

**TEACHERS' ADMINISTRATION OF FORMATIVE ASSESSMENT TESTS
AND ITS INFLUENCE ON STUDENTS' BIOLOGY PERFORMANCE IN
SECONDARY SCHOOLS IN SIAYA COUNTY, KENYA**

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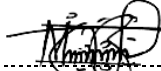
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DECLARATION

I declare that this research work is my original work and has not been presented in any other university/institution for consideration of any certification. This research thesis has been complemented by referenced sources duly acknowledged. Where text, data (including spoken words), graphics, pictures or tables have been borrowed from other sources, including the internet, these are specifically accredited and references cited using current APA system and in accordance with anti-plagiarism regulations.

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DEDICATION

This study is dedicated to my dad John Were Deya, my mother Rose Were and my brother Samuel Were for their support towards my needs during my studies and in the writing process.

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ABBREVIATIONS AND ACRONYMS

CAT	Continuous Assessment Test
CLT	Central Limit Theory
KCSE	Kenya Certificate of Secondary Education
KNEC	Kenya National Examination Council
OECD	Organization for Economic Co-operation and Development
SPSS	Statistical Package for the Social Sciences

ABSTRACT

Improving the value of the current system of education depends on the evaluation methods used in class, which play both summative and formative roles. For several years now, students have continued to perform poorly in biology in Siaya County and across most secondary schools across the country. Therefore, this research aimed at investigating how teachers' administration of formative assessment tests influences learners' academic achievement in biology in high schools in Siaya County, Kenya. The research is based on three major objectives: to determine how feedback on formative assessment tests administered by teachers influence the performance of learners in biology in Siaya County; to find out how frequency of teachers' administration of formative assessment tests influence the performance of learners in biology in Siaya County; and to establish how learning through assignments influence the performance of learners in biology in Siaya County. Ivan Pavlov's (1929–1936) Classical Conditioning Model guided the study. Questionnaires and in-person interviews were utilized to gather data. The study's research design was descriptive in nature. The study targeted 159 secondary schools in Siaya. The respondents, including principals, teachers, and deputy principals, were selected at random to provide their primary data. The collected data were analyzed using descriptive statistics in the form of frequencies, percentages, means and standard deviations. Content analysis was used to analyze the qualitative data. The estimations between the dependent and independent variables were based on the results of both frequency and tabulation distribution charts. The instruments' validity and reliability were also established. With the intention of finding instrument errors during the research, a pilot study was carried out to determine the instrument's appropriateness for the study before actual data collection began. Ethical, logistical, legal, and HR concerns were also considered and upheld in this study. All participants were asked to provide their appropriate consent before they could take part in the study. The findings revealed that all three components of formative assessment, feedback ($r = 0.635$, $p < 0.01$), frequency ($r = 0.652$, $p < 0.01$), and assignments ($r = 0.622$, $p < 0.01$), had strong positive and significant correlations with learners' academic performance. The regression model indicated that feedback ($\beta = 0.326$, $p < 0.001$), frequency ($\beta = 0.235$, $p = 0.005$), and assignments ($\beta = 0.284$, $p < 0.001$) significantly predicted students' performance, jointly explaining 53.7% ($R^2 = 0.537$) of the variation in academic outcomes. The study concludes that prompt and constructive feedback enables students to understand their learning progress and address weaknesses, frequent formative assessments help teachers adapt instruction to learners' needs, and learning through assignments promotes reflection, responsibility, and better academic results. Recommendations include that school administrators and policymakers strengthen teachers' capacity to provide timely, goal-oriented feedback; promote regular formative assessments; and design meaningful assignments aligned with clear learning objectives. Continuous professional development, in-service training, and curriculum alignment toward formative assessment practices are also recommended to enhance students' performance in Biology and other subjects.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The worldwide consensus is that each educational endeavor must begin with an evaluation of pupils' academic achievement, since this will reveal whether or not the goals of instruction have been met. Evaluation is regarded as a testing process that is reliable in collecting formative information. Similarly, it can refer to generating extrapolations depending on the academic achievement of students concerning different bona fide learning goings-on, whether the extrapolations are for formative or summative reasons (Morris, Perry, & Wardle, 2021). Consistent quality improvement of formal learning majorly depends on the available well-conceived approaches used in evaluation with both collective and determinative purposes.

For many years, teachers' administration of formative assessment tests has turned out to be a major concern in the entire education sector across the world. The education sector stakeholders, including researchers, teachers, and policymakers, have continued to show a lot of interest in teachers' administration of formative assessment tests since it supports and reflects students' learning. For instance, in the United States, teachers' administration of formative assessment tests is used as an official policy in schools within 25 states (Lee, Chung, Zhang, Abedi, & Warschauer, 2020). The policy is considered an important strategy for achieving several targets set out within the Organization for Economic Co-operation and Development (OECD) (Awofala & Olaniyi, 2023). To ensure the effectiveness of teachers' administration of formative assessment tests, several countries have come up with guidance books used by teachers in employing a more methodical

developmental assessment process. A determinative valuation plan was instigated in England in the year 2000 at both primary and secondary schools (Anders, Foliano, Bursnall, Dorsett, Hudson, Runge, & Speckesser, 2022). Additionally, New Zealand has linked its national assessment strategy to formative assessment. More nations, such as Spain, Germany, Finland, and Sweden, have also stressed the effectiveness of formative assessment and the need to continue evaluating students with the use of various assessment methods, including portfolio assessment, interviews, and the use of verbal feedback (Anders et al., 2022).

Generally, assessment can entail a formative role that both teachers and students can use to enhance their learning experiences. Therefore, Teachers' administration of formative assessment tests can be defined as a process employed by both teachers and learners to respond and recognize the learning processes of students to ensure the effectiveness of the entire process of studying (Irons & Elkington, 2021). Incorporating formative assessment tests into the learning-teaching process requires instructors to divide the entire course into various hierarchical parts that can be utilized for instruction. That is, administration of summative tests, which is done after the completion of all units, giving specifications of objectives for each unit, provision of group-based remediation, especially in places where there are deficiencies in students before incorporating other units, and also validating and designing various formative tests that are validated (Awofala & Olaniyi, 2023). Breaking up the curriculum into smaller elements enables learners to sufficiently prepare for their various assessments. Additionally, providing students with such tests frequently enhances their commitment and involvement in the entire teaching-learning process, improving their performance. Determinative valuation is beneficial

first to teachers as a mechanism of identifying the learning hitches of their students, together with the development of various alternative corrective procedures, and secondly to teachers as a strategy for discovering the exact challenges their learners experience in specific contents of the entire course (Ajogbeje, Ojo & Ojo, 2021).

Teachers' administration of formative assessment tests serves three major functions: motivating students, facilitating the transfer of learning, and increasing retention. Moreover, responses made by students regarding a formative assessment may be examined to divulge individual and group mistakes that require rectification (Salas-Bustos et al., 2025). According to Heggarty, Teague, Alele, Adu, and Malau-Aduli (2020), the results obtained from the investigations regarding the extent to which teachers' administration of formative assessment tests and characteristics of cognitive entry measured the academic performance of students across all undergraduates in universities indicated that formative assessment portrays the highest level of strength towards academic achievements, with all variables being put into consideration. According to another study conducted among the polytechnic students, the cognitive entry characteristics, which entail Polytechnics and Colleges Entrance Examination and West African School Certificate, do not directly relate to the academic achievements of polytechnic students in biology (Heggarty et al., 2020).

Nsabayezu, Iyamuremye, Mboniyirivuze, Niyonzima, and Mukiza (2023) state that teachers' administration of formative assessment tests is a procedure through which both learners and teachers offer responses in tuition to systematize both their teaching and learning progression, hence ensuring an escalation in the learner's performance. Determinative valuation can be perceived as a vital and valid unifying

part for both assessment and coaching. Usually, determinative valuations enable teachers to understand if their learners have an indicator qualification on how the next lessons should be conducted or whether they have learned anything from the previous lessons (Panadero, Andrade & Brookhart 2021). There are three major components of teachers' administration of formative assessment tests or formative assessment: using peer and self-assessment, increasing the value of response, record keeping or marking, escalating the worth of dialogue or inquiry, or explaining the learning objectives and success criteria (Nsabayezu et al., 2023).

The concept of feedback stands at the center of determinative valuation. The intensity of the impact of determinative valuation stems from the levels of strength of feedback that students are provided with on their studying and teachers on their coaching methods (Villa-Ochoa, Sánchez-Cardona, & Rendón-Mesa, 2021). Determinative response entails information conveyed to learners, which permits them to shape their behaviors or judgments to advance their studying abilities. The response presented through determinative valuation comes with benefits, especially if it provides learners with a learning profile, helping them improve on their learning skills, reinforcing their work, and playing a key role in motivating students (Villa-Ochoa et al., 2021).

Use of determinative evaluation in the process of learning involves dividing the course or topic matter into different smaller hierarchical units mainly for the purpose of specifying the objectives of each unit, instructing, administration and designing formative tests that are validated, and also provision of remediation, especially in parts where learners are short afore proceeding to the other parts then carrying out the management of collective tests once all units are completed. According to

Gallardo (2020), grouping the entire course or subject into smaller units enables learners to prepare adequately for tests that would occur periodically. Such tests further provide a strategy for making sure students get more committed and involved in the entire teaching-learning process, hence improving their performance. With the new system of education 6-3-3-4, the regular student testing will, to a greater extent, play a key part in discovering the performance of learners, hence improving their studying standards (Tejedor et al., 2021). The reason for making use of trials together with other assessment tools in the structural course is to monitor and guide both students' progress and learning towards attaining the objectives of the entire course. Both teachers and students cannot effectively perform without having adequate information concerning the standing of students at any time and the scope of the advancement regarding the attainment of the specific structural aims. The continuous assessment quizzes presented occasionally to students should the threatening impacts of a sole exam always presented at the closure of the program.

Assignments further seem to be more beneficial to older students than younger students, whose benefits seem to be nonacademic. Teachers always use various instructional approaches to attain the academic requirements of their learners (Castro, Shoaib, & Douglas, 2021). To be successful, teachers always use different approaches to help their learners understand different concepts and provide options for independent classroom work. Assignments benefit the learners' studying and their performances (Pollock & Tolone, 2020). The educational resolution of assignments is to enable learners to obtain genuine information, advance their studying abilities, and help them learn anywhere. Not just within the school classroom or when the teacher is around.

In our modern societies, Biology is considered a basic foundation for technological and scientific knowledge. Biology as a subject plays a key role in scientific, technological, political, and socioeconomic developments within our societies. The subject, biology, is used by all universities to consider learners for entry into science degree programs that are science-based. Studying the academic performance of biology, specifically in secondary education, is crucial due to its direct relevance to numerous fields and its potential impact on national development. Biology is not just an academic subject; it's a foundation for careers in medicine, agriculture, and various scientific fields, making strong performance a key factor in individual success and national progress (Kiilu, Mwania, & Mumo, 2022).

The term assessment can refer to a wide range of actions used by educators to gauge the level of understanding, competency, and disposition among students (Cates & Erkfritz, 2021). It is a process where the performance quality of an individual is analyzed and also ruled on. When an assessment is done continuously, it is referred to as Incessant Valuation. Continuous Valuation is, therefore, a form of formative assessment which focuses on discovering the overall advantage learners have obtained about skills, attitudes, and knowledge after going through specific learning experiences (Kiilu et al., 2022). An assessment can either be external or internal. Internal assessments are usually school-based and always include tests made by teachers, recap exercises, assignments given in class, field studies, and projects. In recent years, public education in America seems to be stagnant with no signs of improvement (Kiilu et al., 2022).

For decades, classroom instruction has remained virtually unchanged despite the many reforms to stabilize the entire education system. The continued lack of

progress is considered a result of American education's existing culture and structure, which essentially do not support rigorous practice. Since each innovation attracts high levels of community attention, there is also the need to ensure implementation efforts are put in place across the education fraternity (Aguayo-Hernández, Sánchez Guerrero, & Vázquez-Villegas, 2024). With no efforts to ensure the available innovations are implemented, the specific innovations may turn out to be the most familiar and simplest elements, hence ignoring the necessary efficacy of the innovation. In the past years, several educational researchers have elaborated on the need to link instruction to assessment. That is, employing formative test processes to initiate learning and evaluate learners' work to inform instruction. However, there is not enough evidence to show that the analysis of student thinking is essential and useful in driving biological instruction in classrooms across America. State tests, textbooks, courses of study, and pacing guides guide topics being taught, the amount of time spent on these topics, and the extent to which these topics are taught. Even though the college results, international, national, and state results show that students in American-based high schools have not adequately learned biology to fully support their future career opportunities and their success in the world job market, such practices continue to be embraced (Kiilu et al., 2022).

In Indonesia, the academic performance in biology, particularly at the high school level, reveals a mixed picture. While some studies indicate that biology is perceived as a challenging subject with difficult concepts, others highlight the need for improved teaching methods and resources to enhance student learning and engagement. Socioeconomic status also plays a role, with students from higher

socioeconomic backgrounds generally showing better performance (Mulbar & Bahri, 2021). Nurjanah et al. (2025) indicated that teachers' administration of formative assessment tests, which includes ongoing feedback and monitoring of student learning, has a positive and significant impact on academic performance in biology, particularly in Indonesia. Studies have shown that effective formative assessment practices, such as providing timely and specific feedback, can improve students' understanding and skills in biology.

Japanese students generally demonstrate strong academic performance in biology, particularly in international assessments like PISA, where they consistently rank high in scientific literacy. The country's rigorous and standardized education system, along with a focus on core subjects like science, contributes to this success. Furthermore, Japan has a number of highly-ranked universities offering biology and related degrees, attracting both domestic and international students (Nawa et al., 2020).

In several African countries, including Somalia, the challenge of poor performance in biology has continued for quite some time now. The existing records in the education sector indicate that, just as in other countries, the students' performance in biology across all secondary schools in Somalia is still poor. The continued students' poor performance in biology has been linked to a lack of understanding of methodology concepts used for instructing purposes, teaching instructor-centered approaches, and students' bad attitude in relation to the subject. Additionally, the absence of complete biology syllabus coverage has also contributed to the continued poor performance of the subject (Aligula, 2024). For this research, the view of students towards formative assessment in biology refers to their emotions, feelings,

opinions, the meaningfulness and usefulness of their teachers' actions, practices, the judgments of importance, and the social environment in which the students' biology learning is assessed and monitored.

In Ghana's Senior High School system, biology has remained the most popular subject. When compared to chemistry, physics, and other science topics, it has a high yearly enrolment figure. This figure, however, does not indicate the pupils' performance in the topic. Students' academic outcomes in examinations held by the West African Examination Council (WAEC) in the area of biology have not had a consistently high result over the years (Ajogbeje, Ojo & Ojo, 2021). Torgby (2022) added that Biology, like other science subjects, faces challenges impacting academic performance in Ghana. These challenges include inadequate resources like science labs and equipment, insufficient teacher training, and socioeconomic factors influencing students' access to quality education.

In Uganda, academic performance at the secondary level, particularly at the A-level (UACE), is generally low, with a significant percentage of students failing to achieve the minimum requirements for tertiary education. Studies indicate that factors such as teaching methods, curriculum, and the availability of resources significantly impact student performance in Biology (Kawanguzi, Twinamatsiko, & Nabachwa, 2024). According to Mitana, Muwagga, and Owino (2022), in Uganda, teachers' administration of formative assessment test practices in biology education has a positive and significant impact on students' academic performance. Effective formative assessment, which includes regular feedback, varied assessment methods, and clear learning objectives, can lead to improved student understanding and achievement in biology.

Assessing students' performance in most subjects, including biology, involves the qualitative judgments of teachers on how satisfactory or how well a student progresses or performs in any given task in biology. There are several types of instructional procedures teachers can use to evaluate the performance of their students. One of these methods is the use of formative assessment tests, which are given by instructors and serve as a constant source of feedback for both the instructor and the students on the progress, or lack thereof, of the lesson. Secondly, diagnostic evaluation essentially tries to find out the learning difficulties students may encounter with biology facts, concepts, or principles (Moyo, Combrinck, & Van Staden, 2022). Summation evaluation is yet another procedure used in schools, especially at the end of every term or year. The evaluation method provides thorough information used in grading students' performances and determining their teachers' effectiveness level. This study will focus on a teacher's administration of formative assessment tests where teachers give both written and oral remarks and use scores as a response to show either incorrectness or rightness of performance in biology and misconceptions that may arise from the performance. Essentially, with teachers' administration of formative assessment tests, teachers are required to gather enough information regarding learners' performance through homework assignments, observations, classroom oral questioning, informal inventories, and questions.

