachers from carrying out all the practicals stipulated in the syllabus which in turn will disadvantage the learners in their WASSCE biology practical. It is therefore important to provide the students with a rich learning environment. An atmosphere conducive to learning which can be promoted by the thoughtful use of teaching/learning materials.

In the science subjects such as Biology which requires a lot of practical work, inadequate teaching and learning resources may lead to passive learning with profound effects on learners‟ academic performances. Jackson (2009), also indicated that lack of parental involvement, poor school management, and shortage of educational facilities and resources cause poor performance.

2.8.5 Inappropriate teaching methods

Teaching methods have great significance in attaining the desired learning outcomes. Without proper methods, content knowledge will not be delivered properly. The biology syllabus states that the teaching of biology should be student-centred and activity oriented. Traditionally, many teachers apply teacher-centred strategies to transfer knowledge to the learners as compared to the learner-centered strategies and rarely extend their teaching to make it relevant to real-life scenarios. As stated by Yore (2001), this does not place any importance on the development of critical thinking skills and whole concepts that are important to science literacy. The old-fashioned methods like lecture and recitation do not tend to foster collaborative problem solving, critical and creative thinking (Blair et. al, 2007).

Secker (2002) elaborated that science educators encourage teachers to replace traditional teacher-centered instructional practices with inquiry-oriented approaches that (a) engage student interest in science, (b) provide opportunities for students to use

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appropriate laboratory techniques to collect evidence, (c) require students to solve problems using logic and evidence, (d) encourage students to conduct further study to develop more elaborate explanations, and (e) emphasize the importance of writing scientific explanations based on evidence.

Biology being the study of natural phenomena requires practical activities which permit and encourage discovery and creativity which involves students in real situations, using real materials and working equipment (Glasson, 2009). In addition to this, practical work encourages and increases students‟ interest in science and promotes it as an engaging subject.

In view of the importance of the skills to the biologist, the Biology syllabus has a unit in almost every section called scientific inquiry skills to help the teacher consciously teach and facilitate certain activities to help the student develop these skills. The teachers in school are the ones that contribute an imperative part in promoting learning among the students. They need to ensure that the teaching methods used should prove to be beneficial to the students.

2.8.6 Insufficient in-service training for teachers

In our present world where changes are rapid and continuous, it is challenging to keep up with change and its consequences (Tuba, 2012). Teachers are expected to keep up with change and to keep themselves up-to-date about the improvements, scientific developments, and educational reforms. In other words, rapid development in science and technology, changes in social relations, and rapid globalization all force educators to redefine the role and characteristics of the teaching profession. Tuba (2012) explained further that for any nation to attain this rapid scientific growth and advancement, it is important that such a nation improves the standard of its

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educational system by improving the teaching and learning of science. One of the ways for teachers to improve classroom activities and student achievement is to receive In-Service Training (INSET). The purpose of INSET is to enable teachers to acquire new understanding and instructional skills.

It should be realized that the end of pre-service training does not mean the end of the teacher learning and development process. However, studies underline the fact that the academic courses taken during pre-service training do not meet all the needs of new teachers. While having a degree or certification in teaching through a college education in teaching has been considered as one of the most important characteristics of qualified teachers, the striking question: Will the courses of teacher education programs be sufficient for teachers for the next twenty or thirty years they spend in the teaching profession? arises (Glathorn, Jones & Bullock, 2006). In this sense, the nature of in-service training has changed from improving teachers‟ teaching skills to supporting teachers to be able to cope with dramatic changes in education and society (Desmarais, 1992).

Anamuah-Mensah, Asare, Mereku and Oduro (2012) pointed out that, Ghana Education Service (GES) acknowledges the fact that pre-service training alone cannot produce a complete teacher who would be able to meet the challenges of a world that is changing rapidly. They explained further that pre-tertiary teacher professional development has three phases (i) initial teacher training; followed by (ii) induction and initial INSET programmes, and then (iii) continuing INSET for updating or upgrading professional knowledge and skills.

There are about 34,304 teachers in public senior high schools in Ghana of which 86.7% are trained (MOE, 2016). The sub-programme has an in-service training

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programme for teachers to ensure that they have up-to-date knowledge of the curriculum and related teaching and learning materials (MOE, 2016). Although INSET programmes in the country are delivered by the Ghana Education Service and other donor agencies, teachers and heads of schools appear not to attach interest to the programmes in which they participate. Many INSET recipients engage in the INSET programme merely because they had been instructed to participate in the training programme but not because they saw the INSET programmes as part of their professional development experiences (Anamuah-Mensah et al., 2012). This has led to the uncoordinated nature of donor-driven INSET programmes hitherto organized in the country.

Teachers mostly appeal to the professional development programme which helps to expand their knowledge and skills and to enhance their growth, and effectiveness (Guskey, 2002). In this sense, the important thing is that teachers need to attend what they will be more effective and develop their skills. Darling-Hammond and McLaughlin (1995) indicated that teachers must have opportunities to discuss and express their needs; to explore the best INSET programme, it is necessary to examine the particular needs of teachers while determining the contents and characteristics of training programmes.

Studies have shown that INSET fail to achieve its objectives (Tuba, 2012). This failure is due to two important factors which have stemmed from not taking into account of motivation factors of teachers to professional development, and the process of teacher change (Guskey, 2002). Another factor of failure is that teachers perceive in-service training as a separate or distinct event from the daily work.

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Desimone (2009) proposed that an effective in-service training programme should focus on a single subject. He also reported that one of the six important aspects of highly qualified training programmes is the content focus that emphasizes not only pedagogy but also the subject matter. On the other hand, Darling-Hammond, Gardner and Hyler (2017) are of the view that there is insufficient systematic professional development for teachers even though policymakers are generally aware of its significance on teacher effectiveness.

A large-scale study of the effectiveness of professional development programme with a nationally representative sample of science and math teachers indicates that an effective professional development programme that promotes change in teachers‟ behaviours should be intensive (not short-term drive-by sessions), should focus on specific academic content, should allow teachers to actively engage with tasks (i.e., hands-on learning), and should be integrated into the school's overall practices and culture (Yoon, 2007).

Bell (2012) concluded that a professional development programme is more effective when it is:

i) collaborative – involves staff working together, identifying starting points, sharing evidence about practice and trying out new approaches;
ii) supported by specialist expertise, usually drawn from beyond the learning setting;
iii) focused on aspirations for students – which provides the moral imperative and shared focus;

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iv) sustained over time – professional development sustained over weeks or months had substantially more impact on practice benefiting students than shorter engagement; and

v) exploring evidence from trying new things to transfer new approaches and practices and the concepts underpinning them to multiple contexts.

Furthermore, collective participation is evaluated as another important characteristic of an effective training programme; participation of teachers from the same department, subject or grade was more likely to be found effective since it fosters active involvement of teachers (Birman et al., 2000).

2.9 Measures to Improve Performance of Students in Biology

2.9.1 Creating an enabling classroom environment for learning

Formal education settings occur as a result of interaction among members in the classroom. In classroom settings, elements of the teaching/learning process include teacher, students, content, learning process and learning situation. The learning situation means the conditions in which learning takes place. Each classroom has unique teaching/learning conditions. Arend (2007) asserts that classrooms may seem similar from a distance but are different in their procedures and processes.

A classroom environment that allows students to work together to perform their learning tasks and allows maximum cooperative learning will represent an ideal classroom environment which in its turn paves the way for a successful and joyful language learning experience (Tayib, 2016). Tsavga (as cited in Umar, 2017) asserts that the learning environment plays a crucial role in determining students‟ success as it determines how a student behaves and handles his learning tasks. Indeed, the

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environment in which one finds himself tends to mould his behaviour to meet the demands of learning.

There are a number of theoretical hypotheses for why teacher-student connections improve learning. Individuals have three basic wants, according to Deci and Ryan (2009), these are competence, autonomy, and relatedness. The relatedness demand in particular emphasizes the importance of having positive interpersonal ties with other people. Given the central importance of peers in teenagers‟ life, the demand for relatedness (with both peers and teachers) is especially significant for students (Brown, 2000). people will internalize habits and attitudes that were previously external to them if these three needs are met. Students‟ relatedness needs will be met in science education when science teachers nurture interpersonal relationships between students and themselves; as a result, students will be more likely to internalize some of the norms and behaviours (related to science practice) that are being taught in the classroom (Deci & Ryan, 2004).

Science educators should ensure that learners get involved in the teaching and learning process always. This is because the study of Biology is a process of acquiring and generating knowledge and thought processes based on accurate observation, thorough investigation, experimentation, logic, proof, explanation and validation. Therefore, every teacher has the task of creating a teaching or learning environment that culminates into a rapport for a meaningful and in-depth understanding of principles and concepts (Kwale, 2006). This would enhance student‟s positive attitude to study Biology.

