TEACHER TURNOVER FACTORS ON LEARNING ACHIEVEMENT IN BIOLOGY IN PUBLIC SECONDARY SCHOOLS IN GARISSA COUNTY, KENYA

BY

MAKOKHA TERRY DAVID

A THESIS SUBMITTED TO THE SCHOOL OF EDUCATION, DEPARTMENT OF CURRICULUM, INSTRUCTION AND EDUCATIONAL MEDIA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF PHILOSOPHY DEGREE IN CURRICULUM STUDIES

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DECLARATION

Declaration by Candidate

This thesis is my original work and has not been presented to any other study program or degree in any other university. No part of this thesis may be reproduced without the prior written permission of the author and/or Moi University.

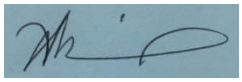
Signature: _____ Date: _____

Makokha Terry David

DPCS/4341/20

Declaration by the Supervisors

This thesis has been submitted for examination to the School of Education, Department of Curriculum, Instruction and Educational Media, Moi University with our approval as University supervisors.

Signature:  Date: 24/07/2025

Prof. Violet Nabwire Opata

Department of Curriculum, Instruction and Educational Media,

School of Education, Moi University, Eldoret

Signature: _____ Date: _____

Prof. Alice Yungungu

Department of Curriculum, Instruction and Educational Media,

School of Education, Moi University, Eldoret

DEDICATION

This study is dedicated to undying love, unfailing effort and unending prayers of my late mother; Teresa Ndeta, and the tremendous sacrifice and endurance of my late grandmother, Jessica Mutsotso; for raising me, introducing me to schooling and instilling in me clear rules of proper behavior, discipline and resilience. The candle she lit in my life has kept my heart aflame to date.

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ABSTRACT

Teachers are key determinants in schools' performance and survival. Their role in curriculum implementation process cannot be underestimated. However, the government's inability to retain qualified and experienced teachers in some schools due to high turnover impacts negatively on the students' learning achievement. The purpose of this study, therefore, was to investigate teacher turnover factors on learning achievement in Biology in public secondary schools in Garissa County. The objectives of the study were to: examine the attributes of teachers' turnover on learning achievement in Biology, analyze the school working conditions of teachers' turnover on learning achievement in Biology and evaluate job satisfaction of teachers' turnover on learning achievement in Biology in public secondary schools. The study was guided by Becker's Human Capital Theory of Occupational Choice and Gagne's Theory of Five Conditions of Learning. The study's philosophical paradigm was adopted from the Pragmatic Worldview and embraced a convergent mixed-methods design. The target population was 2786 individuals, comprising 2691 form three students and 95 Biology teachers from 40 public secondary schools. Stratified random sampling was used to select 27 schools. A total sample of 387 respondents participated in the study and included 336 form three students and 51 Biology teachers who were randomly and purposively sampled respectively. The research instruments for data collection were teachers' questionnaire and document analysis guide. Quantitative data from the questionnaire was analyzed by descriptive and inferential statistics using Pearson Product Moment Correlation and Multiple Linear Regression while qualitative data from document analysis guide was analyzed thematically. The study established that all the independent variables considered had p-values less than the levels of significance (teacher attributes; r=0.76, p<0.05, school working conditions; r=0.73, p<0.05 and job satisfaction; r=0.67, p<0.05) indicating positive significant correlations with the dependent variable; learning achievement in Biology. Qualitative data findings from document analysis guide revealed that teacher attributes influenced absenteeism, massive transfer requests and duty desertions. Further, majority of the teachers intended to transfer from rural to urban schools on the basis of unsuitable working conditions and insecurity. The study findings also indicated that teachers attended lessons inadequately prepared to teach due to job dissatisfaction. The study therefore concluded that, teachers' turnover factors influenced low learning achievement in Biology in public secondary schools in Garissa County. The study recommended strategies that should lower teacher turnover and increase learning achievement in Biology as follows; the Teachers' Service Commission should come up with teacher retention strategies such as robust mentorship programs for the newly employed teachers and provision of attractive remuneration that commensurate with one's level of education. School principals should provide good leadership and adequate instructional resources for effective teaching of Biology while the government should post security officers to every learning institution in Garissa County to safeguard the teachers' safety and security. The findings of this study will benefit policy makers, and all key stakeholders concerned with efficient and effective learning in Biology in insecurity prone regions in Kenya.