The results of the KCSE released in recent years by the Ministry of Education indicate that students have continued to perform poorly in biology as a subject. The failure rates have continuously been more than 50% and increasing (KNEC, 2019, 2020, 2021, 2022, 2023, and 2024). Usually, a biology paper is always examined in

three parts: one practical and two theoretical. The first paper (Paper 1) evaluates different concepts across the entire secondary school syllabus and is always marked out of an overall score of 80. The questions examined are always structured and compulsory. Paper 2, on the other hand, consists of eight different questions that are structured and sampled from five different topics across the entire biology syllabus. Every question carries eight marks. The paper is also marked out of 80 marks. Lastly, paper 3 is usually a practical paper comprising three questions drawn from any of the topics covered within the entire secondary school biology syllabus and is often marked out of 40 (KNEC, 2019, 2020, 2021, 2022, 2023, and 2024). Formative assessment is investigative in nature; it finds out both what students know and don't know (Schneller, 2021). However, students' educational achievement in Biology in Siaya County has been inconsistent since 2015. Therefore, upon this backdrop, the study aims to investigate the effect of formative assessment on students' educational achievement in Biology in high schools in Siaya County, Kenya. The table below indicates the students' performance in Siaya, Kakamega, and Vihiga counties in continuous assessment tests (CATs) between 2017 and 2024.

Table 1.1: Biology Performance from 2015 to 2024 counties

Year	2017	2018	2019	2020	2021	2022	2023	2024
Siaya	4.431	6.233	5.180	6.221	5.326	5.453	5.211	5.124
Kakamega	4.443	6.245	5.252	6.303	5.349	5.472	5.345	5.534
Vihiga	4.523	6.345	5.352	6.329	5.415	5.524	5.511	5.612

Source: Director of studies from Secondary Schools within Siaya County.

Table 1.1 shows how students in Siaya County have been performing poorly in Biology over the past eight years in comparison with neighboring counties such as Kakamega and Vihiga. Teachers' administration of formative assessment tests is

considered one of the ways that can help improve performance; thus, the study focused on determining the effect of formative assessment on the performance in academics of students in high schools in Siaya County, Kenya. Joshua (2021) indicated that formative assessments act as a continuous diagnostic tool, revealing areas where students struggle with biology concepts. Nyaga (2020) also indicated that teachers use insights from these assessments to provide immediate and specific feedback, helping students correct misconceptions and improve their understanding.

1.2 Problem Statement

The importance of Biology to individuals and even to society has been greatly acknowledged. Biology is a scientific discipline that aims to elucidate the workings of the biosphere and the interplay between the various forms of life inside, including humans. Many branches of biology have made strides in bettering human existence, including medicine, agriculture, and biotechnology. That is what makes Biology an obligatory subject in most Secondary schools in the country today.

However, students' performance in the subject in the national examinations is worrying. Kenya National Examination Council decries poor results in Biology, which has recorded adverse results over the past six years, thereby raising fear as most learners from Siaya county are denied the opportunity to pursue courses like medicine, which require good grades in biology for one to take them (KNEC, 2019, 2020, 2021, 2022, 2023, and 2024). A small percentage of students (18%) in Siaya County achieved a C+ grade or higher in biology in the year 2024, which is the minimum grade needed to pursue related courses in higher education. This was lower than the national statistics, which were 31.4% of the students who achieved a C+ grade or higher in biology in the year 2024.

Teachers' administration of formative assessment tests can significantly improve academic performance in biology by providing real-time feedback, identifying learning gaps, and informing instructional adjustments for both teachers and students. Through methods like classroom discussions, quizzes, and exit slips, teachers can continuously monitor student understanding and offer timely support, fostering increased engagement, self-regulated learning, and ultimately, better academic achievement. Studies have shown that a lack of teachers' administration of formative assessment tests and poor utilization of teachers' administration of formative assessment tests methods in public high schools in Siaya County is the major cause of poor performance in Biology. Therefore, the study intended to ascertain whether teachers' administration of formative assessment tests can improve learners' academic performance in biology. Teachers' administration of formative assessment tests is key in improving the performance of students in any given school; thus, a need to incorporate teachers' administration of formative assessment tests in teaching biology in all Secondary schools in Siaya.

1.3 Purpose of the Study

The research focused on determining how teachers' administration of formative assessment tests influences the students' biology performance in secondary schools in Siaya County, Kenya.

1.4 Research Objectives

The following objectives were used to guide the study;

- i. To determine the influence of teachers' provision of feedback on formative assessment tests on students' biology performance in secondary schools in Siaya County, Kenya.

- ii. To find out how the frequency of teachers' administration of formative assessment tests influences students' biology performance in secondary schools in Siaya County, Kenya
- iii. To establish the influence of teachers' administration of formative biology assessment tests on biology learning and performance in secondary schools in Siaya County, Kenya.

1.5 Research Questions

The research sought to answer the following research questions:

- i. What is the influence of teachers' provision of feedback on formative assessment tests on students' biology performance in secondary schools in Siaya County, Kenya?
- ii. What is the influence of the frequency of teachers' administration of formative assessment tests on students' biology performance in secondary schools in Siaya County, Kenya?
- iii. What is the influence of teachers' administration of formative biology assessment tests on biology learning and performance in secondary schools in Siaya County, Kenya?

1.6 Significance of the Research

Answers obtained from this research might have great importance in several aspects. From the findings, school administrations may identify the relevance of formative assessment, henceforth providing suitable approaches and facilities in improving the performance of learners, realizing improved general school performance. Teachers' training institutes may also be able to make use of the findings in teaching the instructors on the significance of formative assessment and

the best methods they should employ for the same. Additionally, from the findings, teachers from both private and public schools may be able to identify how classroom assessment influences the performance of learners.

1.7 Limitations of the Study

This research faced the challenge of non-resonance from the targeted population due to their busy schedules. To solve this, the researcher obtained data from teachers who were not available during the time of data collection. The data collected may not be a true picture of all secondary schools in other counties since the study was only based in one county, Siaya. Some respondents had challenges responding to some questions due to a problem with the language construction. To solve this, the researcher provided clarity where necessary. The data was also not as accurate as it could have been because the measuring device was unreliable. But the researcher kept this under control by checking the questions' internal coherence with reliability tests.

1.8 Delimitations of the Study

This research is restricted to focusing on public secondary schools in Siaya County, where biology has been poorly performed for the last ten years. Siaya County, which is the area of study, is relevant for this research because it comprises a good number of educational institutions. The majority of these institutions perform very poorly in Biology as a subject in both continuous assessment tests and national exams. Therefore, the study did not focus on private schools. This study only focused on teachers' administration of formative assessment tests as a method of improving the performance of learners in biology in public high schools in Siaya County. Learners' performance in biology may be improved by other methods.

1.9 Assumptions of the Study

The interviewees would provide accurate information based on the questions featured in the questionnaire. All biology teachers within the targeted schools had a good mastery of the contents of the subject.

1.10 Theoretical Framework

The research was steered by the Classical Conditioning Model by Ivan Pavlov (1929-1936). The theory is also known as respondent conditioning or Pavlovian conditioning. It refers to learning through association. That is, two different impetuses are connected to generate a different studied retort in an animal or a human. This theory comprises three stages: before acquisition, acquisition, and after acquisition. The most well-known instance of classical habituation was Pavlov's test, which used dogs. Pavlov experimented on dogs and noticed that dogs learned to drool in response to a buzzer after numerous tests, after the food was withdrawn. In relation to this study, the two different stimuli incorporated together are the teachers' administration of formative assessment tests and students' class work. The association of students and teachers' administration of formative assessment tests leads to improved performance in Biology. Students respond to teachers' administration of formative assessment tests through good performance in Biology.

The three stages of classical conditioning theory are also relevant to this research because the researcher was also relating students' achievement before implementation of teachers' administration of formative assessment tests (before acquisition), how teachers' administration of formative assessment tests was adopted (acquisition), and therefore the impacts of formative assessment on the performance of students in biology in Siaya County, Kenya (after acquisition).

Classical conditioning, while a foundational learning theory, has both strengths and weaknesses. Its strengths lie in its ability to explain how associations are formed between stimuli and responses, leading to predictable behaviors, and its applications in therapeutic settings like exposure therapy. However, it is criticized for oversimplifying learning, neglecting cognitive processes, and struggling to account for individual differences and complex human behaviors (Ginty, 2020).

Classical conditioning, as explained by Ivan Pavlov's theory, can be applied to teachers' administration of formative assessment tests in education to influence student behavior and academic performance. By associating formative assessments with positive stimuli, teachers can create a positive learning environment that encourages student engagement and improved outcomes. This theory was also relevant in the study since students in secondary schools are expected to obtain excellent scores when they are trained and subjected to numerous tests of incessant evaluation events. Classical conditioning theory relates to this study in the sense that students are expected to perform better after adopting teachers' administration of formative assessment tests.

1.11 Conceptual Framework

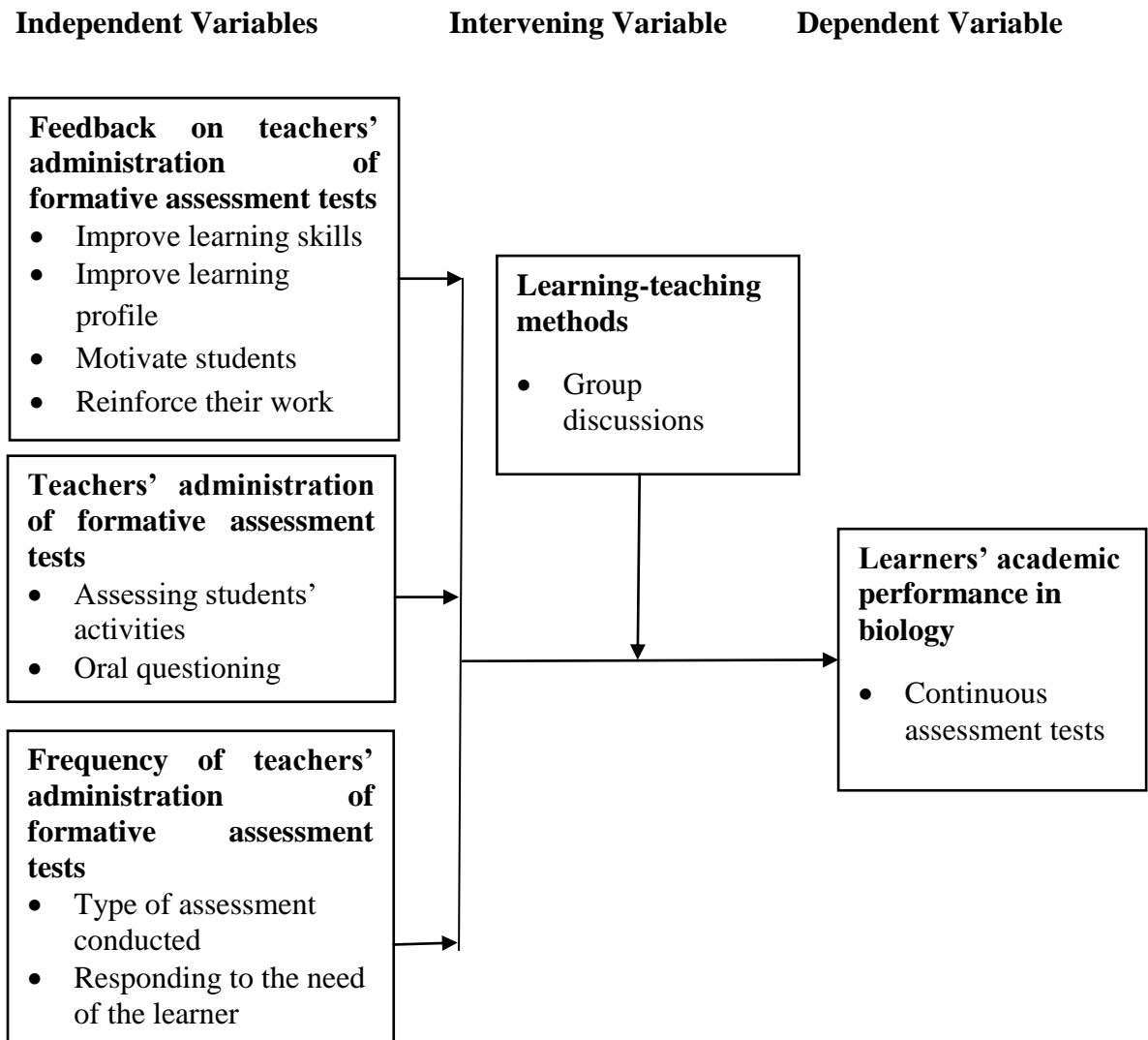


Figure 1:1: Conceptual Framework

Source: Researcher (2025)

This is an investigative tool with numerous distinctions and frameworks. A conceptual framework can be employed in various classes of tasks where there is a need for a general picture. The framework is important in understanding the place and the research project's direction. It is an important tool that helps the researcher pinpoint variables and ideas in the study and represent graphically their connectivity (Leshem & Trafford, 2007). The independent variables are teachers' administration

of formative assessment tests, feedback on teachers' administration of formative assessment tests, and teachers' administration of formative assessment tests frequency, which affect the performance of learners in biology, which is the dependent mutable. Based on the conceptual framework figure above, learners' academic performance in biology depends on teachers' administration of formative assessment tests, feedback on teachers' administration of formative assessment tests, frequency of teachers' administration of formative assessment tests, and student assignments with group discussions, learning teaching methods as the intervening variable. Intervening variables refer to variables that could affect the dependent variable but are left for other researchers to study. For this study, learners' academic performance in biology is the dependent variable. This research was directed by a theoretical structure described in the diagram above.

1.12 Operational Definitions of Terms as used in the Research Study

Continuous assessment: A form of formative assessment which focuses on discovering the overall advantage learners have obtained about skills, attitudes, and knowledge after going through specific learning experiences.

Evaluation: This is a testing process that is reliable in collecting formative information. Similarly, it can refer to generating extrapolations depending on the academic achievement of students concerning different bona fide learning goings-on, whether the extrapolations are for formative or summative reasons.

Frequency: This is the number of times or rate at which assessments are given to learners.

Performance: The extent to which students can reason and provide solutions to their evaluated questions and assessments.

Teachers' administration of formative assessment tests: This is a process employed by both teachers and learners to respond and recognize the learning processes of students to ensure the effectiveness of the entire process of studying.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covers an evaluation of recent theories, ideas, and research that have been conducted regarding biology education. As a result of the lack of enough literature in biology education, the review also covers other topics or subjects in science that have some significant implications in the learning environment of biology as a subject. The literature works discussed in this chapter are organized about the objectives of the entire study. These objectives are feedback on teachers' administration of formative assessment tests, teachers' administration of formative assessment tests frequency, teachers' administration of formative assessment tests, and academic performance of learners in biology. The literature is reviewed according to the objectives of the study.

2.2 Teachers' Administration of Formative Assessment Tests and Students' Academic Performance

As time goes by, researchers, instructors, and policymakers are progressively concerned about teachers' administration of formative assessment tests since it supports and reflects the teaching of students (Karaman, 2021). Criteria and goals enable learners to understand why and what they intend to learn to be effective participants in what may otherwise be an inactive process of studying. Students need to share criteria, needs, and goals, especially when a new topic is introduced, to get quality results and notes. As the lessons begin, students are always given the responsibility of overseeing their learning process, hence allowed to come up with their understanding of the subject, working together with their mates and teachers,

expanding their frame, and also moving to a further multifaceted understanding and knowledge. An advantage of sharing study objectives with students is that the students end up being provided with tasks aligned with their goals (Broadbent, Sharman, Panadero, & Fuller-Tyszkiewicz, 2021).