Teachers should strive to create contexts conducive to science learning in their classrooms. Furthermore, any concerned educationist should make building an ideal

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learning environment a top priority because comfort should be a result of a combination of several variables (Murugan & Rajoo, 2013).

2.9.2 Provision of resource centres

Biology performance could also be improved through the development of resource centres. Resource centres would help a lot as they could provide help and material resources aiding the process of teaching and learning. However, due to the lack of equipped laboratories teachers proposed improvisation.

2.9.3 Provision of learning resources

Ashton (2001) observes that instructional resources are essential in planning and implementing a successful learning program. He adds that the availability of learning aids is the most influential factor which explains various performance levels and concludes that the use of proper instructional materials leads to better performance.

Within schools, it is vital to make provision of resources that can be utilized to enhance the academic performance of students. The textbooks, notes, learning materials, hand-outs, technology, library facilities and laboratory facilities, especially in science subjects should include the essential materials. When students are provided the necessary tools and equipment, they will be able to acquire a better understanding of academic concepts and how to perform the experiments. In some cases, especially the students belonging to marginalized and socio-economically backward sections of the society, cannot afford the books and materials required for learning, hence, they are dependent upon the library facilities and fellow students to obtain the books and other materials (Maina, 2010).

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2.9.4 Motivation

One of the most influential factors affecting performance in school is motivation. The term motivation has many definitions. Loewen and Reinders (2011) defined motivation as the desire and incentive of an individual to engage in a specific activity, while Bukhari, Khan, Khalid and Shahzadi (2014) referred to motivation as students‟ effort to enhance performance.

The major objective of every institution is to achieve its aims and objectives. These aims and objectives are achieved by the co-ordinated efforts of their members (Fayose, 1999). An institution‟s success is dependent upon members being motivated to use their full talents and abilities to perform well in the right areas. The motives that compel teachers to work are complex and the incentives for which they strive include more than the salary. Even when people have clear work objectives, the right skills, and a supportive work environment, they would not get the job done without sufficient motivation to achieve those work objectives (Mullins, 2005).

Although the Government of Ghana has made some attempts to motivate teachers to make them enjoy their work and develop appropriate dispositions to deliver, a lot needs to be done to achieve this aim. The present poor working conditions in various schools in Ghana are indicative of the fact that, teacher motivation leaves much to be desired. These poor working conditions are evidenced by, large classes of teacher to student ratio, unequipped laboratories, few classrooms with few pieces of furniture, text books and teaching and learning materials. It should be noted that, teaching large classes without adequate teaching resources predisposes teachers to hardships and stress. Stressful conditions can result in many teachers being absent from work as result of sickness.

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Learners‟ motivation has also been accepted as a key factor, which influences the rate and success of learning. Motivation, also known as academic engagement, relates to cognitive, emotional, and behavioral indicators of a learner‟s investment in an attachment to education (Anand, 2004). Students‟ motivation and interest in science has been widely discussed concerning science education research (Osborne, 2008). Motivation is an important component for students to achieve success in any learning environment (Bukhari et al., 2014; Yulselturk & Bulut,2007). Therefore, the most important responsibility for science educators is to foster students‟ motivation to learn (Sanfeliz & Stalzer, 2003).

Several researchers have suggested that only motivation directly affects academic achievement; all factors affect achievement only through the effect of motivation (Herman, Tucker & Zyco, 2007). According to Lens and Vansteenkiste (2008), students‟ motivation was considered a crucial factor in the teaching and learning process at all levels of education.

However, it is not so easy to understand what motivates learners. Numerous studies have been conducted on this topic, which has led to the development of several theories of motivation. One widely accepted theory is the Goal Theory (Anand, 2004), which postulates that there are two main types of motivation for achieving at school. Learners with an ability or performance goal orientation are concerned with proving their competence by getting good grades or performing well (Anand, 2004). On the other hand, learners with a task goal orientation are motivated by a desire to increase their knowledge on a subject or enjoyment from the learning material. Studies have shown that learners with a task goal orientation are more likely to engage in challenging tasks, seek help as needed, and adopt useful cognitive strategies, and most

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importantly tend to be happier both with school and with themselves as learners (Anand, 2004).

Motivation is an important component for students to achieve success in any learning environment (Bukhari et al.,2014; Yulselturk & Bulut, 2007). Meanwhile, motivation towards science learning was defined as students‟ desire to learn science (Bolat, 2007). Therefore, the most important responsibility for science educators is to foster students‟ motivation to learn (Sanfeliz & Stalzer, 2003). According to Lens and Vansteenkiste (2008), students‟ motivation was considered a crucial factor in the teaching and learning process at all levels of education.

Most of the time, such students believe in their ability to learn Biology and will take responsibility for their learning. Motivated students will enjoy learning Biology inside and outside the classroom. Most of the time, such students believe in their ability to learn Biology and will take responsibility for their learning. Therefore, science educators need to devote diligently to assisting students to connect concepts in Biology. This can be done by explaining the importance of scientific literacy and its relationship to career opportunities in science (Bryan, Glynn & Kittleson, 2011; Aschbacher, Lee & Roth,2010).

2.9.5 Improving methods of instruction

One of the general aims of studying Biology at the SHS level is to develop a scientific approach to solving personal and societal problems (Teaching syllabus for Biology). The teacher must be informed on the problem of the nature and meaning of science and the methods of science. It‟s important to distinguish between the creation of science through study and the use or application of science. Scientists‟ methodologies, approaches, and attitudes must be used by teachers. They should use some science

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classics to demonstrate how scientists approached their difficulties. Students should have the opportunity to have hands-on experience with scientific approaches for obtaining answers.

For the teaching process to be successful, teachers should apply instructional methods that can best transfer information to the learners for the best outcome (Ayeni, 2011). Methods of teaching according to system theory are considered as part of the transformation process (Lunenburg, 2011). Without proper methods, content knowledge will not be delivered properly. Effective teaching and learning take place when several efficient teaching strategies are used (David, 2000). Teaching methods that allow the kind of teacher-student interaction promote internalization of the aims and goals of the curriculum, which is essential for the development of individual interest (Hidi & Renninger, 2011). Such methods include:

Fieldwork

Fieldwork involves the learning of Biology outside the classroom when treating some topics such as ecology, pollution and other topics (Lebata, 2014). It involves activities, including practical work outside the classroom. During fieldwork, young people have the opportunity to have hands-on experience outside the classroom, and this enables them to recall easily the activities they have done. Baker, Slingsby and Tilling (2002) argue that every little Biology from school, it is often the fieldwork aspect that is first recalled. It seems we all remember what we saw and what we did more. They further indicated that in the field of education whereby there is a mixture of teaching and learning approaches including hands-on and differentiated learning, which characterize much outdoor teaching. Fieldwork in the teaching of Biology is found to be very advantageous to both learners and teachers in various ways.

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Therefore, if employed in the teaching of Biology one would expect better results in the future.

The inquiry approach

Another approach that can yield good results if employed in the teaching of Biology is the inquiry approach. It requires the constant asking of questions about how and why things happen the way they do. Scientific inquiry is crucial for defining the characteristics of scientifically literate persons (Ogunmade, 2005). Understanding the nature of scientific inquiry is an important goal of science education as it enables teachers to be creative and enrich learners‟ abilities in understanding scientific concepts and processes (Bruffe, 2012). The inquiry method is characterized by students‟ actions such as investigation, searching, and exploring about a part of the context. This method requires a shift in the role of the teacher to that of a facilitator rather than an information provider.

Inquiry learning takes the form of investigation or practical work amongst learners. It involves learners investigating, asking authentic questions and constructing reasonable explanations for the questions formulated through an inquiry approach in science teaching and learning so that they understand the world around them and become scientifically literate. Scientific instruction in Biology through this approach also enables learners to formulate their own questions, devise ways to answer questions through data collection, analyze and determine the reliability of the knowledge acquired. Ogunmade (2005) further indicates that through inquiry-oriented teaching, teachers could help learners to build their interest in the materials and activities. It can encourage their thinking and discussion for a variety of investigatory

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paths which fit the lesson content and learners‟ intellectual level with everyday social application problems.

Edelson, Gordin and Pea (1999) argue that participation in inquiry can provide learners with the opportunity to achieve three interrelated learning objectives: the development of general inquiry abilities, the acquisition of specific investigation skills and the understanding of science concepts and principles. As a result, inquiry learning was called for by many governments and curriculum developers. However, studies indicate that inquiry teaching and learning approaches are rarely practical in science classrooms because of a lack of resources for effective practical work, among other factors.