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ABBREVIATIONS AND ACRONYMS

ASEI: Activity, Student-centered, Experiment and Improvisation

ASAL: Arid and Semi-Arid Lands

CAT: Continuous Assessment Test

CBE: Curriculum Based Establishment

CCTV: Closed Circuit Television

CDE: County Director of Education

CEO: Chief Executive Officer

DV: Dependent Variable

DOS: Director of Studies

IV: Independent Variable

HIV: Human Immunodeficiency Virus

IPR: Institute of Primate Research

KCSE: Kenya Certificate of Secondary Education

KEMI: Kenya Management Institute

KEFRI: Kenya Forestry Research Institute

KEMRI: Kenya Medical Research Institute

KMTC: Kenya Medical Training College

KICD: Kenya Institute of Curriculum Development

KNEC: Kenya National Examinations Council

KUCCP: Kenya University and Colleges Central Placement

MOEST: Ministry of Education Science and Technology

MDG: Millennium Development Goals

MMR: Mixed Methods Research

NCTS: National Council of Teachers of Sciences

NGO: Non-Governmental Organization

PDSI: Plan, Do, See, Improve.

SBTSS: School Based Teacher Support System

SDG: Sustainable Development Goals

SPSS: Statistical Package for Social Sciences

SMASSE: Strengthening of Mathematics and Science in Secondary Education

TSC: Teachers Service Commission

UNESCO: United Nations Educational Scientific and Cultural Organization

UNICEF: United Nations Children's Fund

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Introduction

The role of teachers in educating young people for the country's future prosperity cannot be underestimated. In the recent competitive academic climate, teachers are the most important assets in the institutional performance and survival (Gwavuya, 2011). According to Arokiasamy et al., (2016), teachers' expertise, experience, innovativeness and creativity determines the expected academic fulfilment of any institution's needs and objectives and keeps pace with technological advancement. However, Dawley et al., (2014) observes that in the recent decades, the emerging issue of staff retention has continued to plague learning institutions all over the world. Today, Choong et al., (2013), observes that the high rate of teacher turnover in schools is a great worry to most nations.

Therefore, the significance of studying teachers' turnover cannot be displaced since teachers intending to transfer or quit teaching usually reduce their efforts long before the actual exit (Rosenblatt & Shirom, 2016). This chapter focuses explicitly on the background to the study, statement of the problem, study purpose, research objectives, research questions, hypotheses, justification and significance. It also highlights the assumptions, delimitations, limitations, theoretical and conceptual frameworks as well as definition of operational terms used in the study.

1.2 Background to the Study

Education remains the most outstanding development prioritized area in the world today. It is widely regarded as a basic human right, a key to enlightenment, and a source of wealth and power (Mugenda & Mugenda, 2019). Education is critical to industrial and technological development with the history of developed nations

bearing records of this while developing nations aspiring to realize the same status have to put a premium. UNESCO (2016) indicates that knowledge will contribute to the attainment of the Sustainable Development Goals (SDGs) to end poverty, protect the planet and ensure prosperity for all. To acquire knowledge, one must learn, which according to Kiunga (2016), is the assistance provided by educators to a process of knowledge acquisition, mastery of skills and temperament and formation of attitudes on learners.