Learning assessment can be described as a philosophy of teachers' administration of formative assessment tests that involves learners in their assessment by providing them with perfect classroom-level goals founded on either local or state levels (Lee, Chung, Zhang, Abedi & Warschauer 2020). The specific goals are then converted into both accurate and dependable valuations. Afterward, the revelation of a fruitful result is then understood and shared among the learners by using representations of quality and successful work or using descriptive methods (Lee et al., 2020). After that, instructors produce written or oral comments that detail where a student is on the learning continuum and how they might close any gaps they encounter. Asking questions is a key component of determinative valuation. That is, teachers can use a better part of their sessions to ask students questions. At least 50 questions are usually asked in both secondary and elementary schools in the classroom during lessons (Patra, Alazemi, Al-Jamal, & Gheisari, 2022).

In some cases, eighty percent of the entire time spent in school may be used on queries and retorts. Such as focus on a solo plan portrays both its perceived effectiveness and suitability (Patra et al., 2022). However, not all questions may end up actively involving students in the learning process. Moreover, teachers never use dialogue to ensure their students understand what they learn in class. Asking questions in formative assessment is vital to help in gathering important information concerning the learning and understanding of the students (Patra et al., 2022). Such a

goal can be attained, especially when the queries are effective and active in the determination of the extent of the learners.

The impact of modified formative assessment strategies on student performance was studied by Boström and Palm (2023) in their study of fourteen secondary school mathematics educators who had participated in a random selection of professional development training sessions. The study details the strategies used and the results of the pre- and post-tests taken by the students. After accounting for students' pre- and post-test scores, the research indicated no statistically significant differences in post-test performance between the two groups. Similarly, there was no correlation between the quantity of formative assessment activities used and post-test performance thereafter. The study focused on secondary school mathematics, leaving out the aspect of performance of biology, thus showing a contextual gap.

In their study, Awofala and Olaniyi (2023) used a quantitative research approach within the framework of a pretest-posttest experimental research design to examine the relationship between mathematics achievement and the strategy used by mathematics teachers to administer formative assessment tests. The participants included 500 students and 10 teachers from 10 senior secondary schools in Lagos, Nigeria. Predicting pupils' arithmetic performance in senior year of high school was aided by treatment to a mere 4.4%. Results showed that mathematics performance in senior high school was significantly impacted by instructors' use of formative assessment exams. Nonetheless, it was determined to have a good effect because it led to pupils' greatly improved performance. The study was done in Nigeria, while the current study was done in Kenya.

Research by Ismail et al. (2022) examined how Iranian English as a foreign language (EFL) students' self-regulation abilities, test anxiety, academic motivation, and attitude toward learning were affected by formative and summative evaluations. This was accomplished by randomly assigning 72 Iranian EFL students to one of three groups: a control group, an experimental group (summative or formative), or neither. Then, one set of participants in the study were trained using formative assessment guidelines, while the other set of participants were taught using summative evaluation guidelines. There was no predetermined evaluation tool used to train the control group. Finally, both experimental groups were given an attitude questionnaire to see how they felt about the effects of formative and summative assessment on their English learning progress. Both the summative and formative evaluations were effective, however the results of the formative assessment showed that it had a greater impact on academic motivation, test anxiety, and self-regulation competence. The findings support the idea that formative assessment is a crucial component of effective EFL classroom training. The last research took place in Iran, whereas this one is based in Kenya.

Karaman (2021) looked into the ways in which formative assessment procedures help students learn in Turkey by conducting a meta-analysis study. The meta-analytical review approach comprised 32 papers with 47 effect sizes that fulfilled the criteria, such as employing a true experimental or quasi-experimental design and evaluating learning outcomes. The study's total mean effect size was determined to be .72 (SE=.07, $p < .05$). Students' learning was found to be significantly impacted by student-initiated formative feedback ($d = 1.16$) and mixed feedback ($d = .83$), with adult-initiated formative feedback having a medium effect ($d = .69$) and computer-

initiated formative feedback having a small effect ($d = .42$). This study was conducted in Kenya, whereas the previous one was in Turkey.

The impact of Formative Assessment on the academic performance of Kriya Shari Department students was examined by Dandekar (2020). Using a combination of didactic and demonstration techniques, forty students were taught the topics of Rasa and Rakta Dhatu simultaneously. After then, they were split into two groups at random. The experimental group received the interventions through a Rasa & Rakta Dhatu-themed group discussion and quiz. The Rasa & Rakta Dhatu theme served as the basis for both the pre- and post-tests, which consisted of multiple-choice questions (MCQs) designed to assess memorization abilities and short-answer questions (SAQs) designed to gauge analytical prowess. After that, the exams were gathered, graded, and finally put together. A multiple-choice test demonstrated a statistically significant improvement in recall memory for the experimental group of students ($p=0.0001$), and a structured analytical quotient (SAQ) exam was developed to assess descriptive and analytical abilities. Results demonstrated an improvement in SAQ scores, while the difference was not statistically significant. Formatively assessed pupils outperformed non-assessed students in a statistically significant way. The results of formative assessment had a positive impact on students' academic performance and contributed to the improvement of their learning. This study was conducted in Kenya, whereas the previous one was in Kriya Shari, Iran.

Huisman (2021) examined the impact that formative assessment has on student learning. These formative assessment techniques were used in a general education environment with eighty-nine students. Quantitative and qualitative methods were

used to gather data throughout a three-month period. Looking at the big picture, it's clear that using formative assessment strategies in the classroom helps students learn. However, the present investigation was centered on biological performance, and the study did not specifically address it.

Researchers Andersson and Palm (2021) looked at how instructors' formative classroom practices changed after receiving professional development input, and how that affected students' progress. A teacher professional development workshop in formative assessment was attended by 22 mathematics teachers from a randomly selected mid-sized Swedish municipality as part of the professional development input. The program's curriculum was based on the idea of formative assessment as an integrated whole of several methodologies. Classes in the intervention group did much better than classes in the control group on a posttest given one school year after the program ended, even after adjusting for pretest scores. The study was, however, not specific to the performance of biology, which was the focus of the current research.

As time goes by, researchers, instructors, and policymakers are progressively concerned about teachers' administration of formative assessment tests since it supports and reflects the teaching of students (Dandekar, 2020). McManus (2021) states that teachers' administration of formative assessment tests is a procedure through which both learners and teachers offer responses in tuition to systematize both their teaching and learning progression, hence ensuring an escalation in the learner's performance. Determinative valuation can be perceived as a vital and valid unifying part for both assessment and coaching. Usually, determinative valuations enable teachers to understand if their learners have an indicator qualification on how

the next lessons should be conducted or whether they have learned anything from the previous lessons (Panadero, Andrade & Brookhart 2021). There are three major components of teachers' administration of formative assessment tests or formative assessment: using peer and self-assessment, increasing the value of response, record keeping or marking, escalating the worth of dialogue or inquiry, or explaining the learning objectives and success criteria (Dandekar, 2020). Criteria and goals enable learners to understand why and what they intend to learn to be effective participants in what may otherwise be an inactive process of studying. Students need to share criteria, needs, and goals, especially when a new topic is introduced, to get quality results and notes. As the lessons begin, students are always given the responsibility of overseeing their learning process, hence allowed to come up with their understanding of the subject, working together with their mates and teachers, expanding their frame, and also moving to a further multifaceted understanding and knowledge. An advantage of sharing study objectives with students is that the students end up being provided with tasks aligned with their goals.

Learning assessment can be described as a philosophy of teachers' administration of formative assessment tests that involves learners in their assessment by providing them with perfect classroom-level goals founded on either local or state levels (Lee, Chung, Zhang, Abedi, & Warschauer, 2020). The specific goals are then converted into both accurate and dependable valuations. Afterward, the revelation of a fruitful result is then understood and shared among the learners by using representations of quality and successful work or using descriptive methods (Lee et al., 2020). The teachers then develop either verbal or written feedback, which describes whether the student is captured in the learning continuum and specified communication to the

student on how the gap can be narrowed. Asking questions is a key component of determinative valuation. That is, teachers can use a better part of their sessions to ask students questions. At least 50 questions are usually asked in both secondary and elementary schools in the classroom during lessons (Ndlovu, 2025).

In some cases, eighty percent of the entire time spent in school may be used on queries and retorts. Such as focus on a solo plan portrays both its perceived effectiveness and suitability (Ndlovu, 2025). However, not all questions may end up actively involving students in the learning process. Moreover, teachers never use dialogue to ensure their students understand what they learn in class. Asking questions in formative assessment is vital to help in gathering important information concerning the learning and understanding of the students (Ritchhart, Church, & Morrison, 2021). Such a goal can be attained, especially when the queries are effective and active in the determination of the extent of the learners.

The purpose of Oppong's (2021) research was to analyze the impact of formative assessment strategies on fifth graders' self-regulation abilities, attitudes toward class, and academic performance. The study was carried out using mixed-method research techniques. During the 2014–2015 school year, a teacher in Erzurum oversaw the rehearsals with a group of 45 fifth graders from a secondary school. Experiments were conducted over a duration of 28 weeks. As a means of gathering information, we utilized social studies performance exams, attitude inventories for those classes, scales for self-regulation of learning, observation forms, and semi-structured interviews. The research found that compared to the control group, students in the experimental group who participated in the formative assessment techniques did better academically and had more positive opinions regarding the class. Even though

the formative assessment helped students improve their self-regulation skills, there was no discernible change between the two groups when it came to this outcome. Secondary schools in Siaya were the focus of the present study, as opposed to those in Erzurum.

2.3 Provision of Feedback on Formative Assessment Tests Administered by Teachers and Students' Performance in Biology

However, instructors are not the only ones to respond. Self-valuations and peers can be prudently trained, hence managing students in developing learning-oriented and constructive responses without intervention (Amuche & Gabriel, 2025). Self-valuation entails a procedure through which learners can evaluate their work depending on the available expectations, provided in the form of criteria and goals (Arifin, Nurrijal, Jahidin, Munir, & Ede, 2025). Essentially, self-valuation is a form of determinative valuation plan that offers learners with response regarding their presentation depending on criteria and established standards, and provides information on how to develop adjustments that will help them improve how they learn and what they learn. Additionally, self-assessment is considered a major element of determinative valuation, for it directly aids learners to take part in activities involving studying objectives.

Even though feedback plays a crucial role in teachers' administration of formative assessment tests, not all feedback is always effective. In most cases, feedback enables students to understand how they are progressing in their learning processes. Of importance, any feedback should be specific and timely; it should also include multiple suggestions on how future performance should be improved. Sufficient and effective feedback should incorporate criteria regarding students' performance,

hence ensuring the learning process is more transparent (Ene et al., 2025). Another aim of determinative valuation is to offer a direct response concerning teaching and learning processes, hence providing beneficial effects for both teachers and learners. Teachers may provide either verbal or written feedback to their students. According to teachers and a number of researchers, effective feedback should be explicitly tied to criteria, timely, and specific (Ene et al., 2025). Further, teachers always adjust their strategies to align with the specific needs featured in the assessment. Both written and verbal communication should specifically focus on what seems to be wrong with the students' work and what obligatory actions need to be used to advance on the same (Crooks, 2021). However, teachers should ensure that the feedback message is more concerned with improvement than evaluation.

Amuche and Gabriel (2025) state that the most effective feedback is timely, detailed, and actionable. They argue that feedback that is given immediately after a task has been completed, focusing on specific aspects of the task, and providing clear guidance on how to improve, is more likely to have a positive impact on student learning and motivation. Additionally, Arifin et al. (2025) stress the significance of providing students with constructive criticism that teaches them how to do better in the future, as opposed to merely pointing out their mistakes.

According to research by Amuche and Gabriel (2025), students' performance can improve by as much as 30 percentile points when they receive constructive criticism. Black and Wiliam (2021) found that students' performance can improve by up to two grade levels when teachers provide them with effective feedback. These research statistics support their findings.

To help pupils grow and develop to their maximum potential, teachers should provide them with constructive criticism. Teachers can encourage their students to believe in themselves and their talents by pointing out their strengths and offering constructive criticism; this, in turn, improves students' performance (Fong et al., 2021).

For their study, Mackinney, Kelly, and Pulling (2021) compared the effects of written, audio, and in-person feedback on the grades of undergraduates enrolled in level six courses. In all, ninety-one undergraduates majoring in physical education at a university in the south of England participated in the research. They were evaluated using the same criteria for both the A and B exams that the students took. Post-Assessment A, students might choose to get comments in writing, over the phone, or in person. Students were encouraged to use the feedback to improve their performance on Assessment B. The influence of the feedback on students' grades between the two assessment points was determined. A considerable influence was observed depending on the form of feedback, according to the analysis. There was little effect of written comments on the final score. However, there was a considerable improvement in evaluation grade following both audio and face-to-face feedback. Research indicates that students are more likely to actively participate in the feedback process when it is delivered by audio or face-to-face interactions, and that this feedback style has the potential to boost academic achievement through providing more detailed and constructive criticism. The study was done in England, while the current study was done in Kenya.

Morris and Chikwa (2021) investigated the effects of both written and auditory feedback on students' performance on following assignments, as well as students'

preferences in the use of each kind of feedback. In the study, sixty-eight students were split into two groups. One group received written feedback on their first project, while the other group received audio feedback. The students in the second group were asked to recall and apply the feedback they received on the first assignment. Students in the written feedback and voice feedback groups were compared and the outcomes from the second assignment were analyzed. Another tool used to gauge students' thoughts on the comments they had gotten was an online survey. The results showed that students' grades on the following task were unaffected by the feedback kind. Also, students preferred written feedback for future assignments, even if they were generally pleased with auditory input. The study, however, ignored the aspect of performance in Biology, thus showing a contextual gap.

In their evaluation of instructor-delivered midterm feedback, Sato et al. (2021) used a system that allowed students to reflect on their answers and then have an email conversation with their teacher regarding the comments. The study found that the students who participated in the feedback process provided higher-quality responses to similar final-exam questions. The study included interviews and surveys to find out what students thought were the most important parts of receiving feedback. The study, however, ignored the aspect of performance in Biology, thus showing a contextual gap.

Faulconer, Griffith, and Gruss (2022) aimed to comprehend the effects of integrating positive and performance-gap feedback in a situation including instant feedback, where students were given several chances to finish an assignment. Following the completion of a general inorganic chemistry course, 176 undergraduates enrolled in

an online program were asked to participate in a survey. As far as feedback went, some students got performance-gap comments, and others got both. A lack of change in students' beliefs and self-reported behaviors in the course appears to be the outcome of the feedback kind. Students who got both performance-gap and positive comments ended up with an average grade that was one whole letter higher than those who got simply performance-gap. A mixture of feedback has a direct favorable impact on pupils in an online situation, according to this research. The study focused on undergraduate students, while the current study focused on secondary school students.

Researchers Batool and Akhter (2021) looked examined the impact of feedback on math grades in high school. The research included 87 ninth grade math students as a sample. Both the control group and the experimental group consisted of 43 and 44 students, respectively. To make sure all groups were equal, they were matched based on pupils' eighth grade math test scores. Also, to make sure they were equivalent, a pretest was run. The researcher employed different techniques and strategies of feedback while teaching mathematics to the experimental group. At the end of the intervention, the participants of this study were post-tested. Students' mathematical performance improved significantly after receiving feedback, according to a comparison of their pre- and post-test results from the control and experimental groups. The study focused on students' achievement in Mathematics, while the current study focused on performance in biology.

Researchers Shin, Lee, and Seo (2021) looked at how students' accomplishment goals were affected by regulatory focus (i.e., promotion vs. prevention) and reference of comparison (i.e., self-referential vs. normative). This study tested the

hypothesis that promotion-focused normative feedback will mitigate or eliminate the detrimental impact of normative feedback on students' success goals. An experimental investigation with 155 sixth and seventh graders found results that were in line with the theory. Students were more likely to support performance-approach and performance-avoidance goals when they received normative feedback rather than self-referential input. The results showed that normative feedback did not substantially increase the endorsement of performance goals when students received feedback focused on promotion. There was no statistically significant relationship between the various forms of feedback and the adoption of mastery goals. The study was experimental, while the current study was descriptive.

Newman et al. (2021) evaluated the effect of feedback on students' achievement through a systematic review. In order to offer more accurate estimations of the influence of various forms of feedback in various contexts for various learners ranging from 5 to 18 years old, the Education Endowment Foundation requested the systematic review. The review analysis sought to explore potential variations in the impact of feedback through subgroup analysis of the characteristics of the feedback, the educational setting, the learners, and the subject. The results corroborated those of earlier research showing that, on average, feedback improves performance. The study was a systematic review, while the current study was descriptive.