Researchers in science education have compared inquiry-based and traditional teaching and learning approaches in science (Bell, 2005). The the inquiry-based approach helps to develop a high level of cognitive skills in learners and improves learning outcomes among learners. Ogumbowale (2001) points out that the broad scope of the science curriculum and emphasis on quantity of content coverage are the major constraints on inquiry approaches in science teaching and learning in Nigerian schools.

Different inquiry methods can be adopted by teachers in the science classroom such as open inquiry, guided inquiry, coupled inquiry, and structured inquiry or a combination of them as per the demand of the science concept. Science teachers can develop critical thinking and a deeper understanding of science concepts through inquiry methods (Abdi, 2014).

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2.8.6 Developing a positive attitude towards Biology

A study conducted by Usak et al. (2009) has shown that students‟ attitudes towards Biology are neutral, they concluded that improving their interest in studying Biology will lead to better learning outcomes in Biology. A positive attitude towards science may improve students‟ academic performance not only in science classes but also in other subjects as well. It is therefore in the interests of society, and the responsibility of educators, to improve student‟s attitudes towards science and to prepare students to live in a highly technological society.

The future of our society will be determined by citizens who can understand and help shape the complex influences of science and technology on our world (Ungar, 2010). If the students change their attitude towards Biology subject, the performance in their results will definitely improve since they will dedicate more time towards learning the science subjects.

2.9.7 Improving teachers' competency and abilities

Teachers play an important role in determining the climate of their classroom (Trowbridge, 2004). A study by Fuller in 1985 on factors influencing performance indicates that about 80% of studies confirm that in-servicing of teachers is positively correlated to achievement and 70% of the studies revealed a positive correlation between years of tertiary education and teacher training to achievement (Yoon, 2007). He further asserts that standards set the course, the assessment provides the benchmarks, but it is the teaching that must be improved to push us along the path to success.

Kwale (2004) in their baseline study‟s findings suggests that when the professional approach is embraced in the teaching and learning process, the use of indirect verbal

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behaviour, for instance, acceptance of student‟s feelings, praises, or encouragement is enhanced, may be associated with a more positive attitude towards learning and higher achievement by students. Thomas (2013) indicated that no matter how education is viewed, the role and the quality of teachers must be given the most critical consideration. Kwale (2004) found that some science Biology teachers subjected learners to traditional telling or the narration marathon which leads to ineffective learning of knowledge, skills and concepts required in Biology as a practical subject. They, therefore, suggest that it be made imperative for Biology as well as other subjects to be handled by teachers who are technically qualified. Teachers‟ qualification goes with their effectiveness in the classroom. They play an important role in teaching and influence the student‟s acquisition of knowledge, skills and concepts.

The role of development in student learning is increasingly important and researchers are beginning to take up the challenge of designing studies that can help identify the link between professional development and student learning outcomes (Borko, 2004; Fishman, Marx, Best & Tal, 2003). A large-scale study has examined how professional development affects teachers' knowledge and practice (Birman, Desimone, Garet, Porter & Yoon, 2001). It found evidence supporting the value of reform orientation, duration, and reform-oriented activities such as study groups to be more effective. The study was funded by the Eisenhower Math and Science programme. The content of teachers‟ professional development included targeting improvements to content knowledge, pedagogical strategies, alignment of curriculum and assessment, and a range of other topics (Porter, Garet, Desimone, & Birman, 2003). In-service training courses are necessary since teachers who attend them get to

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know the changes in the curriculum as far as the subject matter and teaching techniques are concerned (Beck & Earl, 2002).

2.9.8 Meeting students' needs

To ensure adequate recruitment and education of future scientists, sound and stimulating science teaching is needed. It should include a Biology course that meets the individual needs of all students. Capable students interested in science should have an opportunity to become acquainted with working scientists. Teachers should make it possible for all students to work at their maximum ability through a flexible program in which students help to determine and to achieve many of their objectives and all of the valuable scientific resources of the school and community are utilized.

It appears evident that learning is most effective in situations that actively involve the student, and especially when the course is specifically designed around his expressed needs.

2.10 Empirical Literature Review

In their study of the relationship between contextual factors at the school and pupil level and proficiency scores for science achievement in Italy, Fabio and Laura (2010) looked at the relationship between contextual factors at the school and pupil level and proficiency scores for science achievement using the Italian TIMSS (2007) data. According to their findings, schools account for 34% of the overall variance in Italy, and the school and teacher factors studied have no meaningful impact on students‟ science achievement. Science performance suffers when a student is a non-native speaker with limited cultural resources. The most important predictor of students‟ achievement was their confidence in learning science.

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Teachers can boost students‟ self-confidence by utilizing specific teaching strategies, according to educational psychology research. Research into educational psychology shows that teachers can improve students‟ self-confidence and self-efficacy by employing certain teaching strategies such as creatively engaging students and implementing collaborative learning or inquiry-based activities, according to educational psychology research (Fencl & Scheel, 2005).

A comparable study was conducted in Nigeria where science performance in secondary schools was extremely bad. It was observed that inadequate teaching and learning facilities at secondary schools, such as science equipment and laboratories, a dearth of trained and dedicated instructors, the scholars‟ inability to perform effectively in practice, and the teachers‟ teaching technique were among the factors that contributed to their low performance (Akinola, 2006). The majority of secondary school textbooks are authored by foreign authors that utilize sophisticated terminology that is difficult for students to understand.

Poor performance in science topics has been on the rise in Malawi, owing to a lack of science equipment, a lack of sufficient and high-quality textbooks, students‟ perceptions that science subjects are difficult, student laziness, and insufficient time dedicated to practical sessions (Dzana, 2012).

In South Africa, where education and training during apartheid were marked by the underdevelopment of human potential, particularly among blacks, a study on factors related to high school learners‟ low performance (Andile & Moses, 2006) was conducted. It was found that the teaching and learning of mathematics, science and technology were the hardest hit. The researchers divided the factors that contributed to poor performance into two categories: direct influences, which include teaching

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strategies, content knowledge and understanding, motivation and interest, laboratory usage, and syllabus non-completion; and indirect influences, which include teaching strategies, content knowledge and understanding, motivation and interest, laboratory usage, and syllabus non-completion.

The indirect influences include parental roles and language, (Thomas & Pedersen, 2003) argue that a common maxim in the educational profession is that one teaches the way he was taught. This suggests that for example an educator who was educated in an incompetent manner will have learnt bad practice and is likely to use such in teaching others.

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CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Overview

This chapter presents the methods adopted in the data collection process and their analysis. It also describes the research design. The chapter consists of the following headings: research design, population of the study, sample and sampling techniques, instrument used for the study, validity and reliability of the instrument, data collection, data analysis procedures and ethical considerations.

3.1 Research Design

The study employed a case study design. A case study is an in-depth exploration of a bounded system (e.g., activity, event, process, or individuals) based on extensive data collection (Creswell, 2012). It also permits collection of more data and information regarding respondents. The purpose of using this design agrees with what The case study places more emphasis on the full analysis of a limited number of events or conditions and their interrelations.

Based on the objectives of the research, an introductory letter was sent to the headmistresses of the two schools to seek permission from the authorities of the selected school to use the teachers and students for the study.

3.2 The study Population

The study population consisted of all Senior High Schools within the Ledzokuku Municipality in the Greater Accra region. The target population of this study was the entire biology teachers and students in two public Senior High Schools in Ledzokuku municipal assembly. These schools were Teshie Presbyterian S.H.S and O'Reilly S.H.S. These two schools were selected due to their proximity and convenience to

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work with. There were at present, eight (8) classes each in each school offering biology. The accessible population consisted of three classes from each school and three biology teachers from Teshie Presbyterian S.H.S and four teachers from O'Reilly S.H.S.

3.3 Sample and Sampling Techniques

The purposive sampling technique was used. This technique was employed to select the sample. In purposive sampling, often (but by no means exclusively), researchers handpick the cases to be included in the sample based on their judgement of their typicality or possession of the particular characteristic(s) being sought (Cohen, Manion & Morrison, 2018). They further said that, in this way, researchers build up a sample that is satisfactory to their specific needs and as its name suggests, the sample has been chosen for a specific purpose. The advantage of purposive sampling includes that participants who are relevant to the study are selected, therefore reducing costs and saving time. It also allows for the collection of reliable and robust data (Lewis, Saunders & Thornhill, 2012). The researcher used the purposive sampling technique to select seven (7) biology teachers including two Biology heads of department and six classes.