Okwuduba and Okigbo (2018) define learning as the acquisition of knowledge or skills that are developed by subject matter usually indicated by test scores or numerical value assigned by teachers. According to these scholars, learning is a recipe of learning achievement. Okwuduba and Okigbo (2018) further observe that learning achievement is important because it prepares students for future careers, allows them to enter competitive fields and often signals a refined intellect essential in assisting learners in various areas of their future lives. In order to measure learning achievement, Okwuduba and Okigbo (2018), advocate for the use of examinations and continuous assessments. On the other hand, Cho (2019), asserts that learning achievement is the outcome of instruction which is the end product of a learning experience. Completion of educational benchmarks such as Kenya Certificate of Primary Education (KCPE), Kenya Certificate of Secondary Education (KCSE), diplomas and bachelor's degrees represent learning achievement.

Learning achievement encompasses the acquisition of knowledge in various subject disciplines including sciences. Pure science comprises the basic disciplines such as Biology, Physics, Chemistry and Mathematics. Biology is the natural science that studies life and living organisms, including their physical structure, chemical processes, molecular interactions, physiological mechanisms, development and

evolution (KLB, 2018). Biology, being the study of living things and their vital processes, deals with all the physicochemical aspects of life. Today, the modern propensity toward multi-disciplinary research and the alignment of scientific knowledge from different fields has led to significant overlap of the field of Biological sciences with other scientific disciplines. Notably, there are key modern concepts in related fields such as Medicine, Physics and Chemistry which are combined with Biology in the scope of Biomedicine, Biochemistry and Biophysics, thus making Biology a significant subject to humankind (Cho, 2019).

Studying Biology as a subject gives a learner an in-depth understanding of the natural world which helps one learn to conduct research, solve problems, be organized and think critically. Besides, graduating with Biology degree opens the door to many exciting job opportunities (KLB, 2018). In spite of these vital facts, the learners' achievement in this significant subject in recent years has been low forcing many students to leave it and opt for Chemistry or Physics which are comparatively performed better in national exams. This has even led to some schools making the subject optional to deal with the effects of students' underperformance.

According to Kenya Institute of Curriculum Development (KICD) (2021), Biology is presented in the syllabus as a practical subject in which scientific concepts, principles and skills are expected to be developed through experimental investigations. The Kenya National Examinations Council (KNEC) objectively evaluates learning achievements in Biology yearly to enhance and safeguard both locally and globally acceptable certification standards (KNEC, 2019). The subject is examined nationally at KCSE through two theory papers; 231/1 and 231/2 and a practical paper; 231/3 (KICD, 2021).

The learning achievement among students, being an outcome of classroom instruction emphasizes well developed and carefully planned lessons. Effective instruction in Biology occurs when the lessons provide small learning increments and clearly define and prescribe teaching tasks. The Biology lessons should be based on the theory that clear instruction eliminates misinterpretation and greatly improves and accelerates learning process. Biology being accorded a prime position worldwide within the context of science education is a core-subject among the natural sciences and pre-requisite subject for offering most vital science-oriented courses in the tertiary institutions. Effective learning occurs when the Biology subject is taught properly by qualified, committed, competent, knowledgeable and experienced teachers using suitable methodologies as intended by education planners and curriculum developers (KICD, 2021).

Improving Biology learning achievement in terms of content mastery and timely evaluations is KICD's prime goal and is emphasized in Biology Teachers' Handbook of 2006. The handbook emphasizes on need for proper and effective Biology instruction methodologies that incorporate both mind and hands-on-activities. This therefore calls for the need of thorough Biology teacher preparation, commitment, performance, productivity and retention in the learning institutions worldwide.

A teacher, without any doubt is a very important element in the whole educational setup. There is a wide global consensus that improving quality of education, especially in sciences depends on the quality of teachers and classroom instructional practices (Eakman et al., 2019). According to UNESCO (2014), teachers are the categories of human capital assets based in schools that play an important role in enabling the third world countries' dream of achieving the objective of Education for All by 2030 become a reality. According to Tipton (2013), educational prosperity of

our children largely depends on teachers and no other human or technology can effectively replace these significant individuals in terms of the influence they have on children. According to Kiunga (2016), a teacher is a facilitator, guide and a supervisor of classroom instructional processes without which no meaningful learning can take place.