The effect of formative assessment feedback on student performance was studied by Duss (2020). The instructor gave the students a series of progressively more difficult low-stakes exercises to finish before turning in their final project, building on ideas of formative assessment found in the current scholarly literature. Students had the chance to analyze their work and enhance certain elements before going on to the

next task because at each stage, they received concrete, constructive criticism from either the instructor or classmates, or both. A scoring rubric was used to evaluate the students' performance on each subsequent submission. The significance of offering students' numerous opportunities for active learning through a progressive scaffolding approach is demonstrated by the mixed results that resulted from the instructor's decision not to require a preliminary draft of the final project (T3), even though there was a significant improvement from one draft of an assignment (T1) to the next (T2). The study, however, ignored the aspect of performance in Biology, thus showing a contextual gap.

In their study, Ajogbeje, Ojo, and Ojo (2021) looked at how junior high school pupils in Ondo State fared in mathematics when taught via formative assessments accompanied by comments. In this study, 227 students from three co-ed schools in the Akure South Local Government Area of Ondo State were chosen at random from junior secondary school two (JSS II) intact classes. The study employed a quasi-experimental design with treatment at three levels, namely: Formative Test with Feedback, Formative Test only, and Non-Formative Test, which served as control. The gathered data were examined with the use of Scheffe's Post-Hoc Analysis and Analysis of Covariance (ANCOVA). Researchers found that using Formative Test with Feedback significantly improved kids' math scores. The study, however, ignored the aspect of performance in Biology, thus showing a contextual gap.

2.4 Factors that Influence Teachers' Administration of Formative Assessment Tests in Secondary Schools

There are some facets of incessant valuation tests that apply to the instruction-studying consequences. These aspects comprise the emphasis that the results obtained from the continuous assessment tests should be combined with the results obtained from semester valuations in determining the ultimate result of a single student (Ajogbeje, Ojo & Ojo, 2021). Feedback is essentially the teacher's information regarding their academic performance and capabilities, which they may change their perception of themselves. Feedback provides correctional information and also a reinforcement effect. Teachers also need to provide students comments on their work and test results as part of the formative assessment testing process (Dilova, 2021). However, feedback on test scores may affect the anxiety, motivation, and confidence levels of students. At the same time, feedback from tests motivates students intrinsically. Individuals who are well conversant with their fruitful performance on a given exam usually develop intense interests in that specific unit and later on continue to develop ways through which they may perform even better in the subsequent tests (Ozan & Kincal, 2021). However, negative feedback may have two different impacts on the student's performance level. First, the student may use the feedback for correctional purposes, hence improving on future tests. While at the same time, the student may choose to perform even worse, hence developing a negative attitude towards the subject.

There is not enough evidence on the effect of feedback, whether optimistic or negative, on the subsequent presentation of students on a given subject. The basis on which the existing studies were carried out needs to be widened comprehensively.

There are possibilities that there exist other facets of the studying atmosphere that need to be put into consideration. In most schools in Kenya and even beyond, it is common for learners' writings to be heaped in teachers' workplaces for long, later disposed of by two hawkers and destroyed after some time. Under some circumstances, learners are always provided with feedback on their performances only after their final examinations. However, such feedback may not be useful, especially in helping students improve their performance in biology.

Math teacher educators' use of formative assessment procedures was investigated by Enu (2021). Six math teachers from three different Ghanaian colleges of education participated in this qualitative case study research project. The reasons that prevent teacher educators from utilizing formative assessment procedures were the main focus of the investigation. Lesson observations and semi-structured interviews were used to gather data. Using theme analysis, we examined the qualitative data. The study's results showed that teacher educators have challenges with internal and external summative assessments, as well as with big class sizes, time constraints, and an absence of assessment transparency. The study was done in Ghana, while the current study was done in Kenya.

A systematic evaluation was carried out by Yan et al. (2021) on the elements that impact instructors' intentions and implementations of formative assessment. We found 52 research that met our inclusion criteria, and we classified the components we found into two groups: individual and environmental. Instrumental attitude, self-efficacy, and education and training were the main personal characteristics impacting instructors' intents to undertake formative assessment. The elements at the school level, also known as the meso-level factors, appear to have the most impact

on teachers' intents and actions when it comes to formative assessment. Among the top three elements influencing teachers' intents and implementations are school environment and internal school support. The study, however, ignored the aspect of performance in Biology, thus showing a contextual gap.

Researchers Asare and Afriyie (2023) looked at how elementary school teachers' access to certain resources influences whether or not they use formative assessment. Three hundred educators from the six circuits in Ghana's Cape Coast Metropolis were chosen using a multistage sampling process in a descriptive survey. Both descriptive (mean values, SD) and inferential (two-way ANOVA) statistics were used to examine the collected data. The effective implementation of formative assessment was shown to be hindered by factors such as time, workload, an overcrowded curriculum, class size, and the number of lessons. The study, however, ignored the aspect of performance in Biology, thus showing a contextual gap.

Liu and Zhang (2022) explored the influencing factors and validity of formative assessment in online learning. This study examines the elements specific to online learning that impact formative evaluation in online learning using a Grounded Theory based qualitative research technique. This paper conducted a literature review, interviewed 45 online learners, and then used three-level coding to examine the sources. The results demonstrate that functional alienation, which can be impacted by factors such as the subject's emotional game and adaptability, the external environment, technology, and bad contact, can impact the validity. The study focused on qualitative research methodology, while the current study adopted both qualitative and quantitative methodologies.

Waheeda, Thama, and Keata (2023) set out to investigate, from the viewpoint of the educators working in a few chosen primary schools in Nekemte town, what variables influence the use of formative assessment. The study's target population consisted of two groups: principals and teachers. In addition to interviewing school principals, a survey was sent out to all teachers. Using descriptive and inferential statistics, we found that there were substantial disparities in mean scores among departments (arts, social science, natural science, and language) and between groups (sex and experience) in the survey data. Additionally, multiple regression was used to examine the amount of variance in the use of formative assessment practices. The regression analyses show that the seven predictor variables, sex, department, experience, commitment, awareness, attitude, and age, account for 14.4% of the variation in the dependent variable. The study was done amongst primary schools, while the current study focused on secondary schools.

Eshun, Bordoh, and Ochour (2024) investigated factors that influence formative assessment practices of Social Studies in the Techiman Municipality of the Bono East Region of Ghana. The study used a descriptive survey research design with a quantitative methodology. The study's target audience consisted of all 84 social studies teachers working with junior high school students in the Techiman Municipality, Bono East Region, Ghana. Researchers used the census sample method to pick their study population. A total of twenty-two (22) five-point Likert itemized questionnaires served as the principal data gathering tool for the research. In order to analyze the quantitative data, descriptive statistical procedures were used. The results showed that the majority of teacher evaluations are driven by outside forces, such as the demands placed on them by the school district or the Municipal

Director of Education, or by the questions published by the West Africa Examination Council (WAEC). This study was conducted in Kenya, whereas the previous one was in Ghana.

Alotaibi (2021) surveyed elementary school teachers in the Saudi province of Riyadh on their thoughts and feelings on fourteen different topics. School working conditions, students' strengths and weaknesses, prevailing traditional learning and assessment practices, learning culture, beliefs or notions, nature of flexibility or uncertainty, tensions of external examinations and accountability, and educational reforms at the state and federal levels were among these factors. Other factors included policies and support from school administration, variations in students' attitudes and abilities, teachers' professional experience and involvement in professional development programs, and curriculum material, both current and future. Information was collected from fifteen schools' instructors using stratified random sampling. Teachers slightly agreed on all the given factors. The study was done in Saudi Arabia, while the current study was done in Kenya.

Researchers Githua (2023) looked into how secondary school pupils felt about math formative assessments given by teachers and how it affected their desire to study the subject. Secondary school pupils from the districts of Nakuru, Kericho, and Koibatek in the province of Nairobi, Kenya, were the intended subjects. The study utilized a sample size of 649 students from 32 different secondary schools, with 320 males and 329 girls. The students were stratified according to class level, school type, gender, and social arrangement (whether the school was mixed sex or single sex). The data was collected using a 16-item SPEM Questionnaire and a 28-item SMLM Questionnaire, both of which had reliability coefficient alphas of 0.81 and

0.89, respectively, and were designed to measure students' perceptions of teachers' administration of formative assessment exams and students' willingness to learn mathematics. The findings demonstrated a robust and statistically significant correlation between SPEM and SMLM. This suggested that how students perceive their teachers' use of formative assessment exams impacts their willingness to use them. While the study focused on secondary schools in Nairobi province, Nakuru, Kericho, and Koibatek districts, the current study was done in Siaya county.

Chan (2021) conducted a literature study on formative assessment and put out a preliminary model that shows the elements influencing teachers' use of formative assessment in the classroom by utilizing the teacher change environment framework. Teachers' use of formative assessment is impacted by four primary aspects, according to the results: personal, contextual, resource-related, and external.

Ndukanio and Kinyua (2021) investigated the factors influencing the design of business studies tests in formative assessment. The study's population consisted of all the business studies instructors in the Mount Kenya region. A case study research design formed the basis of the study. The study included eight secondary schools that offered business studies at the form four level, and the researchers used a purposive sample technique to choose these schools. The participants were the business studies teachers at these schools. In order to gather the necessary data for the theme analysis, a focus group discussion guide was utilized as a research tool. Secondary school business studies teachers based the development of their formative assessment tests on considerations such as testing frequency, question item sources, the necessity of the Kenya Certificate of Secondary Education model exams, the language of the test, the areas of the curriculum that were required, the advantages

of good results, and the risks of bad results. This study used a descriptive research strategy as opposed to the case study methodology used in the previous one.

The impact of student-teacher ratio on the administration of formative assessment examinations in public primary schools in Mwingi North Sub-County, Kenya was studied by David, Cheloti, and Maithya (2021). A total of 135 participants, including 44 principals, 88 classroom teachers, and 3 district education officers, participated in the descriptive survey that formed the basis of the research. Head teachers and teachers were surveyed in the study, while the Chief Education Officer, Sub-County Quality and Standards officer, Teachers Service Commission, and Sub-County Director were interviewed. Using descriptive statistics, the quantitative data were examined. Using chi-square analysis, we assessed the null hypotheses at the 0.05 level of significance. The study's aims served as the basis for the analysis of the qualitative data. The study found that the Pupil-Teacher Ratio significantly affected how teachers administered formative assessments at the 5% level of significance. The study was done amongst public primary schools, while the current study focuses on secondary schools.

2.5 Frequency of Teachers' Administration of Formative Assessment Tests and Students' Performance in Biology

How well students do in any particular theme is directly related to the kind of assessment that is used, and this assessment needs to be in line with the course or subject's learning goals. Hence, coming up with the type of assessment to be conducted is a very vital part of the teachers' administration of the formative assessment tests procedure. For it to be highly effective, an assessment should be formative. That is, it should be able to respond to and also identify the needs of the

learners. To ensure formative assessment is successfully attained, teachers always make an interactive and consistent assessment for student understanding (Waheeda, Thama, & Keata, 2023). This ultimately enables teachers to come to terms with their teaching, therefore meeting their students' needs and helping them attain high standards. A study conducted by Correia and Harrison (2020) carried out an analysis of 21 measured research studies concerning the impacts of repeated formative assessment on learners' performance from preschool through grade 12. From the studies, the teachers carried out formative assessments up to five times every week. The standard deviation for the typical result scope was 0.70 for schoolrooms, which enabled students to develop progress reports for every student and adjust instruction. Such studies indicate that learners in classrooms receiving structural recommendations and reports on graphical progress achieved better outcomes and improved more quickly than students in classrooms that have no structural recommendations and students within a controlled group.

Another study conducted by Bergan, Sladeczek, Schwarz, and Smith (2021) evaluated a structural planning system and an eight-week implementation of an assessment system for students who were highly affected by poverty. The students were required to exhibit their grasp of tough assignments in reading, science, and biology through the tasks. The teachers conducted the assessments every two weeks, after which they sought help from a researcher who helped them analyze and interpret the results obtained. The results would then help the teachers plan for instruction. Within the two weeks, the use of assessment negatively affected placement and referrals to special education. Only one in every 17 students who

took part in the experiment got a referral to special education. The study left out the aspect of performance of biology which was the focus of the current study.

Additionally, only one out of 71 students got placement. Johnson (2024) researched to examine the effect of development scrutinizing used to evaluate K-3 students' mastery abilities from a sample of 200,000 learners. The study found that the frequency of progress monitoring results positively impacts students' performance. In the study, fewer progress monitoring administrations were conducted, while smaller size effects were also observed. Under circumstances whereby larger figures of advancement censoring managements were conducted, larger size effects were observed. That means the greater the frequency of teachers' administration of formative assessment tests, the higher the performance of students in biology.

Njiru (2021) assessed the influence of teachers' administration of formative assessment tests on learner performance in Mathematics in secondary schools in Embu County, Kenya. The results show that children do better when their performance is evaluated often, according to the study. While that study looked at math performance, this one looked at biology performance.

Bhansali et al. (2022) explored the perception of the number and types of formative assessments in competency learning among competency-based medical Education students. The data was collected using a pre-validated questionnaire from Phase 1 MBBS students at three different medical colleges. The results showed that between 43 and 71% of students thought that the frequency of formative assessment was optimal. Additionally, between 59 and 66% of students felt that periodic formative assessment tests helped them learn the pre-clinical subjects. The previous study had

focused on college students, but this one was conducted among secondary school students.

Stangeland and Hansen (2022) examined the relationship between the frequency of a variety of assessment methods and academic performance. The study obtained data from the Pupil Survey. Results showed that different types of assessments had different relationships between assessment frequency and student achievement. Using written tests and homework more frequently is associated with higher achievements, suggesting a favorable association between the two. Portfolio assessment has a negative relationship: lesser achievements are associated with more frequent usage of this strategy. The study was, however, general to the academic performance of all subjects and not specific to the performance of Biology.

Through the prism of social sustainability principles and complex adaptive systems, Sahoo et al. (2023) sought to measure the effect of weekly, monthly, and semester formative evaluations on students' learning. Statistical analysis and a post-test survey were utilized in the study to examine the students' performance on the competency-based curriculum's timely periodic formative assessments. This group included first-year medical students from 2018 (semester), 2019 (weekly), and 2020 (monthly). We utilized descriptive statistics, Spearman's correlation coefficient, and repeated-measure analysis of variance to examine the link between each cohort's formative assessment and summative scores, and to identify any noteworthy differences. The only evaluation that showed a meaningful association was the weekly formative assessment. Results from the weekly formative evaluation were significantly higher than those from the summative exam. However, the study found that the paradigm of continuous periodic formative evaluation was not sustainable in

light of social sustainability principles, despite its valid educational impact. The study used a post-exam survey, while the current study was descriptive.

Bulut et al. (2023) examined the relationship between the frequency and participation rate of formative assessments and students' course achievement using data from different undergraduate course offerings. The findings showed that student performance and participation in the required formative assessments were more predictive of their course outcomes. Furthermore, increasing the frequency of formative assessments did not improve student performance.

The correlation between the number of quizzes and eighth-grade mathematics TIMSS scores was investigated by Guven (2021). The study's narrower objective was to analyze the correlation between student performance and the optimal quiz frequency (daily, weekly, monthly, or no quizzes) for an eighth-grade mathematics course. The aforementioned correlation was examined in the United States, four particular countries (Korea, Singapore, and Turkey), and in all eighth grades across all participating nations. Information for the study came from a variety of sources, including the TIMSS 2011 test and surveys given to students, teachers, and schools. To find out if quiz frequency is a significant predictor of student achievement in all nations combined and in specific countries, we ran several multiple linear regressions. After accounting for socioeconomic status (SES) characteristics, regression analysis showed that the frequency of quizzes did not affect eighth-grade mathematics achievement globally or nationally. In addition, the data showed that weekly quizzes were the most effective across the board, while monthly quizzes were the most effective in Korea and Singapore, and daily quizzes were the most

effective in Turkey and the US. The study was done in Turkey and the United States, while the current study was done in Kenya.

Owiti (2023) aimed to determine how the number of formative assessments administered by teachers affected students' performance in Chemistry. A sequential explanatory mixed-method approach was employed in the investigation. At Parklands Arya Girls' High School, the research took place. Parklands Arya Girls High School's three chemistry students and six chemistry teachers made up the 250-person target population. The research surveyed the whole population using a census sample method. The study used questionnaires and tests of continuous evaluation to gather primary data for the investigation. It was demonstrated that frequent teachers' administration of formative assessment tests has a positive effect on student results. The study focused on the performance of Chemistry, leaving out the aspect of the performance of biology which was the focus of the current research.