3.4 Research instruments

Document analysis, observation and interview were used to collect the primary data. Document analysis is useful in helping to develop a key phenomenon in depth because it can offer both „a behind-the-scenes look" that may not be collected from other data collections tools (Patton, 2015) and contextual richness (Creswell, 2012). Documents consist of public and private records that qualitative researchers obtain about a site or participants in a study, and they can include newspapers, minutes of

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meetings, personal journals, and letters (Creswell, 2012). These sources provide valuable information in helping researchers understand central phenomena in qualitative studies. These may be public documents (e.g., newspapers, minutes of meetings, official reports) or private documents (e.g., personal journals and diaries, letters, e-mails). For this study, the documents used were test and examination question papers, past internal examination results and the WASSCE data analysis developed at the schools.

Observation is the process of gathering open-ended, firsthand information by observing people and places at a research site (Creswell, 2012). This instrument was chosen as a data-gathering strategy because it provided the researcher with first-hand information as opposed to reports given by participants. First-hand information is important because what people say may be different from what they do (Cohen, Manion & Morrison, 2018). Observation also enabled the researcher to notice certain unusual aspects of the research and record information as it occurred.

Interviews enable participants to express their opinion on the situation (Cohen, Manion & Morrison 2018). The interview was used due to its ability to enable researchers to collect in-depth data from respondents (Opie, 2004; Bell, 2005) hence it enabled access to more information on challenges teachers face in teaching biology. For this study, data was collected via semi-structured interviews using an interview schedule (Appendix B). Cohen, Manion and Morrison (2018) explained that semi-structured interviews enable the course of the respondents‟ responses to dictate the direction of the interview, though the researcher also has an interview schedule to keep an interview on track, and may operate probes to inquire further into issues. An interview schedule is a list of questions that are asked during an interview to ensure

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that the interview achieves its intended purpose (Opie, 2004). In constructing this interview schedule, the researcher took into account the nature of information being sought, clarity of the questions to the respondents and sensitivity of the questions so as not to offend my participants. The head of the science department and five teachers were interviewed. The duration of the interview was considered as well since it has a bearing on the success of interviews (McMillan & Schumacher, 1993; Opie, 2004; Bell, 2005).

3.5 Validity and Reliability of the instrument

Validity in research is the ability of an instrument to measure what it is intended to measure (Creswell, 2012). Content validity was used for the study. To demonstrate this form of validity, one must show that it fairly and comprehensively covers the domain or items that it purports to cover (Cohen, Manion & Morrison, 2018). Content validity of the research instruments is important in enabling the collection of the intended information. The interview schedule and the questionnaire were validated by the researcher"s supervisor in terms of their relevance to answering the research questions. Based on his comments, the instrument was reviewed and restructured to meet the content instrument.

3.6 Pilot Study

The instrument was trial tested on a small sample of two biology teachers from Nungua S.H.S who were not part of the study sample but have the same characteristics as the respondents of the study, to prevent its influence on the main study. The data collected through the pilot study were statistically analyzed to obtain the reliability of the interview questions.

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3.7 Data Collection Procedure

Data from the sampled population was obtained using observation, document analysis and semi-structured interview.

3.7.1 Observation

Observation has the advantage of giving the researcher the opportunity to record information as it occurs in a setting, to study actual behaviour, and to study individuals who have difficulty verbalizing their ideas (Creswell, 2012).

Broad observation was conducted at first to enable the researcher note the landscape of activities in the school. The physical environment (the science laboratory,), human setting (characteristics of the students, teachers and class), interactional setting and teaching methods used by the biology teachers were observed.

Two lessons were observed for each of the five teachers in the sample using an observation check list (Appendix C). The type of observation employed in this study was the complete observer. In biology lessons observations, in order to capture teachers‟ changes in pedagogy and learners‟ activities, this approach was necessary. This meant that the researcher had no engagement in the class and did not intervene in the flow of the class with the aim of collecting data in a setting that was as natural as possible. The observation checklist assisted in capturing aspects of the lessons that related to challenges affecting the teaching and learning of biology. The researcher sat at one side of the classroom whilst observing and taking field notes.

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3.7.2 Document analysis

Despite documents analysis having limitations, such as difficulties in accessing material or inaccuracy in contents (Creswell, 2012), it has the potential to offer additional insights into a social phenomenon or structure. The documents analysed were past tests question papers, internal examination questions papers and WASSCE results analysis. These documents were helpful both to understand the central phenomenon and to design interview questions.

Following the observation, the participants were asked to provide her with the documents mentioned above. The documents were analyzed to enhance credibility. Marked sheets enabled the researcher to explain the attitude of students towards biology and compare performances of individuals throughout the whole year to find out if there were consistencies or inconsistencies in their performances. Question papers collected further shed more light on the type of questions asked during tests and internal examinations. The researcher was able to see whether the questions asked covered the learning outcomes stated in the syllabus. The documents also verified particular details provided by the respondents during the interview, and whether they corresponded with the data provided. The analysis of the WASSCE for different years was also looked at to find out if there were consistencies or inconsistencies between them.

3.7.3 Interview

The seven (7) Biology teachers including the Heads of the Department for Biology were interviewed face to face at their school by the researcher. In each case, a quiet and secluded place was used for confidentiality purposes as well as to prevent noise during the recording process. The interview duration ranged from 10-15 minutes. An

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interview schedule was used to guide the interview (Appendix B). Opie (2004), an interview schedule as a list of questions that are asked during an interview to ensure that the interview achieves its intended purpose. The researcher took into account the nature of information being sought, clarity of the questions to the respondents and sensitivity of the questions as well as the duration so as not to offend my participants. In addition to the questions on the interview schedule, follow-up questions also focused on the state of the science laboratory and the inability to complete the syllabus before the external examinaation as teachers raised these issues in their responses. All interviews were conducted at the participants‟ schools. The interview proceedings were audio-recorded with a phone. This was done to capture all the responses from the respondents along with the questions and to re-examine them at a later time if the need arises (Opie, 2004). In addition to these advantages, audio-recording gave the researcher ample time to listen to teachers during the interviews without the interruptions of taking notes.

3.8 Data analysis Procedure

Thematic analysis was used to analyse the data. Qualitative data from the interviews were organized into themes and interpreted based on the research objectives. The analyzed data were put in narratives and discussed. Conclusions were drawn and recommendations were made from the findings based on the research objectives.

3.9 Ethical Considerations

Ethical guidelines regarding issues such as informed consent, confidentiality, anonymity, and privacy need to be adhered to (McMillan & Schumacher, 2006). Permission was sought from potential participants of the study before the commencement of the study. A meeting with the biology teachers and students was

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held to induct them into the study. The students and teachers also filled a consent form before being engaged in the study indicating that they were informed of the purpose and the procedure of the study and their rights to withdraw at any time. Each participant was fully aware of the nature and purpose of the research. The information which was gathered was treated confidentially and their anonymity was ensured.

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CHAPTER FOUR

FINDINGS AND DISCUSSION

4.0. Overview

The data resulting from the findings of this study are critically analysed and discussed in this chapter. Lessons were observed and recorded (Appendix D) and an interview conducted for the biology teachers to gain an insight into the causes of the students‟ performance.

Table 1: Demographic Information of Teachers

TEACHER	GENDER	TEACHING EXPERIENCE	QUALIFICATION
HOD A	Male	14 years	M. Ed Science
HOD B	Female	11 years	B.Ed Science
Divine	Male	12 years	B.Ed Science
Anita	Female	7 years	B.Ed Science
John	Male	$1^1/_2$ years	B.Sc. Agriculture
Andrew	Male	1 year	B.Sc. Env. Science
Gladys	Female	10 years	B.Ed Science

4.1 Factors which Negatively Affect Students' Performance in Biology at S.H.S in the Ledzokuku Municipality

Tests and internal examination questions and results as well WASSCE results were analysed. The teachers were also interviewed in Table 2.

4.1.1 Internal examination questions and marks scored

Analysis of documents in O‟Reilly S.H.S revealed that internal examinations were organized twice a year. Marks obtained were from 2019 to the first semester of 2021 with records showing fluctuations in students‟ performance. Generally, most learners did not perform well (below average), only a few learners did well. Comparing the

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examination results for the two semesters, learners‟ marks seemed to be the same, there were no variations. The questions asked during the internal examination were of standard as they tested various levels of knowledge. Tests questions or results were not available.

However, at Teshie Presec SHS the researcher was not provided with any of the question papers for internal examinations or tests. Question papers for both the tests and the internal examination were not provided but the researcher was given the school-based assessment for only one class. Data provided indicated that learners were not tested as frequently as required, and this could be a factor affecting Biology performance. Frequent testing is important in teaching and learning. Records from internal examination results further showed that most learners performed poorly at the end of year examination. Few learners scored high marks ranging from 60% to 75%.