Imran (2017) observed that for teachers to be more effective, they must be generally satisfied with their work as well as their place of work. According to Imran (2017), studies regarding teachers' job satisfaction and contentment with their places of work have in the recent past gained more attention. The study further expounded that this could be attributed to the fact that there have been several recently recorded high teacher turnover rates in many countries all over the world. The study surmised that teachers were running from class for greener pastures.

According to studies by Ingersoll (2013), Hanushek and Rivkin (2005) and Boe et al. (2017), teachers represent a category of workers that is globally experiencing shortage issues. A study by Imran (2017) established that teachers' shortage issues are primarily caused by high levels of turnover, which Ingersoll (2013) defined as "the departure of teachers from their teaching jobs". Ingersoll (2013) further stated that research into teacher retention often focuses on the three groups of teachers; known as *stayers, movers* and *leavers.* Stayers according to Ingersoll (2013) are the teachers who decide to remain in the profession at their current work site. Movers are a category of teachers that hop from one school to another while leavers constitute those who leave the teaching profession altogether in search of other job opportunities (Ingersoll, 2013). Whether stayers, movers or leavers, the study surmises that high rate of teacher turnover obstructs the instructional process in schools thereby impacting negatively on the students' learning achievement.

Boe et al. (2017), asserts that teacher turnover ranges from area transfer within the teaching profession such as changing the subject(s), to migration from one school to another, or the act of leaving the teaching profession entirely. All these acts of attrition impacts negatively to instructional process in learning institutions. The current study used the term turnover to refer to teachers' intentions to transfer from one school to another or *leave* the teaching profession in entirety.

According to Choong et al. (2013), many employed teachers are constantly in search of "greener pastures" leaving the learning institutions in quagmire. Galgóczi and Glassner (2018) reveal that numerous European countries have been experiencing a shortage in the teaching profession with the situation in Sweden particularly alarming. A study by Brandman University (2020) showed that as opposed to typical beliefs, the staffing challenges experienced by schools in United States of America were not primarily due to teacher short falls occasioned by staff retirements and increased students' enrolment. The study rather established that teachers' turnover was the reason huge numbers of teachers were leaving the teaching profession in pursuit of better careers. According to the study by Toosi (2012), it is expected that by 2030 more than 2.6 million teachers in the United States alone would have exited the teaching profession.

According to Cho (2019), turnover among teachers can generally be placed into three categories as *individual related factors* such as age and level of education; *school-related factors* such as job dissatisfaction and work atmosphere and also as a result of *external factors* such as perceptions surrounding teaching job and the influence of teachers' trade unions (e.g. KUPPET and KNUT in Kenya).

The study by Nyamubarwa (2013) revealed that teachers avoid working in places which are tiring, unconducive, difficult to access, risky, demotivating, have extremes of temperatures and are generally unpleasant. The available literature, according to Lily (2016) as well shows that teaching in such places is very stressful and a major cause of both health and mental problems among teachers. The study further elucidates that teacher turnover intentions triggers teacher absenteeism and other teaching related problems including improper instructional strategies leading to low learning achievement among students. Michelle (2015) highlights individual teacher attributes (gender, marital status and tenure) as the key factors influencing their turnover. The study further expounds that high rate of teacher turnover is disruptive as it constantly changes the composition in teacher quality in learning institutions which impacts negatively on the students' learning achievement.

A recent study by IOL News (2019) puts South Africa as the country in Africa with the highest rate of teacher turnover. According to this report, in spite of teachers resigning from the teaching profession in droves, the country also has a remarkably large number of stayers, constantly nursing turnover intentions. The report further puts individual teacher demographics, learner characteristics and unpleasant school working environment among the strongest impediments pushing teachers to seek alternative employment opportunities. Mampane (2015) further adds that the attrition of these skilled personnel from the learning institutions has led to adverse effect on the capacity of the South African state to realize its millennium development goals. According to Smylie and Miretzky (2014), teacher turnover has led to deterioration of the standards of education in this South African country.