Palmen et al. (2021) aimed to determine if formative testing once a week or every day yielded better results. Four online quizzes every week tested students' knowledge of thoracic anatomy in a first-year anatomy course. They were given an abdominal anatomy quiz once a week. Immediate feedback was given to students following the session. The fourth week of class was when we polled students on their level of engagement and happiness with the course. The final summative exam was taken by 424 students. As a control, we utilized trunk wall questions. Using a one-way ANOVA, we looked at how participation correlated with test scores. No difference was found between daily and weekly quizzes in terms of the correlation between participation in formative assessments and greater results on the summative

exam. The study was done amongst university students, while the current study focused on secondary school students.

2.6 Teachers' Administration of Formative Assessment Tests and Students' Learning and Performance in Biology

Assignments are part of students' academic work, hence providing them with opportunities to learn and demonstrate that they have attained their learning goals. Teachers often offer their pupils assignments to complete outside of class time. The basic objective of giving assignments to students is the same as the general schooling objectives. It, however, is not clear whether the assignments can facilitate parents' participation in their kids' coursework. However, some investigators have concluded that assignments have an optimistic impact on families and parents by giving them some attention in their kids' educational development (Cates & Erkfritz, 2021). Formative assignments are always used to develop responses that can be applied to develop both coaching and studying experiences. In most cases, learners who seem to be struggling the most academically are often assessed compared to the rest since the continued assessments have been shown to improve their academic performance (Ajogbeje, 2021). Major assessments always serve the audience more as opposed to the learner. Therefore, feedback ends up reaching all stages within the scheme, minus for the one that tallies the learner most. Essentially, assignments are meant to help teachers understand their students better as far as their academic performance is concerned, while at the same time helping the students understand their teachers' learning intentions.

Suamuang, Easter, and Suksakulchai (2021) assessed the effect of homework on students' learning. Participants were 140 undergraduates from a Thai university. A

set of questionnaires and focus group interviews were used. Despite having some psychological effects on learning and on free time management, the results showed that homework helped and supported students' learning. It paved the way for children to learn more, grow as learners, and excel in the classroom. Additionally, it encouraged students to work together and encouraged professors and students to communicate in order to clarify homework. While that research took place in Thai universities, the present investigation zeroed in on secondary education institutions.

For their study, MacNaul et al. (2021) used a repeated-measures with an alternating-treatments design to examine how 42 graduate students in an online, asynchronous course fared academically when given the option to use flash cards or study guides as assignments. Statistically significant differences were not found; however, slight differences were noted between circumstances.

Bas, Senturk, and Cigerci (2021) aimed to find out how homework affected students' grades by doing a meta-analysis. Course type, grade level, duration of implementation, instructional level, socioeconomic status, and setting were among the substantive characteristics used to compare the effect sizes of the studies included in the meta-analysis. Methodological characteristics compared to these included research designs, sample sizes, and publication bias. Findings showed that homework had a small effect size ($d = 0.229$) on pupils' levels of academic accomplishment. Lastly, it was observed that all factors, with the exception of the course type variable, did not show a significant difference in the effect sizes of the studies. The study adopted a meta-analysis, thus showing a conceptual gap. The current study adopted a descriptive research design.

Haq, Shakil, and Din (2020) investigated the effect of homework on secondary school students' grades in Gilgit Baltistan. Public school educators in Gilgit Baltistan participated in the study, with one hundred educators selected at random. Research instruments such as questionnaires were used. Homework has an effect on students' learning, the study revealed, and that effect varies with students' ages and is significantly related to kids' academic performance. This study was conducted in Siaya County, Kenya, whereas the previous one was conducted in public schools of Gilgit Baltistan.

Ozyildirim (2022) looked at the variations in homework time and how school assignment tactics impact students' academic performance. The participants comprised a statistically significant group of Spanish teenagers (N = 26,543), with an average age of 14.4 (± 0.75) and 49.7 percent female. Academic achievement in four subjects, Spanish, Mathematics, Science, and Citizenship, was assessed using a test battery. The indicators utilized to describe homework and control variables could be measured by a questionnaire. For every assessment, two hierarchical-linear models were created with three levels: student, school, and autonomous community. At the school level, there was a positive correlation between homework time and academic performance, but at the individual level, it was discovered to be negative. The inequalities in the amount of time students spent on homework increased as the amount of homework assigned by schools increased. The study was done in Spain while the current study was done in Kenya.

The effects of homework assignments in scientific education research were reviewed in the electronic database by Masalimova et al. (2023). The same keyword was also used to search the electronic database for journals. Using criteria derived from the

relevant literature, 21 papers were selected to examine the impact of homework in the context of science education. This research made use of a qualitative thematic analysis. Topics included students', instructors', and parents' perspectives on homework, as well as the pros and cons of homework in relation to students' performance and attitudes. According to the results, homework has far-reaching, multi-faceted consequences for science education. Quantitative methods were not utilized in the study since qualitative methods were chosen instead. The current study adopted both qualitative and quantitative techniques.

The goal of Olojo's (2023) research was to determine whether and how homework affected students' grades in computer science courses. Methods such as descriptive surveys were employed in the study. Of the two LGAs in Ekiti State, 195 students from Senior Secondary School 1 (SSS1) were chosen at random to make up the study's sample. In order to gather data, the researchers utilized two Computer Science Achievement Tests, namely CSAT1 and CSAT2. We used Analysis of Variance (ANOVA) to test three hypotheses. Without grading or corrections, the results demonstrated that high-ability, average-ability, and low-ability students' performance on computer science homework does not differ much. The current study did not include computer science class performance; rather, it focused on biology class performance.

Latif and Miles (2020) examined the impact of classwork and homework on final test scores using data from a Canadian business school. The results of the exams showed that, according to the difference-in-difference method, the assignments improved the overall sample's performance. When looking at exam scores by gender, assignments helped boys but had no noticeable effect on girls. There was no

statistically significant effect of the quizzes on either gender or the general population. Exam scores for overseas students were positively affected by both assignments and quizzes when examined by student residency status, although no statistically significant effect of either was seen for domestic students. This study was conducted in Kenya, whereas the previous one was in Canada.

In a study conducted in the Awgu Local Government Area of Enugu State, James, Odo, and Nnaemeka (2021) investigated how classroom assignments affected students' performance in junior secondary school mathematics. This goal was accomplished by formulating three research questions. A total of 120 participants were included in the study, with the researcher using a simple random sampling procedure. A standardized questionnaire was utilized to gather data, which were then evaluated and understood by calculating the mean and standard deviation. Students' mathematical performance is affected by homework, exercises, and projects, according to this study's results. There was a conceptual gap since the study only looked at mathematical performance. Biology efficacy was the subject of the present investigation.

The goal of the study by Fahmi Latif et al. (2022) was to find out if high school students' grades increased when teachers commented on their homework. This study used a quasi-experimental design with a control group that was established before and after the test. The Lahore Public Girls' High School was the center of attention. The research included 80 high school pupils. A control group of forty students and an experimental group of forty students were each formed. Twelve weeks were required to complete the trial. Results showed that the experimental group outperformed the control group on the post-test when it came to English. In contrast,

the control group averaged very high marks on the English section of the pretest. Consequently, it was contended that the experimental group's students performed exceptionally well on the post-test. It was discovered that students' academic performance was affected by the comments made on their English assignments. The study was done in Lahore Public Girls High School thus showing a contextual gap. The current study was done in Siaya County.

2.7 Summary of the Literature Review

Teachers' administration of formative assessment tests is a teaching method that helps students improve their performance by providing feedback and coaching. It helps develop skills and effective learning strategies. Research shows that feedback and frequency of evaluation significantly impact students' performance, particularly in mathematics in London, UK (Ajogbeje, 2021).

Teachers' administration of formative assessment tests is a significant teaching method used by teachers, but it is not systematically implemented. This method can change how teachers interact with students and assess their success. Factors contributing to poor presentation of learners in biology include negative attitudes, social factors, and teachers' lack of mastery of biological concepts. Studies have shown the impact of teachers' administration of formative assessment tests on learners' performance in math and chemistry (Nsabayezu et al., 2023).

The literature review highlights the need to assess the impact of teachers' administration of formative assessment tests on learners' performance in biology, despite the importance of biology teachers in societal settings, as poor performance in biology remains prevalent in high schools across the country.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section presents approaches that were applied in data collection and the relevant statistical analytical tools that were used to analyze the results of the study. The section also described the study area, research design, sample population, sample techniques, sources of data, and instruments used.

3.2 Research Design

This research embraced a descriptive survey plan. A descriptive survey is a technique of collecting data by administering questionnaires or carrying out interviews. Siedlecki (2020) asserts that the primary focus of a descriptive survey is the description of facts. It is a self-report that necessitates gathering fair data from the sample (Doyle et al., 2020). With no control over the variables being studied, a descriptive survey is suitable for this study's goal of presenting a situation, what people now believe, what people are doing at the moment, and so on (Siedlecki, 2020).

The design was considered suitable as it allows an in-depth study of the effect of agile project management on the performance of information technology projects in commercial banks in Kenya. Both qualitative and quantitative methodologies were utilized. The design was efficient because it ensured favorable data presentation in meaningful ways, thereby creating a favorable platform for further research.

3.2.1 Variables of the Research

Independent variables for this research were teachers' administration of formative assessment tests, feedback on teachers' administration of formative assessment tests, and the frequency of teachers' administration of formative assessment tests, which affected the performance of learners in biology. Based on the conceptual framework, learners' academic performance in biology depends on teachers' administration of formative assessment tests, feedback on teachers' administration of formative assessment tests, frequency of teachers' administration of formative assessment tests, and student assignments with group discussions, learning teaching methods as the intervening variable. The dependent variable for this research was learners' academic performance in biology, as the performance of students was highly dependent on teachers' administration of formative assessment tests, frequency of teachers' administration of formative assessment tests, and assignments.

3.3 Study Locale

The study was done in Siaya County, Kenya. Siaya County is located in the southwest region of Kenya and is among the counties found in the former Nyanza province. This area was chosen because it had a good number of public secondary schools, and poor performance in Biology was prevalent in these schools, as observed by the researcher. In addition, poor performance in Biology in Siaya County is a concerning issue, with implications for students' ability to pursue related university courses. There were 259 public secondary schools in Siaya County, and all these schools were targeted for this study. The published KNEC examination report from the Siaya County Education directors' office indicated poor performance in Biology in the last six years, which made the area suitable for the study. Teachers'

administration of formative assessment tests is key in improving the performance of students in any given school; thus, there is a need to incorporate teachers' administration of formative assessment tests in teaching biology in all Secondary schools in Siaya.

3.4 Target Population

This research targeted public high schools in Siaya County. The target population in this research was 159 secondary schools, 159 principals, who are stakeholders in implementing teachers' administration of formative assessment tests, 159 deputy principals, and 477 biology teachers, which was 3 biology teachers in each of the 159 secondary schools (Siaya County Report, 2024). Biology teachers were key people among the target population, as they helped in providing first-hand information as far as teachers' administration of formative assessment tests was concerned. This summer, a total of 795 participants were represented in the table below.

Table 3.1: Target Population

	County
Principals	159
Deputy Principals	159
Biology Teachers	477
Total	795

3.5 Sample Size and Sampling Techniques

A sample is described as a portion of the target population that is being studied (Lakens, 2022). Siaya County was purposively sampled because it had a large number of public secondary schools, with the majority of these schools performing poorly in Biology. In this investigation, a census approach was used. The method was used since the population under investigation comprised 906 respondents, which was a rather large number. The census method assured that all members of the target population were considered, eliminating bias. Since a census technique was applied, the study ruled out the application of sampling design and technique. A sample should be large enough to achieve data validity and reliability. A sample consisting of 30% or more of the targeted population is always reliable (Andrade, 2020). This study, therefore, used 30 percent of the population. Sampling was done by use of questionnaires where the respondents included school principals, teachers heading the department of biology, and biology teachers across Siaya County. The respondents were required to fill in the questionnaires to the best of their knowledge. Data from the questionnaires were grouped and analyzed. The sample size was 190 teachers and deputy principals. The sample also comprised 48 principals.

3.6 Research Instruments

Questionnaires and face-to-face interviews were used in collecting information from all groups that were principals, deputy principals, and biology teachers. Different instruments were used in collecting data, which enabled the investigator to obtain more reliable information from the respondents.

A permit will be obtained from Kenyatta University graduate school and the National Council for Science, Technology, and Innovation (NACOSTI) before

undertaking the study. Informed consent was obtained from each respondent, clearly outlining the study's objectives, voluntary participation, and the right to withdraw at any stage without repercussions. The researcher self-administered the questionnaire. The drop-and-pick method was adopted for the data collection procedure. Drop and pick involves dropping off and picking up surveys in person and can yield high participation because personal interactions have been shown to stimulate norms of reciprocity (Fife-Schaw, 2020).

3.6.1 Questionnaires

The research used questionnaires for deputy principals and biology teachers. Questionnaires were effective as they provided a relatively quick, cheap, and competent way of collecting large quantities of data from a large sample of persons.

3.6.1.1 Questionnaire for Deputy Principals

The questionnaire consisted of two main parts: Part A, which focused on obtaining general information from the respondents, while Part B aimed at answering the research objectives, which included determining the impact of teachers' administration of formative assessment tests on the academic performance of learners in biology in high schools in Siaya County.

3.6.1.2 Questionnaire for Biology Teachers

This questionnaire consisted of two sections; section one entailed teachers giving their general data, and section two sought information on how the biology teachers incorporate teachers' administration of formative assessment tests in teaching biology and the outcome of using teachers' administration of formative assessment tests in teaching.

3.6.1.3 Interviews Schedules for Principals

Interviews were more flexible and clearer; hence, they helped to secure details and clear information that may be easily left out in questionnaires. The study employed face-to-face interviews. Principals were interviewed in two phases; the first phase focused on obtaining their general information, and the second phase entailed obtaining information on forms of teachers' administration of formative assessment tests that were used in their schools in teaching biology. Biology teachers were also interviewed in the same way as the principals and deputy principals.

3.6.2 Reliability of Instruments

Dependability is the extent to which an apparatus gives reliable results as it is verified on repetitive trials, so that the investigator warrants the steadiness of results over the period (Sundram & Romli, 2023). This study adopted an assessment-reassessment technique to establish trustworthiness. Here, the investigator administered the tools on two successive times at a three-week pause (Anggraini, Khumaedi, & Widowati, 2020). It is assumed that the time break between the assessment and reassessment of the devices was long enough to guarantee that the interviewees would not remember the retorts of the earlier questioning. It would also be short to ensure that there would be no considerable alteration in the actions under study. The assessment-reassessment of the tools enabled the investigator to approximate the degree to which the instruments would produce similar fallouts as a way of finding out their dependability. Cronbach's alpha values will be calculated using SPSS Version 27, with a threshold of $\alpha \geq 0.7$ indicating acceptable internal consistency (Hair et al., 2019). The closer the value is to 1, the higher the reliability.

Below is the interpretation scale for Cronbach's alpha. The results in Table 3.2 showed that all were reliable since they were all above 0.7.

Table 3.2: Reliability Results

	Cronbach's alpha	reliability
Feedback	0.771	Reliable
Frequency	0.876	Reliable
Assignments	0.791	Reliable
academic performance in biology	0.789	Reliable

3.6.3 Validity of the Instruments

Sugiarta, Arofiati and Rosa (2023) argue that cogency means the ability of a device to perform the function it was intended to perform. In some study fields, there exist specialists and professionals whom the investigator may refer to measure the content cogency performance of the devices. Furthermore, specialists help investigators in outlining the spheres of the objects in the instruments, as well as how well that content universe would be experimented with by the test objects. The content cogency of the instruments, therefore, was inspected and developed through the help and conference of experts, especially overseers and professionals in the field of educational administration of the School of Education. Then, the investigator recycled the remarks and proposals for making the devices suitable to measure what they were invented to measure through repetitive checks and rechecks of the devices. Additionally, before posting the instruments for the real data gathering, they were assessed and reviewed so that they would record the vital information.