4.1.2 Analysis of WASSCE results

The WASSCE results analysis developed at O'Reilly SHS indicated in Table 2 shows that between 2016 and 2019 no student had A1, the percentage of students who obtained B3- D7 in the WASSCE were below 60% except for 2019 where 69% passed with about 33 students obtaining E8 and F9. However, in 2020, one student had A1 and out of the One hundred and eleven students, 38 students obtained B3 to C5 and 24 students failed.

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Table 2 : Analysis of 2016-2020 WASSCE results for Biology-O'reilly S.H.S

YEAR	A1	B2	B3	C4	C5	C6	D7	E8	F9	TOTAL	ABSENT
2016	0	0	5	4	2	6	17	22	21	77	0
2017	0	1	3	3	4	12	18	19	12	72	0
2018	0	1	6	3	2	5	21	10	21	69	0
2019	0	2	1	9	4	3	3	15	17	54	0
2020	1	3	8	8	19	13	14	30	24	111	1

At Teshie Presby S.H.S, the researcher was provided with WASSCE analysis from 2017-2020. The results from Table 3 indicates that percentage pass for learners increased slightly in 2018 to 51%. The percentage pass dropped drastically to 42.5% in 2019. The information gathered from the analysis demonstrated that students" performance in biology in the two schools is below average.

Table 3: WASSCE Results From 2017-2020. Teshie Presbyterian Senior High School

Year	Population	No. Passed	% Passed
2017	72	34	47.2
2018	69	35	51
2019	80	34	42.5
2020	125	56	45

An interview was conducted to find the cause of the poor performance. Five teachers from the two schools were interviewed. There was a wide range of views from the teachers. Table 4 below shows their responses which were categorized into four factors.

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Table 4: Factors Affecting Students' Performance Negatively

THEME	CATEGORY	CHARACTERISTICS
Factors affecting students‟ performance negatively.	Learner-related Factors	**INTERVIEWER:** Performance in your school is below average, what are some of the causes? **Divine:** The students perceive the subject to be a reading subject and do not attach any seriousness to it. (Attitude) We do our very best as teachers to help improve the learners‟ performance. All teachers, including myself work hard to provide "good" teaching but our students are not helping us. **Anita:** Learners also see some of the topics to be very difficult to understand and the biological terms are also difficult to memorise. (Attitude) **John:** Students do not do the work assigned to them. They want to be forced to learn. (Study habit) **Andrew:** Difficulty in understanding some biology topics. The students do not have time with their books, some of them study only when there is an examination. (Study habit)
	Institutional factors	**Divine:** Lack of well-equipped laboratory and library also hinder students‟ performance. Without these facilities, teaching and learning of biology is highly affected as it jeopardizes the learners‟ chances of success. (Limited physical resources). **Anita:** Another factor hindering students‟ performance is lack of teaching and learning facilities to enhance teaching. The books in the library are very few and some do not meet the standard of our students. (Limited physical resources) **John:** There are not enough text books in the library to aid students in their learning. The few Biology books available do not contain knowledge required by the syllabus. (Limited physical resources) **Andrew:** Lack of exposure to practical activities due to inadequate facilities is another problem which affects the students‟ performance. There are not enough text books in the library to aid students in their learning. (Limited physical resources) **Gladys:** The school also lack laboratory activities in biology due to the difficulty in organizing practicals with the little resources. (Limited physical resources)
	Technical factors	**Anita:** There are so many causes, let me start with the syllabus; the syllabus is too packed for the three year two and half course so we are not able to complete it at times and the students as well do selective learning to prepare for WASSCE because their notes are too many (Lengthy syllabus). **John:** The Biology syllabus is broad and sometimes questions were asked on parts of the syllabus not treated

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	(Lengthy syllabus). **Gladys:** The lengthy syllabus content of Biology hinders the proper learning of the facts as the learners may find it difficult to grasp the concepts as they also have other subjects to study during the examination (Lengthy syllabus).
Teacher-related factors	**John:** Some colleague teachers also do not assist the students; biology is a subject which requires practicals, yes we do lack so many facilities but it doesn‟t mean it cannot be organized in the classrooms. The practical section in the WASSCE carries a lot of marks and these students have to know all the technicalities involved (Teacher impact). **HOD A:** The Biology teachers are very few compared to the number of classes we have. There are three teachers at present instead of six. **INTERVIEWER:** What teaching methods do you often use in teaching biology? **Divine:** I normally use the discussion method because students get involved in discussions and this keep them active in class. **Anita:** Discussion. **John:** I use discussion method and once in a while I take the students around the school to observe some living organisms. I also take them through practical activities in the classroom. **Andrew:** Discussion method. **Gladys:** Discussion and sometimes Activity method. **INTERVIEWER:** How often do you carry out practical sessions? **Divine:** I start my practicals when they get to form two. **Anita:** Once a year **John:** Once a semester **Andrew:** Once a semester **Gladys:** Once a semester but when they get to the final year we do it regularly.

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4.1.3 Institutional factors

Physical Facilities

Table 4 indicates that all the five teachers were unanimous about their comments that Biology had been badly impacted by a lack of physical facilities in the schools. These are some responses from the teachers:

> *Without these facilities, teaching and learning of Biology are highly affected as it jeopardizes the learners' chances of success" (Divine).*
> *"Another factor hindering students' performance is lack of teaching and learning facilities to enhance teaching" (Anita).*
> *"Lack of exposure to practical activities due to inadequate facilities is another problem which affects the students' performance" (Andrews).*

The interview revealed that Biology is not taught to its full potential by teachers. One of the reasons is that there is the lack of a properly equipped laboratory and a library. Biology is a difficult subject, and the best way to teach it is to involve students. The lack of a well-equipped laboratory makes it difficult to provide education. This is in line with Akiri and Nkechi (2009), ineffective teaching is caused by situations such as a lack of resources that facilitate instruction, and this has a negative impact on student performance.

It was also revealed from the interview and observation that O"Reilly S.H.S has three laboratories but two have been converted into classrooms. However, in one of the schools, there are laboratories but not well equipped. Due to inadequate facilities in both schools, students were not mostly exposed to practicals that would have prepared them for paper one (a practical paper). The observation revealed that some experiments employing simple apparatus, on the other hand, were solely taught through demonstration. The HOD for O"Reilly S.H.S mentioned that the few instructional materials available at the laboratories were underutilized because teachers feel lazy to convey them to classrooms during lessons. Since biology is better

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studied through hands-on activities, the lack of resources such as inadequate laboratories adds to poor performance. Words alone are insufficient to convey concepts to learners in a way that captures and maintains their interest.

The interview also revealed that the schools lacked a well-equipped library and current reference books for Biology. In both schools, the libraries lacked adequate textbooks for Biology and other science subjects. According to one of the respondents, the textbooks available at the library contain insufficient or outdated information. Biology students‟ needs were not being met by the current library. In the interview, two teachers stated that the books in the library are very few and some do not meet the standard of our students.

Biology necessitates the use of a variety of textbooks for students to gain a better understanding of the subject. Dinah (2013), mentioned that textbooks, laboratory equipment, and other learning resources contribute significantly to the performance of learners in Biology examinations. The presence of irrelevant Biology textbooks in the library had a negative impact on the performance of students, especially when students were unable to extend their reading by using library books.

4.1.4 Learners as factors affecting performance

Teachers and learners who form the key elements in the school work together to achieve the intended goals. At O‟Reilly and Teshie Presby however, this is not the case. The responses from the interview from Table 4 specify that students contributed significantly to their success or failure in learning Biology. Three of the respondents talked about the students being a factor affecting performance. They pointed out that:

> *“Students do not do the work assigned to them. They want to be forced to learn” (John).*

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> *Some of the students do not have time with their books, some of them study only when there is an examination" (Andrews).*
>
> *Most of the students admitted in this school are already below average due to the school's category (Gladys).*

Divine and Anita also mentioned students‟ attitude towards the subject and difficulty in the topics as learners‟ related factors.This suggests that the students, do not cooperate with their teachers. This, of course, had a negative impact on performance. According to the expectancy-value theory (Eccles & Wigfield, 2002), a student‟s attitude toward science can be explained by two main factors: the student‟s expectations of success, and the value that the student places on success. It was discovered from the interview that students want to be pushed to learn rather than learning on their own. Gladys also explained that Most of the students admitted in this school are already below average due to the school‟s category. There is no competition among them in class. She went on to say that students struggled in Biology because they couldn‟t answer questions correctly. They always wrote practically everything they knew about a notion instead of responding to the question. It was evident from the test results that students do not study.

4.1.5. Overload of syllabus

The interview revealed that the lengthy Biology syllabus affects the learners‟ performance in the two schools. It was also revealed that the lengthy Biology content of the syllabus hinders learning of Biology.