In Tanzania, a study by Demis & Debritu (2020), found that many educators were leaving the teaching profession for other well-paying job opportunities as a result of job dissatisfaction, too much paper-work and unconducive learning environment thus lowering the quality of education in the country. Perceived unfair school management, school location and inaccessibility, inadequacy of salary and lack of training opportunities were cited among numerous other factors as the major contributors to teachers' turnover which consequently lowers the learning achievement of students.

In the last two decades, the Kenyan government has had a tremendous increase in the enrolment of learners in schools owing to free primary education, subsidized secondary education and the Ministry of Education's 100% transition policy. This however has not been matched with the commensurate recruitment of teachers. The problem has further been compounded by the massive teacher turnover in search for greener pastures.

A study by Ekabu (2018) established that several teachers were seeking employment in the county governments, non-governmental organizations and some even venturing into business or farming at the expense of teaching. This move comes despite the government's steadfast efforts to resolve teacher turnover by increasing yearly recruitment, harmonizing teacher salaries and allowances with those of other public servants and investing heavily in their in-service teacher training exercises such as workshops; School Based Teacher Support System (SBTSS), seminars and Strengthening of Mathematics and Science in Secondary Education (SMASSE).

A keen review of the related literature has however revealed that teacher turnover intentions, which most often culminate in the actual quitting behavior of the

educators, still persist (Dijana, 2015) and (Onwonga, 2018). These studies further indicated that teacher turnover intentions is highest among the teachers working in the marginalized regions of the country such as Garissa, Wajir, Mandera, Lamu, Marsabit and Turkana counties, areas characterized by insecurity and the adverse working conditions.

In accordance with Onwonga (2018), in Kenya, approximately six thousand teachers leave the teaching profession annually through resignations only. Additionally, according to the statistics from Teachers Service Commission (TSC), about 44 teachers retire, desert or resign teaching daily putting a strain on the education sector that is already facing a shortage of about 100,000 tutors. In 2021 for instance, the Kenya Secondary Schools Heads Association chairperson Mr. Indimuli reported that 4300 teachers had left the classroom for jobs in the public service within that year. According to newspaper review of Thursday 24th October 2024, while appearing before Parliamentary Select Committee for Education, TSC CEO Dr. Nancy Macharia affirmed a glaring shortage of science teachers in the Country in spite of yearly employment.

Teacher attrition for whatever reason leads to wastage of resources since it has negative impact like loss of knowledge gained by the teachers while on job and the institutions' incurring consistent costs in conducting recruitment interviews for hiring and inducting new teachers. According to Hussain and Asif (2012), besides indirect cost of downtime needed for new teachers to gain work proficiency, losing seasoned teachers through teacher turnover is detrimental to education quality. The study added that improving teacher retention in schools serves to improve the education system as a whole. The study further explicated that if fewer teachers were replaced, then, instead of financing recruitment and training, schools could spend that money on

new education programs or technology that works to improve learning achievement. The study surmised that the higher the teacher retention, the less the financial strain encountered, and the more the schools investment in the tools students need to learn leading to enhanced learning outcome.

Daniele (2016) posits that qualified and seasoned teachers generally have better academic productivity and efficiency in teaching than the new recruits because of their experience, confidence at teaching methodologies and mastery of subject content. He further explained that experienced teachers are familiar with the needs of a school and its students and are best positioned to provide advice on how to meet those needs. The study further expounds that when these teachers leave the profession or change schools, their voices are lost and education policy suffers set-backs as senior education administrators no longer receive their feedback on the success or failure of different academic initiatives (Daniele, 2016). In the same vein, Dijana (2015), opine that seasoned teachers know how to develop lesson plans that adhere to the set curriculum while at the same keeping students engaged and excited. Garcia and Weiss (2019) and Helman (2017) further add that losing such qualified and experienced educators from our learning institutions increases the reliance on substitutes (Board of Management teachers), who according to the study tend to have less experience and lower credentials in handling learners.