3.7 Pilot Study

Before collecting real information, the equipment was tested in the field to ensure consistency and accuracy. This was known as pilot research. The objective of piloting was to measure the instruments' suitability for the elements in relation to the goal of identifying flaws in the research instruments. This helped establish the acceptability of the expected analytical processes. Because they had all the data they needed, researchers could look at responses after getting pilot study input. The investigation instruments were piloted before the real research was undertaken. The piloting process was important as it helped to identify the challenges that respondents were likely to encounter and find out whether the instruments included in the investigation device helped gather sufficient figures for the research. The pilot study was done using students, teachers, principals, and deputy principals from three public high schools within Gem Sub-County using a random sampling method. Using the indiscriminate selection method, the investigator used a sample of 30 people, equal to 10% of the research sample size, which entailed 30 people. A trial equal to 10% of the research taster is sufficient for conducting the research tools. Sampling is a process that an investigator uses to collect respondents for the study. Random sampling was used in this study since it was free from bias and it enables the researcher to generalize to a larger population and make inferences from it. After reviewing the instruments, the people were fortified to make essential adjustments and corrections to increase their reliability.

3.8 Data Analysis

The researcher studied the data collected and then edited it so that only data appropriate to the study question and objective of the research were retained. Editing helped in generating accurate and consistent data, with other facts also being gathered. Questionnaires were examined to see whether they were complete and if they had been filled out correctly. The data were tallied after being coded and categorized according to their commonalities. The quantitative data were examined and outcomes given using graphs, pie charts, and frequency tables. Descriptive statistics like percentages, means, and standard deviation were employed. The grade of relationship between independent and dependent variables was assessed using inferential statistics (regression and correlation). The analyses of the data were done using SPSS (Statistical Package for Social Scientists) V22 software. The application additionally enhanced data by doing a multiple regression analysis to reveal the association between independent and dependent variables (Ali & Younas, 2021). During the study, regression analysis was used to determine if one variable (independent) predicts another variable (dependent).

The regression model was specified as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Where:

Y = Academic performance of biology (dependent variable)

β_0 = Constant term.

$\beta_1 - \beta_3$ = Regression coefficients for each independent variable.

X₁ = Teachers' administration of formative assessment tests frequency

X_2 = Evaluation feedback

X_3 = Learning through feedback

ϵ = Error term

The qualitative data took into account the feelings, attitudes, and opinions of the principals. The qualitative data produced from content analysis, observation, and key informant interviews were transcribed and coded into common themes. Use of a narrative report supplemented with quotes from important informants and examined materials allowed for the interpretation and explanation of the topics. To ensure the results were more reliable and legitimate, they were triangulated with the quantitative analysis's findings to see if the hypotheses were the same or different.

3.9 Research Considerations

3.9.1 Ethical Considerations

The researcher obtained approval from Kenyatta University experts and a research permit from NACOSTI before contacting school principals for permission to conduct the study. Participants were briefed on the purpose of the research and gave informed consent to voluntarily take part. To ensure confidentiality, respondents remained anonymous, and they were free to withdraw at any stage. Collected data were securely stored in locked cabinets and password-protected files, while unused data were destroyed, thereby safeguarding both raw and processed information.

3.9.2 Logistical Issues

To make sure data collection went smoothly, the researcher planned and organized all the required logistics. This required consulting with school administrators to plan school visits, organizing transportation to the different schools, making sure there were enough surveys, and making sure writing equipment was available. The data gathering timelines were meticulously planned so as not to conflict with school activities, especially test and class schedules.

3.9.3 Human Relations Issues

The researcher treated school administrators, instructors, and learners with the utmost professionalism and politeness at all times. Everyone involved made an effort to get to know each other, trust each other, and promote honest, non-threatening engagement. Additionally, it was noted that being sensitive to cultural norms and values in Siaya County helped foster cooperation and reduce participant resistance.

3.9.4 Legal Issues

The study was conducted in accordance with the applicable laws and regulations of Kenyan research. A research permit was obtained from NACOSTI, and letters of authorization were sent to school principals to legitimize the study. The researcher followed all standards for data protection in Kenya, which included protecting the personal information of participants, keeping their identities anonymous, and erasing any data that were not needed for the study. As a result, the study was able to meet the requirements of both national and institutional laws regarding ethical research practices.

CHAPTER FOUR

RESEARCH FINDINGS, DISCUSSIONS AND INTERPRETATIONS

4.1 Introduction

This chapter is a presentation of study findings, interpretations, and discussion. It comprises the response rate, background information of the respondents, and findings according to the study variables/objectives. The findings are further discussed in relation to previous studies. The specific objectives of the study were: To determine the relationship between feedback on teachers' administration of formative assessment tests and performance of learners in biology in Siaya County; To find out how the frequency of teachers' administration of formative assessment tests relates to performance of learners in biology in Siaya County, and To establish the relationship between learning through assignments and the performance of learners in biology in Siaya County.

4.2 Response Rate

The sample size was 190 teachers and deputy principals. The response rate results are presented in Table 4.1.

Table 4.1: Response Rate

Instrument	Sample size	Obtained Responses	Percent (%)
Questionnaires	191	177	93%

Source: Research Data (2024)

The researcher managed to collect 177 questionnaires from teachers and deputy principals. These represented a 93% response rate. According to Saunders et al. (2009), a response rate of 50% and above is adequate for statistical analysis. The response rate is considered adequate for further analysis.

4.3 Background Information

This section provides background information, including title, academic credentials, use of teachers' administration of formative assessment tests while teaching biology, and improvement in learners' performance through teachers' administration of formative assessment tests. The respondents were asked to specify their title, and the results are shown in Figure 4.1. Specifying respondent titles like principal or teacher in a questionnaire is important for several reasons: it allows for targeted analysis, helps with data interpretation, and ensures the validity of the research. This distinction enables researchers to compare responses from different stakeholder groups and understand how their perspectives might vary on the subject matter.

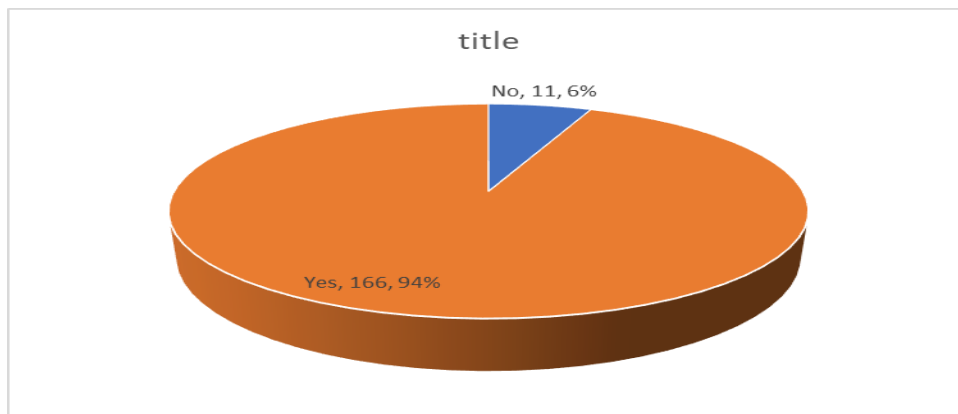


Figure 4.1: Title of the Respondents

Source: Research Data (2024)

The findings show that the majority, 166 (94%) of respondents were teachers, while 11(6%) were assistant principals. This implies that most of the respondents who were interviewed were teachers. This could be attributed to the fact that secondary schools have more teachers than principals. In secondary schools, the number of teachers significantly outnumbers principals. This disparity is relevant to teachers' administration of formative assessment tests and its influence on academic

performance, as teachers are directly involved in implementing formative assessments, while principals oversee the overall educational environment (Opiyo, Asema, & Olel, 2025).

Respondents were also asked to state their academic credentials, and the results are shown in Figure 4.2. Including academic credentials in a questionnaire provides valuable context about respondents, allowing researchers to analyze data with a more nuanced understanding of the sample's characteristics. This information can help identify trends, tailor research findings, and potentially explain variations in responses based on educational background.

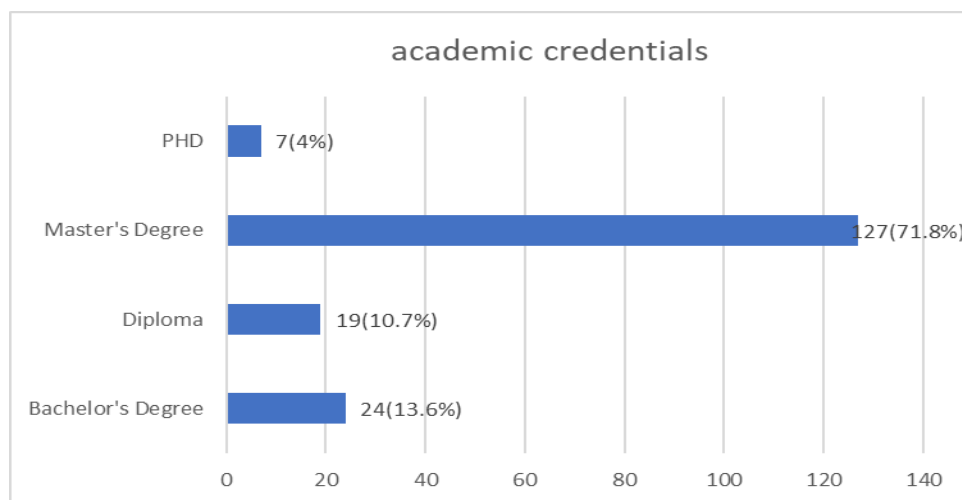


Figure 4.2: Academic Credentials

Source: Research Data (2024)

The findings reveal that the majority, 27(71.8%) of teachers and deputy principals had master’s degrees, 24(13.6%) bachelor’s degrees, 19(10.7%) diplomas, and only 7(4%) had attained PHD level. This implies that most teachers and principals in public high schools in Siaya County were educated and thus have the capacity to enhance the performance of learners. This implies that in Siaya County's public high

schools, teachers and principals generally receive education and training that emphasizes teachers' administration of formative assessment tests and its influence on student academic performance. This includes understanding the principles of formative assessment, how to effectively implement it, and how to interpret the results to improve teaching and learning (Opiyo, Asesa, & Olel, 2025).

The respondents were further asked whether they employ teachers' administration of formative assessment tests while teaching biology. Results are shown in Figure 4.3.

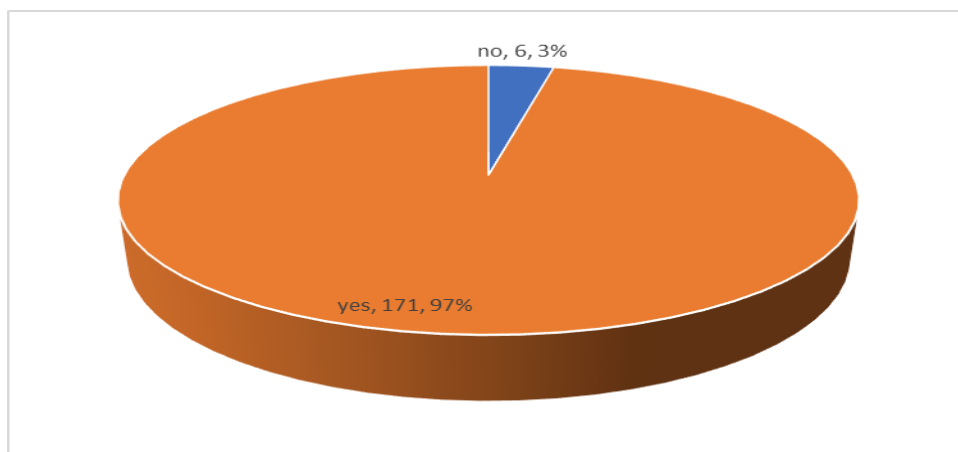


Figure 4.3: Teachers' Administration of Formative Assessment Tests While Teaching Biology

Source: Research Data (2024)

The findings reveal that 171(97%) of teachers and deputy principals reported that they employ teachers' administration of formative assessment tests while teaching biology, with only 6(3%) stating that they did not use teachers' administration of formative assessment tests while teaching biology. This implies that most teachers in high schools in Siaya use teachers' administration of formative assessment tests while teaching biology. In Siaya County's high schools, while the extent of its use may vary, biology teachers generally employ teachers' administration of formative

assessment tests to enhance learning and improve student academic performance. This approach focuses on ongoing assessment to provide feedback that helps students identify strengths and weaknesses, ultimately leading to better learning outcomes (Akinyi & John, 2022).

The respondents were asked whether they had realized improvement in learners' performance through teachers' administration of formative assessment tests. Results are shown in Table 4.2.

Table 4.2: Improvement in Learners' Performance through Teachers' Administration of Formative Assessment Tests

	Frequency	Percent (%)
No	15	8.5
Yes	162	91.5
Total	177	100

Source: Research Data (2024)

The findings indicate that the majority, 162 (91.5%) of teachers and deputy principals had realized improvement in learners' performance through teachers' administration of formative assessment tests; however, 15(8.5%) of respondents had not noticed improvement in learners' performance. This implies that teachers' administration of formative assessment tests enhances learners' performance.

4.4 Analysis of Feedback on Teachers' Administration of Formative Assessment Tests

Descriptive analysis is one of the critical phases of statistical data analysis. It provides a clear conclusion on the distribution of data, which help in detecting errors and outliers (Alabi & Bukola, 2023). Descriptive statistics for Feedback on Teachers' administration of formative assessment tests were presented in Table 4.3.

Table 4.3: Provision of Feedback on Formative Assessment Tests Administered by Teachers

Statement	SD	D	N	A	SA	Mean	Std Dev
Teachers provide feedback to students.	0 (0.0%)	4 (2.3%)	18 (10.2%)	61 (34.5%)	94 (53.1%)	4.4	0.8
Teachers spend more time on a few selected assignments as opposed to grading every work done by students.	4 (2.3%)	26 (14.7%)	35 (19.8%)	68 (38.4%)	44 (24.9%)	3.7	1.1
Prompt feedback on teachers' administration of formative assessment tests informs students of their academic progress.	4 (1.1%)	11 (6.2%)	33 (18.6%)	75 (42.4%)	56 (31.6%)	4.0	0.9
Students usually obtain better grades when they work towards process objectives instead of product objectives, and when following their development towards the general learning objective	0 (0.0%)	1 (0.6%)	45 (25.4%)	65 (36.7%)	66 (37.3%)	4.1	0.8
Overall score						4.0	0.9

Source: Research Data (2024)

The findings in Table 4.3 show that the majority of teachers and deputy principals (155, 84.6%) agreed with the statement that teachers provide feedback to students.

This was supported by a mean of 4.4 and a standard deviation of 0.8. This implies

that most teachers provide feedback to their students. In addition, the majority of the teachers and deputy principals (112, 63.3%) agreed with the statement that teachers spend more time on a few selected assignments as opposed to grading every work done by students. This was supported by a mean of 3.7 and a standard deviation of 1.1. This implies that most teachers preferred to spend more time on a few selected assignments. Findings also supported findings by Sato et al. (2021), who showed that students who participated in the feedback process provided higher-quality responses to similar final-exam questions.

The majority of the teachers and deputy principals, who were 131 (74.0%), agreed with the statement that prompt feedback on teachers' administration of formative assessment tests informs students of their academic progress. This was supported by a mean of 4.0 and a standard deviation of 0.9. In addition, the majority of the teachers and deputy principals (131, 80.0%) agreed with the statement that students usually obtain better grades when they work towards process objectives instead of product objectives and when following their development towards the general learning objective. This was supported by a mean of 4.1 and a standard deviation of 0.8. Findings agreed with Andrade and Valtcheva (2021), who showed that feedback enables students to understand how they are progressing in their learning processes.

The overall mean of 4.0 with a standard deviation of 0.9 implied that the majority of respondents were in agreement with statements relating to feedback on teachers' administration of formative assessment tests. The findings point to the importance of feedback on teachers' administration of formative assessment tests in improving learners' academic performance.