> *"The lengthy syllabus content of Biology hinders the proper learning of the facts as the learners may find it difficult to grasp the concepts as they also have other subjects to study during the examination" (Gladys).*

According to one of the respondents another major factor affecting biology performance was the lengthy syllabus. The respondent explained that due to the long

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syllabus it was always very difficult to complete it. This agrees with Cimer (2007) who argues that Biology curriculum is broad and in order to let learners to perform better it would be of advantage to reduce the content of the Biology curriculum. From the observation made by the researcher (Appendix C), Biology was assigned five lessons at O'Reilly SHS. Due to the high demand for the subject, the periods on the timetable were insufficient, making it impossible for teachers to complete the extensive syllabus. And, of course, this constraint, which was not imposed on the students, had an impact on their performance. As a follow up to the response on the lengthy syllabus, the researcher asked what they do to complete it because the examination questions are set based on the topics, Anita responded by saying:

> *"I had to teach after school hours and weekends in order to cover enough before they write the final exam" (Anita).*

She explained further that the Biology course is broad, and that queries were occasionally posed about portions of the syllabus that were not covered. As a result, most students would leave questions unanswered, failing.

4.1.6 Teachers as factors affecting Biology performance

The suitable minimum qualification in teaching Biology is Bachelor of Education, Science, majors in Biology and any other science subject. Two out of the teachers interviewed were „new" in the system and they have taught for barely two years. This Heads of Department had the same views during the interview. This is what they had to say:

> *"Some teachers have inadequate exposure to teach Biology effectively and promote better performance because they are not experienced" (HOD A).*
>
> *"Teacher qualifications do affect Biology performance. Most of the time Biology was taught by unqualified teachers due to shortage of teachers thus having a toll on students' performance" (HOD B).*

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This could also be a factor affecting performance negatively. The more experience and training an educator has the more confidence and expertise he will have acquired to be an effective educator (Jackson, 2009).

It was observed that some teachers could not present concepts in Biology as expected during the lesson. Teachers who bring about student learning" are called effective or successful teachers. By successful teaching, they mean that the learner acquires some reasonable and acceptable level of proficiency from what the teacher is teaching. One of the Heads of department again mentioned teacher absenteeism as another factor which hinders students" performance.

The teaching methods used by the teachers also affects students understanding of Biology. The responses from the teachers showed that they seldom use the inquiry approach or the activity-based methods. During the observation, it was realized that some teachers were only giving notes whilst explaining them to the students. The students were not involved in the process unless one has a question to ask. Teachers" academic preparation, certification type, and years of teaching experience are often taken as indicators of teacher quality (Orleans, 2007). Lack of teacher discipline and commitment affect Biology performance negatively.

Another teacher related factor was lack of techers in the schools. This affects the students to teacher ratio thus the teachers" efficiency. The teachers find it difficult to attend to the individual learners who may need more attention. This is what a HOD had to say: "Biology teachers are few in the school and hardly go on vacation due to the tracking system". He further said they easily become stressed out due to the heavy schedule thus limiting their delivery of the lesson. Learners may not receive the

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attention they require to learn well in this situation affecting their performance negatively.

4.2 Challenges Affecting the Teaching and Learning of Biology in the Ledzokuku Municipality

The study probed further to find out other challenges teachers face in the teaching and learning of biology. There was a great variety of responses to this question. Table 5 shows the interview responses from the teachers.

Table 5: Challenges Affecting the Teaching and Learning of Biology

Theme	Category	Characteristics
Challenges affecting the teaching and learning of biology	Institutional factors	**INTERVIEWER:** Do you have adequate facilities which enhance the teaching of biology? **Divine:** No. The laboratories have been converted into classrooms and we are left with one room for practicals. **Anita:** No. Not at all. We need a well-equipped biology laboratory, learning materials, and classrooms to enable us deliver lessons to the understanding of the students. **John:** Hmm! No, We don‟t have enough classrooms and a laboratory. **Andrew:** No we don‟t have enough science apparatus. Some are broken down, we need new ones. **Gladys:** We have but not enough to accommodate the students.
	Lack of in-service training	**INTERVIEWER:** Have you attended any in-service training or workshop on biology recently? **Divine:** Yes, about 5 years ago. **Anita:** No **John:** I attended one recently but it was for integrated science. **Andrew:** Yes, but it was for integrated science. **Gladys:** Yes, an integrated science workshop.

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Financial resource	**INTERVIEWER:** Are there any other challenges facing the teaching and learning of biology? **Divine:** Lack of financial support to purchase teaching learning aids or conduct practicals. **John:** There are no funds to support us in the teaching-learning of biology.
Learner related factor	**Anita:** Learners behaviour in the classroom is one of the challenges facing us. **Gladys:** Most of our students commute long distances before getting to school therefore they get to school late missing a lot of lessons. (Learner related factor)
Lack of Motivation	**Andrew:** We are not motivated to teach at all. At least we should be given some incentives or other rewards to motivate us to teach.
Parent factor	**Anita:** Parents have a greater impact on their children‟s achievement by refusing to buy Biology textbooks for them. If they all had textbooks it will make our work easier because the students will read ahead of the lesson. **John:** Students these days don‟t learn and their parents are not helping as well. **Gladys:** The home these students are coming from is another factor hindering their performance. Some students are house helps and have a lot of chores to do in the house. (Home environment)

4.2.1 Physical facilities

All the respondents indicated again that they lack resources that enhance teaching and learning, there was unanimity in their responses. John submitted that:

> *“We need a well-equipped biology laboratory, learning materials, and classrooms to enable us to deliver lessons to the understanding of the students” (John).*

It was revealed that the schools need laboratories and classrooms as they experience problems with lack of equipment and chemicals in the laboratories while some of the available equipment is broken down.

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4.2.2 Financial resources

The interview revealed from Table 5 that the teaching and learning of Biology at the two schools were limited due to a lack of funds. Indeed, this made it difficult for teachers to carry out even the most basic experiment. Teaching and learning procedures were hampered due to a lack of money. Gladys explained that:

> *"Owing to a lack of financial assistance, the duty of delivering Biology syllabus is also hampered because the teacher was demotivated due to a poor income" (Gladys).*

Such teachers would not take the time to properly explain any idea that was taught. As a result, students lost interest in class activities, impairing the transmission of knowledge.

A lack of financial support has a negative impact on performance in any school. There must be aids that facilitate the teaching and learning process in order for the transformation process to proceed as planned. When instructional tools are used, students understand more. According to Jackson (2009), words alone are insufficient to communicate concepts to learners in a way that captures and retains their attention and interests. Indeed, practical training is critical to acquisition of knowledge and skills in Biology and to improve learning outcomes.

4.2.3 Parents influence on Biology performance

One respondent said:

> *"Parents can have an even greater impact on their children's achievement by refusing to buy Biology textbooks for them" (Anita).*

Parents have a say in how their children learn, which can lead to great outcomes. Norlin (2010) said for the school to achieve good results, people involved including parents should work together. Parents have a positive or negative influence on their children‟s academic achievement. They play a vital role in education by paying for

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their children‟s basic educational needs. Their performance suffers as a result of their failure to complete tasks on time. In their absence, teaching and learning continue to have a negative impact on performance. Even the most capable pupils fall short of achieving their full potential. The interview also revealed that students staying with guardians do not have ample time to study.

As a result of the study‟s findings, one of the heads of department (HOD B) believed that home background is a component that influences the performance of students. One of the respondents also stated that some students do not perform well because they are emotionally disturbed at home, such as those whose parents are abusive or drug users. Some students are orphans, with no one to look after them at home and no one who can control them. Family, behaviours, and cultures can all be part of one‟s home background. When you combine these factors, one or both of them can have an impact on a child‟s academic achievement.

4.2.4 Lack of motivation

The interview also revealed that teachers are not motivated to carry their duties. Andrew commented that:

> *"We are not motivated to teach at all. At least we should be given some incentives or other rewards to motivate us to teach" (Andrew).*

Motivation is another thing to consider. An extremely motivated person puts forth maximum effort in his or her work. Motivation and job satisfaction are influenced by several factors. Andrew, one of the respondents mentioned that teachers are not motivated to teach. Motivation is an inner drive in an individual to excel in whatever he or she is doing.

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Young (1989) looked at job satisfaction among Californian public school teachers in the United States and discovered that one of the overall job predictors was the wage. Motivation is a very important psychological concept which helps an individual to consistently strive to achieve an objective.