Finally, a study by Oduor (2018) on teacher turnover intentions, a predicament of teacher turnover, reported that nationally 129,600 out of the 288,000 teachers employed by TSC had shown intent to leave the teaching profession translating to about 45% of voluntary turnover rate. The study by Abdiaziz (2019), further detailed that the majority of these teachers with the highest intent to transfer or leave teaching profession hailed from the marginalized and insecurity prone counties, Garissa

topping the list. The aforementioned scenario is worrying and therefore calls for urgent need by the Kenyan government and other education stakeholders concerned with efficient and effective learning achievement in order to address this problem that threatens the educational prosperity of young Kenyans.

1.3 Statement of the Problem

The teaching profession remains the most outstanding career opportunity attracting thousands of applicants in Kenya today (Onwonga, 2018). As a noble career, teaching is supposed to enchant and maintain highly qualified and passionate professionals to instill knowledge and add value to the lives of millions of learners worldwide. Effective classroom instruction in Biology, just as any other subject offered at learning institutions requires the expertise of qualified, experienced and contented teachers. Such educators according to OECD (2012) have better content delivery and excellent skills in class management due to their exceptional subject mastery and confidence in instructional strategies which is ideal for enhanced student learning achievement.

However, in spite of several applicants showing high rate of interest in teaching job, a few years into employment, there are increased reported cases of teacher absenteeism, low morale and highly expressed desire by many educators to shift schools or exit the profession as a result of individual teacher demographics, job dissatisfaction and unsupportive school work environment (Onwonga, 2018). In-fact according to Abdiaziz (2019), the current high rate of teacher turnover in Kenyan public schools in Garissa County is a major contributor to low learning achievement among students. According to Saeed et al., (2014), the intent to quit a job is a predictor of voluntary turnover and it is a major concern today in Kenya for teacher employer; Teachers'

Service Commission (TSC) and other private institutions in securing and maintaining highly qualified workforces in learning institutions.

According to Sutcher et al. (2019), less than a quarter of national teacher attrition globally is as a result of retirements and death. This therefore implies that Kenya, and most of other countries each year employs tens of thousands of new teachers as a result of the beginning and mid-career teachers leaving the profession voluntarily. Studies; Isaac et al. (2015), IOL News (2017) and Demis and Debritu (2020) have established a positive correlation between teacher turnover and low learning achievement among students. According to Saeed et al., (2014), teacher turnover intention leads to the actual turnover and it is likely to initially reflect low-level job satisfaction which affects teacher's performance, effectiveness and productivity. Accordingly, Helman (2017) opined that high rate of turnover among highly-productive teachers is costly to affected schools as it hinders the implementation of planned curriculum. This results to inadequacy of teaching staff which consequently affects the effective delivery of subject content to learners leading to dismal performance.

According to Onwonga (2018), understanding and addressing the aspects that cause teacher turnover is essential for educational prosperity of any nation, particularly Kenya. The current study thus endeavored to explore how student learning achievement in Biology is influenced in the intricate dynamics of teacher turnover in public secondary schools in Garissa County. This was done with a view of establishing the possible measures that should be considered in mitigating the gap that exists between teacher turnover factors and learning achievement in Biology.

1.4 Purpose of the Study

The study focused on assessment of the teacher turnover factors on learning achievement in Biology in public secondary schools in Garissa County.

1.5 Research Objectives

This study was guided by the following research objectives:

1. To examine the attributes of teachers' turnover on learning achievement in Biology in public secondary schools.
2. To analyze the school working conditions of teachers' turnover on learning achievement in Biology in public secondary schools.
3. To evaluate the job satisfaction of teachers' turnover on learning achievement in Biology in public secondary schools.

1.6 Research Questions

The following research questions guided the study:

1. To what extent do the attributes of teachers' turnover influence learning achievement in Biology in public secondary schools?
2. How do the school working conditions of teachers' turnover influence learning achievement in Biology in public secondary schools?
3. To what extent does the job satisfaction of teachers' turnover influence learning achievement in Biology in public secondary schools?