These responses were supported by the responses provided by the principals. All the principals who were interviewed revealed that they usually offer formative assessments to their students. All the principals affirmed that feedback is provided to students after every assessment. The principals' responses revealed that feedback on the teachers' administration of formative assessment tests provides students with an opportunity to evaluate themselves in terms of their understanding of the different topics. Feedback on teachers' administration of formative assessment tests helps students gauge their knowledge on particular subjects and recognize the knowledge gaps that they need to improve on. It therefore enables the students to know the topics that are challenging them the most, and hence they can put more effort into the topics or seek help from the teachers. Further, feedback helps students know the strategies they need to adapt to enhance their learning on the subjects and topics that are more challenging to them. They are also able to know the support resources that they need to enhance their learning. Formative feedback, according to the principals' responses, helps the students understand what good performance is, and hence they can work towards that goal. Doing so led to better grades in the subsequent assessments, hence leading to a better performance in the subject.

These findings concurred with other studies previously conducted. As an example, Nicol and Macfarlane-Dick (2006) emphasized the need to provide students with constructive criticism that focuses on how to enhance their work rather than only highlighting their mistakes. That was also in agreement with what Fong et al. (2021) said about how constructive criticism motivates students to do better and realize their maximum potential. Teachers can have a good impact on students' performance by guiding them and recognizing their skills. This helps pupils develop a feeling of self-confidence and belief in their ability.

4.5 Analysis of Frequency of Teachers' Administration of Formative Assessment Tests

Descriptive analysis is one of the critical phases of statistical data analysis. It provides a clear conclusion on the distribution of data, which helps in detecting errors and outliers (Alabi & Bukola, 2023). Descriptive statistics for frequency on Teachers' administration of formative assessment tests were presented in Table 4.4.

Table 4.4: Frequency of Teachers' Administration of Formative Assessment Tests

	SD	D	N	A	SA	Mean	Std Dev
Reports, formative assessments, and structural recommendations are used to facilitate peer-to-peer instruction, address more skills, and also enhance instruction.	0 (0.0%)	5 (2.8%)	32 (18.1%)	58 (32.8%)	82 (46.3%)	4.2	0.8
Teachers' administration of formative assessment tests frequency of progress observation has been attested to have a positive effect on the progress of students.	0 (0.0%)	6 (3.4%)	17 (9.6%)	70 (39.5%)	84 (47.5%)	4.3	0.8
Teachers actively involve students in assisting them in developing skills that will enable them to learn better	0 (0.0%)	2 (1.1%)	32 (18.1%)	61 (34.5%)	82 (46.3%)	4.3	0.8
Overall score						4.3	0.8

Source: Research Data (2024)

The findings in Table 4.4 reveal that the majority of the teachers and deputy principals who were with the statement that 140(79.1%) agreed with the statement that reports, formative assessments, and structural recommendations are used to facilitate peer-to-peer instruction, address more skills, and also enhance instruction. This was supported by a mean of 4.2 and a standard deviation of 0.8. This implies that most of the teachers used reports, formative assessments, and structural recommendations to facilitate peer-to-peer instruction. The majority of the teachers and deputy principals, who were 154, 87.0% agreed with the statement that teachers' administration of formative assessment tests, the frequency of progress observing has been attested to have a positive effect on the progress of students. This was supported by a mean of 4.3 and a standard deviation of 0.8. This implies that most of the teachers' administration of formative assessment tests, frequency of progress observation has been attested to have a positive effect on the progress of students. These results corroborated those of Hupert et al. (2021), who discovered that students' performance in biology improved in correlation with the frequency with which instructors administered formative assessments.

Further, the majority of the teachers and deputy principals, who were 143 (80.8%), agreed with the statement that teachers actively involve students in assisting them in developing skills that will enable them to learn better. This was supported by a mean of 4.3 and a standard deviation of 0.8. This implies that most of the teachers assist their students in developing skills. These results corroborated those of Hupert et al. (2007), who discovered that students' performance in biology improved in correlation with the frequency with which instructors administered formative assessments. The results were in agreement with those of Sahoo et al. (2023), who

also discovered a strong relationship between the weekly formative evaluation and the outcomes.

The overall mean of 4.3 with a standard deviation of 0.8 implied that the majority of respondents were in agreement with statements relating to the frequency of teachers' administration of formative assessment tests. The outcomes point to the importance of the frequency of teachers' administration of formative assessment tests in enhancing learners' academic performance.

According to the principals' responses, more frequent teachers' administration of formative assessment tests provides students with vast opportunities for enhancing their performances. The students have more opportunities to get involved and committed to the learning. According to the principals, more frequent teachers' administration of formative assessment tests helps them to get better grades than less frequent formative assessments. However, according to the principals' responses, more frequent formative assessments can take more time, leading to the students not having enough time for teaching. The principals hence highlighted the need to moderate the frequency of teachers' administration of formative assessment tests.

4.6 Analysis of Student Learning and Performance in Biology through Teacher-Administered Formative Assessment Tests

Descriptive analysis is one of the critical phases of statistical data analysis. It provides a clear conclusion on the distribution of data, which helps in detecting errors and outliers (Alabi & Bukola, 2023). Descriptive statistics for learning through assignments were presented in Table 4.5.

Table 4.5: Learning through Assignments

Assignments	SD	D	N	A	SA	Mean	Std Dev
Assessments allow students to improve and revise their thinking and aid them in observing their development over time.	0 (0.0%)	0 (0.0%)	32 (18.1%)	67 (37.9%)	78 (44.1%)	4.3	0.7
We use modified assessments frequently to improve students' learning outcomes.	0 (0.0%)	8 (4.5%)	16 (9.0%)	67 (37.9%)	86 (48.6%)	4.3	0.8
Conducting frequent assessments of students' performance has proven to improve students' outcomes.	0 (0.0%)	3 (1.7%)	14 (7.9%)	63 (35.6%)	97 (54.8%)	4.4	0.7
Teachers employ assignment tests as a formative assessment method to assess learners' progress in performance in Biology.	0 (0.0%)	5 (2.8%)	44 (24.9%)	65 (25.4%)	83 (46.9%)	4.2	0.9
Overall score						4.3	0.8

Source: Research Data (2024)

The findings in Table 4.5 indicate that respondents 145(82%) agreed with the statement that assessments allow students to improve and revise their thinking and aid them in observing their development over time. This was supported by a mean of 4.3 and a standard deviation of 0.7. This implies that most teachers allow students to improve and revise their thinking. The findings agreed with the statement that most of the respondents who were 153, 86.5%) agreed with the statement that teachers use modified assessments frequently to improve students' learning outcomes. This was

supported by a mean of 4.3 and a standard deviation of 0.8. Ajogbeje (2021) argued that assignments assist teachers in understanding their students better in terms of academic achievement, and the study's results corroborated this view. At the same time, students gain insight into their professors' learning intentions through these assignments.

Further, the findings reveal that respondents strongly agreed (54.8%) and agreed (35.69%) that conducting frequent assessments of students' performance has proved to improve students' outcomes. This was supported by a mean of 4.4 and a standard deviation of 0.7. In addition, results reveal that respondents strongly agreed (46.9%) and agreed (25.4%) that teachers employ assignment tests as a formative assessment method to assess learners' progress in performance in Biology. This was supported by a mean of 4.2 and a standard deviation of 0.9. This implies that most biology teachers employ assignment tests as a formative assessment method to assess learners' progress. These results corroborated those of Haq, Shakil, and Din (2020), who also discovered that homework has an effect on students' learning and is a major factor in their academic success. This is in line with the results of the study by James, Odo, and Nnaemeka (2021), which showed that students' performance in Mathematics is affected by taking a test at home.

The overall mean of 4.3 with a standard deviation of 0.8 implied that the majority of respondents were in agreement with statements relating to learning through assignments. The findings document the importance of employing assignment tests as a formative assessment method to assess learners' progress in performance.

The responses from the interview schedule with the principals revealed that assignments increase students' engagement in learning. Assignments also lead to

positive educational outcomes. Assignments provide teachers with opportunities to provide guiding questions to the students in order to enhance their understanding of the subjects. Assignments also help students prepare for the main examinations. According to the principals, the teachers provide students with questions that enable them to revise the related topic and prepare them for the final term examinations. The principals also indicated that assignments help the students to do further reading, which reinforces what they are taught in class. Sometimes teachers give assignments to the students on a topic that they intend to teach next. This helps the students with studying particular topics before the actual class lesson. This enhances the students' understanding of the topic. They also stated that the assignments helped the students to utilize their free time in learning, which also helped them attain better grades.

Suamuang, Easter, and Suksakulchai (2021) came to a similar conclusion, finding that homework helped students learn, but it also had psychological effects on their performance and altered how they managed their leisure time. It helped students to study more, become better learners, and do better in school. Additionally, it encouraged students to work together and encouraged professors and students to communicate in order to clarify homework.

4.7 Correlation Analysis

Correlation is usually used to test the relationship between the dependent and the independent variable. The correlation ranges from perfect negative correlation (-1) to perfect positive correlation (+1). Any value close to -1 or +1 indicates that the variables were strongly negatively correlated and strongly positively correlated. A

correlation value close to zero (0) indicates a weak correlation between variables. Correlational results were presented in Table 4.6.

Table 4.6: Correlation Analysis Results

		Performance	Feedback	Frequency	Assignments
Performance	Pearson Correlation	1			
	Sig. (2-tailed)				
Feedback	Pearson Correlation	.635**	1		
	Sig. (2-tailed)	0.000			
Frequency	Pearson Correlation	.652**	.671**	1	
	Sig. (2-tailed)	0.000	0.000	0.000	
Assignments	Pearson Correlation	.622**	.533**	.698**	1
	Sig. (2-tailed)	0.000	0.000	0.000	

** Correlation is significant at the 0.01 level (2-tailed).

Source: Research Data (2024)

The study findings showed that feedback on teachers’ administration of formative assessment tests had a strong positive and significant correlation with Learners’ academic performance in biology ($r=0.635$, $p=0.000$). This implies that an increase in feedback on teachers’ administration of formative assessment tests would enhance learners’ academic performance. Ajogbeje, Ojo, and Ojo (2021) demonstrated that students may comprehend their own learning progress through feedback; the results corroborated this finding.

Outcomes further showed that the frequency of teachers’ administration of formative assessment tests had a strong positive and significant correlation with Learners’

academic performance in biology ($r=0.652$, $p=0.000$). This implies that an increase in the frequency of teachers' administration of formative assessment tests would enhance learners' academic performance. These results corroborated those of Hupert et al. (2007), who discovered that students' performance in biology improved in correlation with the frequency with which instructors administered formative assessment assessments. The results were in agreement with those of Sahoo et al. (2023), who also discovered a strong relationship between the weekly formative evaluation and the outcomes.

Further outcomes showed that learning through assignments had a strong positive correlation with learners' academic performance in biology ($r=0.622$, $p=0.000$). This implies that an increase in assignments, together with group discussions, would enhance learners' academic performance. The results of the study corroborated those of Ajogbeje (2012), who argued that the purpose of assignments is to provide both the instructor and the student with insight into the other's learning goals and progress in the classroom. The results also agreed with those of Haq, Shakil, and Din (2020), who noted that homework influences students' learning, that this influence varies with students' ages, and that it is a significant factor in students' final grades.

4.8 Multiple Regression Analysis

Regression models, according to Zikmund et al. (2010), provide light on how changing one independent variable affects the typical value of the dependent variable, with the other independent variable kept constant or fixed. Regression analysis was done to determine the relationship between the independent variables (feedback on teachers' administration of formative assessment tests, frequency of

teachers' administration of formative assessment tests, as well as learning through assignments) and the dependent variable (learners' academic performance).

Table 4.7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.733a	0.537	0.529	0.12162

a Predictors: (Constant), Assignments, Feedback, Frequency

Source: Research Data (2024)

Table 4.7 shows that among the variables that adequately explain students' academic performance, feedback on instructors' formative assessment test administration, the frequency of instructors' formative assessment test administration, and learning through assignments collectively were the most significant. The dependent variable, students' academic performance, is explained by 53.7% of the variance by feedback on teachers' formative assessment test administration, frequency of teachers' formative assessment test administration, and learning through assignments. This result provides more evidence that the model used to link the components was appropriate. Table 4.8 provides the results of the analysis of the variance (ANOVA).

Table 4.8: Analysis of Variance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.97	3	0.99	66.923	.000b
	Residual	2.559	173	0.015		
	Total	5.529	176			

a Dependent Variable: Performance

b Predictors: (Constant), Assignments, Feedback, Frequency

Source: Research Data (2024)

Table 4.8 indicated that feedback on teachers' administration of formative assessment tests, frequency on teachers' administration of formative assessment

tests, as well as learning through assignments were good predictors of learners' academic performance as represented by an F statistic of 66.923 and the reported p value of 0.000, which was less than the conventional probability of 0.05 significance level. This implies that the feedback on teachers' administration of formative assessment tests, frequency of teachers' administration of formative assessment tests, as well as learning through assignments, have a statistically significant effect on learners' academic performance.

Regression coefficient results were presented in Table 4.9.

Table 4.9: Regression Coefficients

Model		Unstandardized		Standardized	T	Sig.
		Coefficients		Coefficients		
		B	Std. Error	Beta		
1	(Constant)	-0.131	0.096		-1.37	0.172
	Feedback	0.127	0.027	0.326	4.643	0.000
	Frequency	0.085	0.03	0.235	2.833	0.005
	Assignments	0.108	0.028	0.284	3.905	0.000

a Dependent Variable: Performance

Source: Research Data (2024)

The study findings showed that feedback on teachers' administration of formative assessment tests had a positive and significant influence on learners' academic performance in biology ($\beta=0.326$, $p=0.000$). This implies that an increase in feedback on teachers' administration of formative assessment tests would enhance learners' academic performance by 0.326. The results corroborated those of Andrade and Valtcheva (2009), who demonstrated that students gain insight into their own learning progress through the use of feedback. The results corroborated those of Sato et al. (2021), who demonstrated that students' answers to comparable final exam

problems were of greater quality when they were involved in the feedback process. Also, it agreed with Batool and Akhter (2019), who discovered that feedback significantly affected students' math performance.

Outcomes further showed that the frequency of teachers' administration of formative assessment tests had a positive and significant influence on learners' academic performance in biology ($r=0.235$, $p=0.005$). This implies that an increase in the frequency of teachers' administration of formative assessment tests would enhance learners' academic performance by 0.235. These findings agreed with Lee et al. (2020), who found that the greater the frequency of teachers' administration of formative assessment tests, the higher the performance of students in biology. Findings also agree with Gjerustad and Opheim (2024), who established that the frequency of assessment is connected to academic performance. The study also concurred with Owiti (2023), who demonstrated that frequent teachers' administration of formative assessment tests has a positive effect on student results. This, however, disagreed with Bulut et al. (2023), who found that increasing the frequency of formative assessments did not improve student performance, and Guven (2017), who found that quizzing frequency is not a significant contributor to student achievement in eighth-grade mathematics.

Further outcomes showed that learning through assignments had a positive and significant influence on learners' academic performance in biology ($r=0.284$, $p=0.000$). This implies that an increase in assignments, together with group discussions, would enhance learners' academic performance by 0.284. Ajogbeje (2021) argued that assignments assist teachers in understanding their students better in terms of academic achievement, and the study's results corroborated this view. At

the same time, students gain insight into their professors' learning intentions through these assignments. This is in line with the findings of Haq, Shakil, and Din (2020), who discovered that homework influences students' learning and significantly affects their academic performance. James, Odo, and Nnaemeka (2017) found that students' performance in mathematics is impacted by take-home tests, and this finding is in agreement with them.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study was required to investigate the influence of teachers' administration of formative assessment tests on the performance of learners in biology in Siaya County. The chapter was done in line with the specific objectives. The specific objectives were to determine the influence of feedback on teachers' administration of formative assessment tests on performance of learners in biology in Siaya County; to find out the influence of frequency of teachers' administration of formative assessment tests on performance of learners in biology in Siaya County; and to establish the influence of learning through assignments on performance of learners in biology in Siaya County. The section highlighted the summary of the findings. The chapter also outlined the conclusions as well as the recommendations using the study findings.

5.2 Summary of the Findings

The section was done in line with the specific objectives of the study.

5.2.1 Provision of Feedback on Formative Assessment Tests Administered by Teachers and Students' Performance in Biology

The first objective was to determine how feedback on teachers' administration of formative assessment tests influences the performance of learners in biology in Siaya County. The findings showed that the majority of respondents strongly agreed that teachers provide feedback to students. Further, the majority of the respondents were in agreement that teachers spend more time on a few selected assignments as opposed to grading every work done by students. Further, the majority of the

respondents agreed that prompt feedback on teachers' administration of formative assessment tests informs students of their academic progress. In addition, the majority of the respondents agreed that students usually obtain better grades when they work towards process objectives instead of product objectives and when following their development towards the general learning objective. Regression results showed that feedback on teachers' administration of formative assessment tests had a positive and significant relationship with Learners' academic performance in biology.