4.2.5 Lack of in-service training

From the interview, it was revealed that all the teachers have not attended in-service training on Biology recently. One of the respondents stated that the in-service training he attended recently was on integrated science. He explained further that it was not of many benefits since they stressed only the Chemistry aspect of the integrated science syllabus. Studies have shown that in-service training fails to achieve its objectives (Tuba, 2012). This failure is due to two important factors which have stemmed from not taking into account of motivation factors of teachers to professional development, and the process of teacher change (Guskey, 2002). Teachers are obliged to keep up with changes and stay informed about advancements, scientific and educational innovations.

4.3 Suggested views that can help Attenuate the Negative Impact of the Factors that Affect the Academic Achievement of Students

There were diverse views from the respondents here which fell into five categories; physical resources, in-service training and workshops, teamwork and improving teaching methods. Suggested strategies for improving performance in biology by teachers were presented in Table 6.

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Table 6: Strategies to Improve Students' Performance in Biology

Theme	Category	Characteristics
Strategies to improve students'' performance	In-service training	**INTERVIEWER: What steps do you think can be put in place to improve biology performance, in your opinion?** **Divine:** There must be in-service training for Biology teachers. **Anita:** There should be workshops for Biology teachers to discuss their issues. During such programmes, we will learn how to deal with difficult topics. **John:** In-service training should be organized to keep us refreshed and boost biology performance. Even teachers with qualifications that meet the current standards are need it.
	Physical resources	**Divine:** We need a science resource centre in the district or if possible a well-equipped laboratory in the school. **Anita:** Well I think the library should be stocked with textbooks which meet the standard of the syllabus. **John:** The laboratory should be expanded and more classroom should be built. **Andrew:** There must be development of resource centres for schools to rent apparatus and other materials. Classrooms should be built so that we can utilize the laboratory. **Gladys:** All facilities which enhances teaching and learning should be provided in schools.
	Teamwork	**Divine:** To tackle difficult subjects, teachers should collaborate as a team in schools, even at the cluster level. **John:** In my school, performance in Biology may be improved by instructors working as a team. Biology performance can improve as a result of collaborative teaching, as teachers will gain new.
	Improving teaching methods	**Anita:** Teachers should use a variety of teaching strategies. Choosing approaches that emphasize a child-centered approach. Teachers should aim at engaging students as much as possible in the learning process. (Teacher impact) **Gladys:** The teachers should involve the students in a lot of field work. (Teacher impact)

4.3.1 Provision of facilities

The respondents suggested the expansion of the laboratories and building more classrooms so that the laboratories will serve its purpose rather than being used as classrooms or for storage of chemicals and apparatus only. Three out of the five respondents also advocated the creation of science resource centers in the

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municipality in order to boost Biology performance. Since most schools do not have science laboratories, the respondents indicated that resource centers will be extremely beneficial because they will be able to rent apparatus, charts, and purchase some chemicals. John commented suggesting that the school should be provided with projectors to enable them explain some biological phenomenon to the students.

Andrews said:

> *"Resource centers are designed to aid and assist people therefore developing one in the Ledzokuku municipality can significantly improve Biology performance"(Andrew).*

Resource centres provide opportunities for learning by providing knowledge, help and material resources. They also serve as a meeting place for like-minded individuals, making them important social centres. They further provide training or classes to help to find answers to questions in the form of reference materials. Scientifically literate assistants will suggest the easiest ways of carrying out some biological experiments at the resource centres if teachers had problems relating to certain investigations. Through the development of resource centres in, one may expect a positive change in Biology as the problems of teaching materials could be minimized.

4.3.2 Devising methods of teaching

The Head of department for O'Reilly S.H.S (HOD A) advised that Biology teachers devise techniques of teaching Biology in order to improve students" performance. "Teachers should aim to include learners in learning as much as possible by engaging them in hands-on activities" he said.

Nwosu (2006) observed that most Biology teachers use all the Biology periods for theoretical aspect of the subject neglecting the weightier practical aspect which has potential for developing critical thinking and objective reasoning abilities in learners.

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She believes that Biology may improve if teachers tried as hard as they could to engage students in activities during lessons. A comment from a teacher also says:

> *"Biology can also be enhanced by working with students on test and internal examination adjustments. Going over the questions together will help them identify how best to interpret the questions" (Divine).*

He went on to say that giving students additional work would be beneficial because it would allow them to improve their knowledge and eliminate misconceptions by exposing them to more reading.

4.3.3 Workshop and in-service training

In-service training was suggested as a means of improving students‟ performance in biology since teachers will be equipped with new knowledge. In this way, solutions to difficulties faced by students and teachers can be found. Responding to the interview, a respondent explained:

> *"In-service training should be organized to keep us refreshed and boost biology performance. Even teachers with qualifications that meet the current standards are need it" (John).*

He went on to say that the government should hold refresher seminars for Biology instructors on a regular basis to keep them up to date on new discoveries. During seminars, teachers should discuss their difficulties in dealing with biological topics. And it is in those sessions that difficult themes can be discussed. s is known by many educators, there have been rapid changes in the teaching profession. In recent years, changes in the teaching profession have affected almost all aspects of classroom life, influencing the philosophy of schools, developing new teaching-learning applications, changing the direction of research efforts, and putting heavy constraints and responsibilities on society with respect to ameliorating the problems of the educational system. Teachers could play a variety of responsibilities in order to

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establish a conducive teaching and learning environment for the most effective use of instructional methods.

Teachers have not been given the opportunity to retrain, which explains their poor performance. As a result, they advocated for teachers to be encouraged to participate in workshop trainings in their areas of expertise, where they could reflect on their learning and share their experiences. Anamuah-Mensah et al. (2012) pointed out, Ghana Education Service (GES) acknowledges the fact that pre-service training alone cannot produce a complete teacher who would be able to meet the challenges of a world that is changing rapidly. In-service training assists teachers in broadening their knowledge and developing new skills. In-service training should be arranged to improve the teaching standards of teachers. Teachers have, and need to use, the many opportunities for keeping up-to-date through their professional journals, refresher courses and in-service training programmes (Tuba 2012).

Unfortunately, the GES in-service training is found to be insufficient and intermittent, making it unproductive for teachers. Another respondent said:

> *"In-service training, could boost students' performance in biology. Even teachers with qualifications that meet the current standards are needed to take it" (Anita).*

Teachers who attend in-service training are usually well-versed in the subject matter as well as numerous teaching approaches that engage student. The development of in-service training is unquestionably a viable technique of improving Biology performance.

A study by Fuller in 1985 on factors influencing performance indicates that about 80% of studies confirm that in-servicing of teachers is positively correlated to

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achievement and 70% of the studies revealed a positive correlation between years of tertiary education and teacher training to achievement (Yoon, 2007).

4.3.4 Teamwork

In Biology, team work or team teaching entails teachers cooperating, sharing materials, offering guidance, and planning classes together. The science HOD for O'Reilly S.H.S had this to say:

> *"Within the classroom, learning can be regarded as an interactive process and a product of learner and teacher engagement" (HOD A).*

HOD A again responded to this issue by stating that teachers should work together as a team in schools as well as cluster meetings, to identify solutions to existing problems. A cluster is formed when nearby schools collaborate to pursue the same educational aim, which is to improve student outcomes. During cluster meetings, instructors are free to share their concerns about Biology teaching and learning at their respective schools. In such meetings, difficulties that Biology teachers face are resolved.

Teachers choose team teaching when teaching and learning do not proceed as anticipated due to the teacher's failure to communicate the subject.

> *"Biology performance may be improved by asking other colleagues to teach some concepts that are difficult for them to teach, which will benefit students much since they will be able to understand the concepts better when treated by another teacher" (HOD B).*

She added that teamwork could be really beneficial because some teachers excel at certain topics that others find challenging.

Students performance in biology can be improved with the usage of team teaching since teachers will be working as a team to address the topics that are the most

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difficult. In the teaching and learning process, knowledge sharing is crucial. Performance in Biology would improve if teachers collaborated as system theory suggests, but failing to do so could result in negative feedback. Teachers collaborate to create lessons for a specific set of students and assist one another in presenting diverse topics.

Fearon (2008) defines team work as an instructional environment in which two or more teachers with complementary teaching talents collaborate to organize and administer instruction for a single group of learners using flexible scheduling and grouping approaches.

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CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview

This chapter summarises the findings of the study and conclusions drawn from the analysis. It also offers recommendations for improvement of teaching of biology in senior high schools in Ghana.

5.1 Summary of Findings

The underlying objective of the study is to improve the academic performance of students in Biology within the Ledzokuku Municipality through the identification of challenges affecting its teaching and learning.

The identification of these challenges and strategies to attenuate them are expected to help the students to develop the required interest, skills and knowledge for better comprehension of Biology concepts for further study. In general, the WASSCE results for Biology of Senior High Schools within the Ledzokuku municipality have been poor. The study has concentrated on Biology performance because it is one of the science subjects that are commonly chosen by students but has a significant failure rate in the WASSCE. The qualitative method was deemed to be appropriate for this research because, in order to understand the causes of poor performance in Biology and how performance could be improved, an in-depth understanding and reasoning were necessary.