1.7 Research Hypotheses

The following null hypotheses guided the study:

H_{01}: There is no statistically significant relationship between the attributes of teachers' turnover and learning achievement in Biology in public secondary schools

H_{02}: There is no statistically significant relationship between the school working conditions of teachers' turnover and learning achievement in Biology in public secondary schools.

H_{03}: There is no statistically significant relationship between the job satisfaction of teachers' turnover and learning achievement in Biology in public secondary schools.

1.8 Justification of the Study

The concept of teacher turnover and how it influences students' learning achievement in schools was selected for this study for several reasons. Firstly, learning achievement in Kenya is established through formative and summative assessments, which consists of set questions that seek to determine how much an individual learner acquires knowledge, skills and attitude change in the subject as a result of exposure to the subject content learned. Commendable learning achievement is an indication of effective teaching and learning process (Tipton, 2013). Effective instructional process in any subject area is facilitated by qualified, experienced and committed teachers (Okwuduba & Okigbo, 2018). Secondly, according to Tonui (2022), the significance of the summative evaluation in Kenya is twofold: It aims at producing creative and problem-solving citizens who can promptly identify opportunities in their environment for self-reliance. Similarly, it's used as criteria for 'survival of the fittest', that is, in selecting and eliminating of learners for further studies, vocational training as well as for job placement.

In the recent years, teacher turnover in most public secondary schools, particularly in Garissa County is robbing off the noble profession the valuable personnel thus leading to lose of mentors, skills and expertise which translate to dismal learning achievement among students (Okwuduba & Okigbo, 2018). The constant in of new and out of the

experienced teachers respectively has led to creation of major instructional challenges that hinder effective instructional process in public secondary schools in Kenya, Garissa County topping the list. This scenario according to KNEC (2021), has resulted to low learning achievement in Biology in affected schools. Therefore, in order to correct the current deficiencies in Biology instructional process and enhance the subject's learning outcome, a study needed to be conducted. Purposely, the study aimed to establish the knowledge gaps on the extent the teacher attributes, school working conditions and job satisfaction of teachers' turnover influence the students' learning achievement in Biology in public secondary schools in Kenya, with special focus on schools found in Garissa County.

1.9 Significance of the Study

According to Kenya Literature Bureau (2018), studying Biology provides a learner an in-depth understanding of the natural world, helps one to conduct research, solve problems, be organized and think critically. Besides, knowledge in Biology opens the door to many exciting job opportunities. Therefore, the predictive determination of the influence of teacher turnover factors on learning achievement in Biology was the study's main objective. The study hence provides the curriculum designers across the world an opportunity to understand how teacher turnover affects instructional process in schools which plays an utmost importance in shaping the learners' academic achievement.

Secondly, the study findings provide the government of Kenya, specifically the Teachers Service Commission (the teacher employer) and the Ministry of Education with constructive feedback on how teacher turnover influences the learning achievement in schools. The revelation will hence benefit the policy makers, and all

key stakeholders concerned with efficient and effective learning in Biology in insecurity prone regions in Kenya.

Thirdly, the findings provide an exhaustive understanding on the limiting teacher attributes of turnover such as gender, age, marital status, level of education, experience and designation and relate their influence on students' learning achievement in Biology. This information is necessary in creating awareness to the school administrators on being sensitive and always strive to improve teacher working conditions in their schools. Of particular interest were the schools found in far flung, remote and marginalized regions of the country. A majority of these principals are insensitive and ignorant on influence of specific teacher attributes of turnover hence annually record a significantly high rate of teacher attrition, particularly in Garissa County that results to low learning achievement in Biology, exhibited through low scores in KCSE examinations.

Moreover, the study findings advocate for improving teachers' job satisfaction by sensitizing the government to provide teachers with attractive remuneration packages /allowances and enhanced school support systems that commensurate with their level of education, teaching experience and designation. The effective classroom instruction process that follows as a result of contented and committed teachers will contribute to the attainment of high literacy level of Kenyan citizens, end poverty and ensure prosperity for all. Finally, the study findings will extensively contribute to the body of knowledge particularly on the correlational studies between teachers' turnover and students' learning achievement in schools. This will equip learners with valuable knowledge and help future researchers in their academic journey in curriculum studies.