5.2.2 Frequency of Teachers' Administration of Formative Assessment Tests and Students' Performance in Biology

The second objective was to determine how the frequency of teachers' administration of formative assessment tests influences the performance of learners in biology in Siaya County. The findings showed that the majority of the majority agreed that reports, formative assessments, and structural recommendations are used to facilitate peer-to-peer instruction, address more skills, and also enhance instruction. The results also indicate that the majority of the respondents agreed that the frequency of teachers' administration of formative assessment tests and progress observation has been attested to have a positive effect on the progress of students. Further results showed that the majority of the respondents indicated that teachers actively involve students in assisting them in developing skills that will enable them to learn better. Regression results showed that feedback on teachers' administration of formative assessment tests had a positive and significant relationship with learners' academic performance in biology.

5.2.3 Students' Learning and Performance in Biology through Teacher-Administered Formative Assessment Tests

The third objective was to determine how learning through assignments influences the performance of learners in biology in Siaya County. The findings agreed with assessments allow students to improve and revise their thinking, and aid them in observing their development over time. The results also indicate that the majority of the respondents indicated that teachers use modified assessments frequently to improve students' learning outcomes. Further, the findings reveal that the majority of the respondents indicated that conducting frequent assessments of students' performance has proved to improve students' outcomes. In addition, results revealed that the majority of the respondents indicated that teachers employ assignment tests as a formative assessment method to assess learners' progress in performance in Biology.

5.3 Conclusion of the Study

The conclusions of the study were in line with the study objectives.

5.3.1 Provision of Feedback on Formative Assessment Tests Administered by Teachers and Students' Performance in Biology

The study concluded that feedback on teachers' administration of formative assessment tests had a positive and significant influence on learners' academic performance in biology. Students' learning was improved when they were given feedback, according to the study. The pupils were able to pinpoint their academic weaknesses and develop strategies to address them thanks to the feedback they received. Academic performance improved among students who received comments. The feedback sessions were valuable and met their expectations.

5.3.2 Frequency of Teachers' Administration of Formative Assessment Tests and Students' Performance in Biology

The study concluded that the frequency of teachers' administration of formative assessment tests had a positive and significant influence on learners' academic performance in biology. Teachers may better tailor their lessons to the requirements of their pupils and ensure that all students achieve high standards when they do formative assessments frequently, according to the study. There was a correlation between the amount of time teachers spent grading and fixing student work and their students' final grades.

5.3.3 Students' Learning and Performance in Biology through Teacher-Administered Formative Assessment Tests

The study concluded that learning through assignments had a positive and significant influence on learners' academic performance in biology. Based on the results, biology teachers use assignment tests as a form of formative assessment to gauge their students' progress in the subject. This practice is widely used in the classroom, and research shows that students do better academically when teachers use formative assessments frequently.

5.4 Recommendations of the Study

The recommendations of the study were made in line with the study objectives.

5.4.1 Provision of Feedback on Formative Assessment Tests Administered by Teachers and Students' Performance in Biology

From the study findings, feedback on teachers' administration of formative assessment tests had a positive and significant influence on learners' academic performance in biology. Feedback on teachers' administration of formative

assessment tests has proved to be an effective teaching technique for biology students. School administrators should prioritize effective teachers' administration of formative assessment tests feedback to enhance student learning. This includes promoting goal-referenced feedback, ensuring it's timely and specific, and fostering a culture of a growth mindset. Administrators should also encourage teachers to use feedback as a tool for instructional improvement and student self-reflection.

In order to make the learning process more transparent and to help students learn new abilities, good feedback should be connected to clear criteria about what is expected of them in terms of performance. Not only that, but comments should be brief, to-the-point, and provide recommendations on how to do better in the future. Every student should be able to thrive in the social and environmental contexts where biology instructors administer formative assessments and provide feedback. This would enhance the students' academic performance.

5.4.2 Frequency of Teachers' Administration of Formative Assessment Tests and Students' Performance in Biology

From the study findings, the frequency of teachers' administration of formative assessment tests had a positive and significant influence on learners' academic performance in biology. School administrators should encourage regular and varied formative assessments to improve student performance, with a focus on low-stakes evaluations and timely, constructive feedback. This approach helps students identify learning gaps, adjust their strategies, and develop a growth mindset, ultimately leading to better academic outcomes. Teachers implementing formative assessment in the classroom should check for comprehension on a regular basis through

collaborative activities. That way, they may tailor their lessons to each student's unique requirements and ensure that every kid succeeds academically.

5.4.3 Students' Learning and Performance in Biology through Teacher-Administered Formative Assessment Tests

From the study findings, the frequency of learning through assignments had a positive and significant influence on learners' academic performance in biology. To improve learner performance through assignments, school administrators should focus on providing timely feedback, incorporating service-learning, utilizing technology, fostering peer support, and implementing formative assessments. Encouraging student ownership of learning through meaningful choices and open-ended assignments can also be beneficial. Secondary school biology teachers should therefore plan carefully for biology assignments, including homework, classroom supervised mathematics work, to increase students' motivation to learn biology as well as enhance the students' academic progress.

5.4.4 Recommendations for Policy

Policymakers should emphasize the use of diverse, well-structured assignments that promote active learning, critical thinking, and reflection to enhance learner performance. This includes incorporating strategies like inquiry-based learning, problem-based learning, and cooperative learning, while also ensuring assignments are aligned with clear learning objectives and provide timely, constructive feedback.

Learning biology is not just a cerebral process, and curriculum developers should keep that in mind when they create activities for students to do. As a result, instructional materials and pedagogical approaches used in biology classes should

encourage students to take an active, exploratory, and exciting role in their own education.

Teachers can improve their performance and learn how to build formative assessments and incorporate them into classroom procedures by attending seminars, workshops, conferences, and in-service training, which should be allowed and incentivized by the government and school administrators.

5.5 Suggestions for Further Study

The research focuses on determining how teachers' administration of formative assessment tests affects the performance of learners in biology in Siaya County. In order to find more consistent results that reflect students' performance in biology, the study recommends more research on the effects of teachers' administration of formative assessment tests on students' performance in Siaya County and other counties like Nairobi and Mombasa. In order to draw comparisons with the current study, future research can be carried out in other nations, like Tanzania and Uganda.

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APPENDICES

Appendix I: Introductory Letter

Were Margaret Awuor

Dear Respondent

REF: REQUEST TO COLLECT DATA

Were Margaret Awour is a Master's student at Kenyatta University, undertaking a master's degree in education administration. As a requirement in accomplishing my Master's degree course, I am doing research on "The extent of Formative Assessment on Academic Performance of Learners in Biology in public high Schools in Siaya County, Kenya."

Due to the position you hold in this school, I have selected you to offer relevant info that will permit the research to attain its set purposes. I propose to use questionnaires to investigate the topic above. I will seek to treat the identity of my respondents with maximum confidence. Therefore, any assistance given will play a crucial part in the success of this research project. At the end of the study, a final copy will be submitted to you whenever required.

Looking forward to working with you.

Yours faithfully,

Were Margaret Awuor

Appendix II: Questionnaire

Kindly write answers in the provided spaces or tick where appropriate;

Part A: Overall Data

1. Respondent's Name
2. Institution's Name
3. Title
Principal Assistant Principal Teacher
4. Academic credentials
Bachelor's Degree Master's Degree Diploma
5. Do you employ teachers' administration of formative assessment tests while teaching biology?
6. Have you realized improvement in learner's performance through teachers' administration of formative assessment tests?
Yes No

Part two: Research Objectives

a) Questionnaire for Principals

Please show your degree of agreement alongside the declarations provided in the table below by relating the effect of formative assessment on the performance of learners.

Statement	Strongly agree	Neutral	Disagree	Disagree	Strongly Disagree
Feedback on teachers' administration of formative assessment tests					
Teachers provide any form of feedback to students.	1				
Teachers spend more time on few selected assignments as opposed to grading every work done by students.	2				
Prompt feedback on teachers' administration of formative assessment tests informs students of their academic progress.	3				
Students usually obtain better grades when they work towards process objectives instead of product objectives and when following their development towards the general learning objective.	4				
Frequency of teachers' administration of formative assessment tests					
Reports, formative assessments, and structural recommendations are used					

Statement	Strongly agree	Neutral	Disagree	Disagree	Strongly Disagree
to facilitate peer-to-peer instruction, address more skills, and also enhance one one-on-one instruction.					
Teachers' administration of formative assessment tests frequency of progress observing has attested to have a positive effect on the progress of students.					
Teachers actively involve students in assisting them in developing skills that will enable them to learn better.					
Assignments					
Assessments allow students to improve and revise their thinking and aid them observe their development over time.					
We use modified assessments frequently to improve student's learning outcomes.					
Conducting frequent assessments of students' performance has proved to improve students' outcomes.					
Teachers employ assignment tests as a formative assessment method to assessing learners' progress in performance in biology.					

b) Questionnaire for Deputy Principals

Please show your degree of agreement alongside the declarations provided in the table below by relating the effect of formative assessment on performance of learners;

Statement	Strongly agree	Neutral	Disagree	Disagree	Strongly Disagree
Feedback on teachers' administration of formative assessment tests					
Teachers provide any form of feedback to students.					
Teachers spend more time on few selected assignments as opposed to grading every work done by students.					
Prompt feedback on teachers' administration of formative assessment tests informs students of their academic progress.					
Students usually obtain better grades when they work towards process objectives instead of product objectives and when following their development towards the general learning objective.					
Frequency of teachers' administration of formative assessment tests					
Reports, formative assessments, and in structural recommendations are used to					

Statement	Strongly agree	Neutral	Disagree	Disagree	Strongly Disagree
facilitate peer-to-peer instruction, address more skills, and also enhance one on one instruction.					
Teachers' administration of formative assessment tests frequency of progress observing has attested to have a positive effect on the progress of students.					
Their teachers actively involve students in assisting them in developing skills that will enable them to learn better.					
Assignments					
Assessments allow students to improve and revise their thinking and aid them observe their development over time.					
Modified assessments are frequently used to improve student's learning outcomes.					
Conducting frequent assessments of students' performance has proved to improve students' outcomes.					
Teachers employ assignment tests as a formative assessment method to assessing learners' progress in performance in biology.					

Questionnaires for Teachers of Biology

Please show your degree of agreement alongside the declarations provided in the table below by relating the effect of formative assessment on the performance of learners.

Statement	Strongly agree	Neutral	Disagree	Disagree	Strongly Disagree
Feedback on teachers' administration of formative assessment tests					
I provide feedback to students.					
I spend more time on few selected assignments as opposed to grading every work done by students.					
Students usually obtain better grades when they work towards process objectives instead of product objectives and when following their development towards the general learning objective.					
Frequency of teachers' administration of formative assessment tests					
Reports, formative assessments, and in structural recommendations are used to facilitate peer-to-peer instruction, address					

more skills, and also enhance one on one instruction.					
Teachers' administration of formative assessment tests frequency of progress observing has attested to have a positive effect on the progress of students.					
I actively involve students in assisting them in developing skills that will enable them to learn better.					
Assignments					
Modified assessments are frequently used to improve student's learning outcomes.					
Conducting frequent assessments of students' performance has proved to improve students' outcomes.					
I employ assignment tests as a formative assessment method to assessing learners' progress in performance in biology.					

Appendix III: Interview Schedule

1. Do you provide feedback to students on assessment performance?

.....
.....

2. How does feedback on formative assessment help students?.....

.....
.....

3. Do more frequent teachers' administration of formative assessment tests or less frequent teachers' administration of formative assessment tests lead to better performance. Please explain.....

.....
.....

4. How do assignments influence students' performance?.....

.....
.....

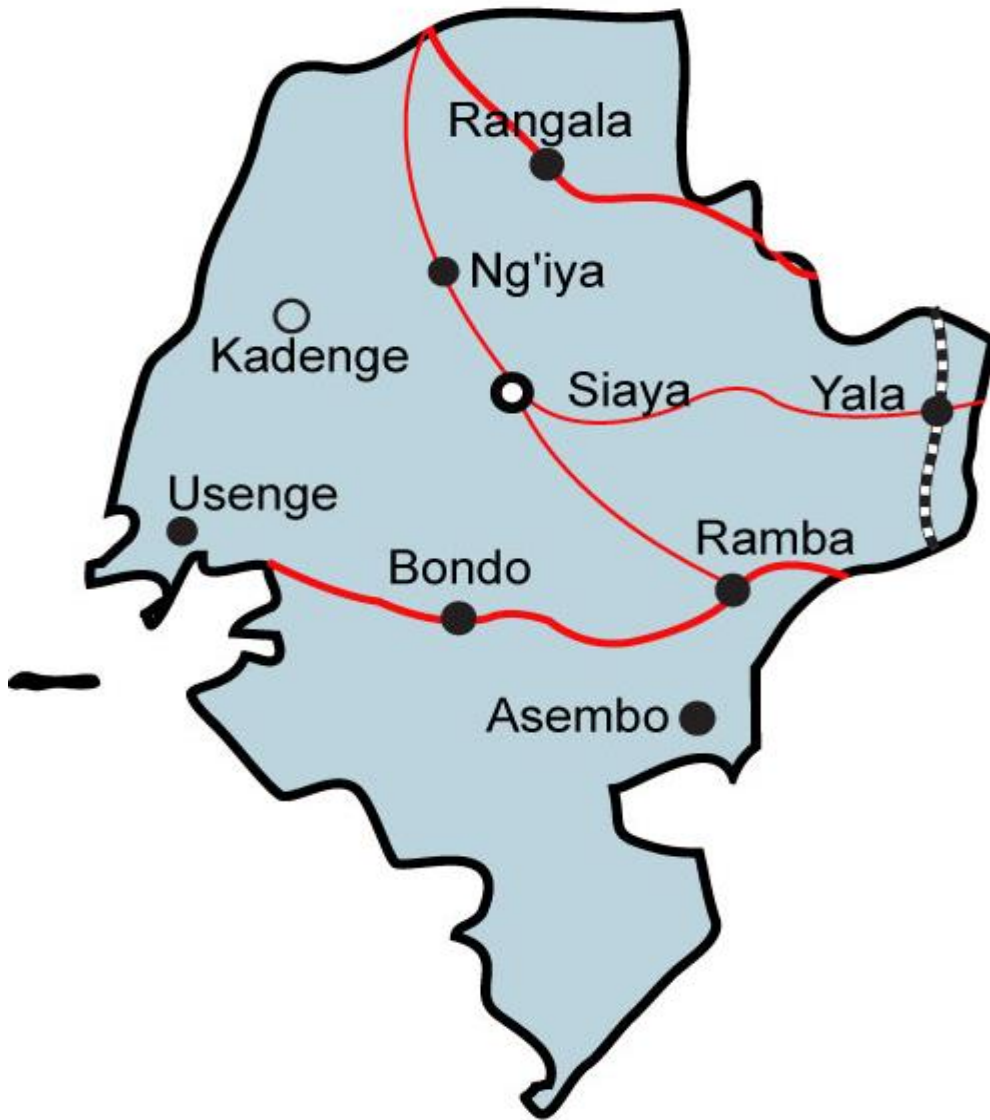
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Appendix IV: Schedule

Activity	TIMEFRAME (Months)																				
	1				2				3				4				5				
	Week				Week				Week				Week				Week				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Drafting a proposal																					
Pilot survey																					
Rectification of changes suggested in the pilot test.																					
Actual survey																					
Sorting out of the response.																					
Data Analysis.																					
Report preparation																					
Review the report.																					
Incorporation of Lecturers' comments in the report.																					
Submission, recommendations																					


THANK YOU

Appendix V: Map of Siaya County



Appendix VI: Research Permit


REPUBLIC OF KENYA


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Ref No: **180726** Date of Issue: **16/August/2023**


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This is to Certify that Miss.. Margaret awuor Were of Kenyatta University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Siaya on the topic: formative evaluation and its influence on academic performance in biology among students in secondary schools in Siaya County, Kenya for the period ending : 16/August/2024.

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