Various challenges were identified to have an effect on students‟ performance in Biology at Senior High Schools within the Ledzokuku municipality. These were institutional factors, technical factors, teacher-related factors and learner related factors.

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- *Institutional factors*

Among the institutional factors found were lack of physical resources which include well-equipped laboratory, library, teaching and learning materials. These resources when available enhance teaching and learning; in their absence performance is affected negatively.

The study discovered that the number of biology teachers in the schools studied is very small in relation to the students‟ number. This results in a very high learner-teacher ratio. This phenomenon affects the effective handling of the class. The temptation is therefore available for the teacher to resort to the lecture method. Dabo 2015 mentioned that learners in overcrowded classrooms do not actively participate since teachers end up employing teacher-centered techniques to teach lessons. There were also complaints from the teachers that lack of funds for purchasing materials to teach had an immense impact on their teaching.

- *Technical factors*

The lengthy syllabus was one of the challenges facing biology teachers as they are unable to complete the topics before the final exams.

- *Teacher related factors*

The use of ineffective methods of teaching resulted in the content not being delivered correctly. It was sometimes taught by unqualified teachers that fell short of the requisite level of skill and competency in the subject‟s teaching due to shortage of teachers. Also teachers had negative impact on the performance of students because they did not attend classes on a regular basis as required; they skipped classes and did not have time to assist learners. Lastly teachers were not motivated to teach and work under stressful conditions.

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- *Learner related factors*

Learners also had a detrimental impact on their performance. They failed to do assignment, study and attend classes due to various reasons. They had bad attitude toward Biology, and were obviously unmotivated to learn the subject. Some students admitted to S.H.S had a poor science background, at the Junior High level, which, of course, had a negative impact on performance.

Strategies to improve Biology performance

Respondents came up with many ways in which they thought would bring positive changes in Biology performance if employed.

In-service training for teacher development was found to be one of the strategies that would bring positive changes if employed. Teachers from time to time ought to have training as a means of empowering them. It is during the in-service training whereby problems they experience in their teaching can be solved.

Secondly, there must be the development of the resource centres where teachers could find help regarding teaching aids such as charts for treating certain topics and provision of well-equipped laboratories.

Respondents further suggested team work by Biology teachers. Through collaborative teaching, learning and teaching would be possible as teachers would work hand in hand to facilitate the process of learning. Teaching and learning could also be facilitated by motivating teachers and by the involvement of parents through the provision of their wards" needs and encouraging them to learn.

Finally, teachers also considered changing their teaching strategies (traditional methods) in favour of those that involve students because they learn more when they

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are involved (inquiry based method). This would be really beneficial because their knowledge of certain ideas would be greatly enhanced.

5.2 Conclusions

It is indicative from the findings of the study that factors such as lack of physical facilities, learners‟ attitude towards Biology, teacher related factors and overload of syllabus affect teaching and learning thus resulting in poor performance among the students. It can be concluded that the inquiry approach, deployment of qualified Biology teachers, in-service training for teachers, provision of adequate teaching resources, team work, development of resources centres and positive attitudes are some measures that can be used to improve performance of Biology students.

5.3 Recommendations

Based on the findings and the conclusions drawn from the study, the following recommendations have been made:

- To build a positive attitude toward learning and increase creativity in learners, biology teachers, should be encouraged to adopt learner-centered methodologies such as discovery learning, problem-solving, hands-on activities, and fieldtrips.
- Biology teachers should devise strategies to motivate students to learn.
- School management should regularly organize series of parents‟ meetings to inform them about the performance of their children and how it could be improved. In this manner parents will value the education of their children and buy books required.

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- MoE on behalf of the Government of Ghana should construct and equip additional modern Science Laboratories and refurbish the existing ones across the entire country. This would bring under control the challenges of non-availability of well-equipped Science Laboratories in the Senior High Schools in the country.
- NaCCA should reconsider the Content-Duration Principle and increase contact hours for teaching biology in the Senior High Schools.
- Teachers should take advantage of the opportunities offered by the Nation‟s Universities to upgrade themselves and acquire the requisite knowledge and skills that adequately meet the Biology Teaching tasks in the Senior High Schools. This would in turn enable the students to develop the needed interest in the study of the subject.

5.4 Suggestions for Future Research

Research should be undertaken in other municipalities to develop concrete strategies that could be employed by all Biology teachers to enhance students‟ performance

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APPENDICES

APPENDIX A

WASSCE RESULTS ANALYSIS

WASSCE RESULTS ON BIOLOGY FROM 2016-2020. O'REILLY SENIOR HIGH SCHOOL

YEAR	A1	B2	B3	C4	C5	C6	D7	E8	F9	TOTAL	ABSENT
2016	0	0	5	4	2	16	17	22	11	77	0
2017	0	1	3	3	4	12	18	19	12	72	0
2018	0	1	6	6	2	5	21	10	18	69	0
2019	0	2	1	9	4	3	3	15	17	54	0
2020	0	3	8	8	19	13	14	30	24	111	1

O'REILLY SHS --- COMPARISON OF 2017, 2018 AND 2019 WASSCE RESULTS

	2017			2018			2019		
SUBJECT	POPL.	No. Passed	% Passed	POPL.	No. Passed	% Passed	POPL.	No. Passed	% Passed
INT. SCI.	277	156	56.3	348	276	79.3	392	354	90.3
PHYSICS	30	30	100.0	25	25	100.0	40	39	97.5
CHEMISTRY	37	35	94.6	41	30	73.2	65	62	95.4
BIOLOGY	72	62	49%	74	63	59.1	64	57	73.1

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APPENDIX A CONTINUED

WASSCE RESULTS ON BIOLOGY FROM 2017-2020. TESHIE PRESBYTERIAN SENIOR HIGH SCHOOL

Year	Population	No. Passed	% passed
2017	72	34	47.2
2018	69	35	51
2019	80	34	42.5
2020	125	56	45

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APPENDIX B

INTERVIEW GUIDE FOR TEACHERS

DEAR RESPONDENT

This study is meant to find challenges besetting the teaching and learning of Biology Senior High Schools at the Ledzokuku Municipal Assembly. The findings of this study will go a long way to enhance the teaching and learning of Biology thus improving performance. All information given will be used only for academic purposes and the information you provide will be treated with the utmost confidentiality it deserves. Your cooperation is therefore highly acknowledged. Thank you for your cooperation.

SECTION A

(i) Gender Male [ ] Female [ ]

(ii)What is your highest professional qualification

PG. DE [ ] B.SC [ ]

Dip. Ed [ ] B.ED [ ]

B.A [ ] M.E.D [ ]

Other (……)

(iii) For how long have you been teaching?

Less than one year	[ ]	1-2 years	[ ]
3-5 years	[ ]	6-10 years	[ ]
11-15 years	[ ]	more than 15 years	[ ]

SECTION B

Interview questions for teachers

3. What is the status of Biology performance in your school?

4. What are the causes of poor performance in Biology?

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APPENDIX B CONTINUED

4. Do you have adequate facilities which enhance teaching of Biology?

5. Are you able to cover all the topics in the syllabus?

6. What methods of teaching do you frequently use in teaching Biology?

7. Have you attended any In-service Training recently?

8. Do the students show interest in Biology? What measures do put in place to arouse their interest.

9. Are there any challenges you experience as a Biology teacher?

10. In your opinion, how can these challenges be resolved?

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APPENDIX C

OBSERVATION SCHEDULE

Outcome of variables observed in O'Reilly S.H.S

Variable	Observation
1. Well-equipped science laboratory	
2. Biology teacher"s readiness and adeptness in the biology practicals	
3. Students" involvement in biology lessons	
4. Teaching methods used by teachers	
5. Too large number of students to one teacher	

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APPENDIX D

OUTCOME OF OBSERVATION

Table 3: Outcome of variables observed in O'Reilly S.H.S

Variable	Observation
1. Well-equipped science laboratory	Disagree
2. Biology teacher"s readiness and adeptness in the biology practicals	Fair
3. Students" involvement in biology lessons	Fair
4. Teaching methods used by teachers	Unsatisfactory
5. Too large number of students to one teacher	Fair

Table 4: Outcome of variables observed in Teshie Presbyterian S.H.S

Variable	Observation
1. Well-equipped science laboratory	Disagree
2. Biology teacher"s readiness and adeptness in the biology practicals	Fair
3. Students" involvement in biology lessons	Fair
4.Teaching methods used by teachers	Unsatisfactory
5. Too large number of students to one teacher	Agree