1.10 Scope/ Delimitation of the Study

Scope or delimitations according to Locke et al., (2014), are the boundaries of the study. The current study mainly intended to investigate the influence of teacher turnover factors on learning achievement in Biology in public secondary schools in Garissa County. The study objectives were; an examination of the attributes of teachers' turnover on learning achievement in Biology, analysis of the school working conditions of teachers' turnover on learning achievement in Biology and an evaluation of the job satisfaction of teachers' turnover on learning achievement in Biology in public secondary schools. The study used the research questions and hypotheses to establish the significance and the relationship between the independent and dependent variables.

The study was conducted in 27 selected public sub-county secondary schools in Garissa County. It involved 51 teachers of Biology teaching the subject at the time of study and 366 form three Biology students. The study was guided by the Human Capital Theory of Occupational Choice and Gagné's Theory of Five Conditions of Learning and borrowed from pragmatic world view research paradigm. Quantitative data from the teachers' questionnaire was analyzed using descriptive and inferential statistics while qualitative data partly from the questionnaire and the document analysis guide was analyzed thematically. The obtained study results were presented in form of frequency tables, percentages, means, standard deviations and graphs.

1.11 Limitations of the Study

Study limitations according to Kombo and Tromp (2018) constitute the circumstances, hindrances and events that transpired throughout the study period that were beyond the researcher's control. Rose and Nikki (2019) opine that study

limitations represent flaws within research that may influence outcomes and conclusions of the study. They restrict the study scope, results and implications.

Firstly, the study constrained itself to collecting data on current teachers of Biology from the public secondary schools in the study area as opposed to those who had left as they would have given the real causes that influenced their turnover which affected the students' learning achievement in Biology. However, the data the researcher accessed from the documents found in the principals' offices stating the reasons for the teacher transfer/ exit teaching assisted in addressing this shortcoming.

Secondly, the study might also have suffered from interaction of history and treatment where the study findings might not be able to be generalized to the past or future status of low student learning achievement in Biology in public secondary schools in Garissa County. This is because the current study participants do not represent the past or the future status of learning achievement in the region. In addition, some responses from the Biology Teacher Questionnaire were likely to suffer from the "floor" or "ceiling" effect. Therefore, the researcher relied heavily on data triangulation sources from the questionnaire and the document analysis guide to get adequate and reliable information.

Finally due to the expanse of Garissa County, poor transport system and the threats of insecurity, some learning institutions, especially those in far flung extreme ends bordering Somalia such as those in Hulugho, Ijara and Lagdera sub counties were not visited by the researcher but relied on research assistants, trained by the researcher and hailing from those regions. However, due to the multiple data collection sources, the data submitted from the schools in the said sub-counties were deemed reliable and true representation of the true situation on the ground.

1.12 Assumptions of the Study

Lunenburg and Irby (2018) postulated that assumptions are premises and propositions that are accepted within studies as operational for purposes of the research. They are factors within the study that the researcher does not have control over.

Based on this therefore, the current study was carried out under the following assumptions: That the teachers of Biology in Garissa County were willing to cooperate and avail 100% of the information as stipulated in the questionnaire. That the respondents provided honest and unbiased responses that reflected the influence teachers' turnover factors had on student learning achievement in Biology. That by the time students got to form three, their attitudes and perceptions towards the subjects (in this case; Biology) they had opted to pursue to KCSE would have stabilized and therefore could easily be projected. That the study variables under investigation were measurable and the attained results are significant and can hence be generalized to the entire population.

1.13 Theoretical Framework

According to Crossman (2020), a theoretical framework constitutes a set of assumptions that inform the research objectives and research questions which guide a particular study. In the same vein, Grand and Osanloo (2014) opine that a theoretical framework provides a lens for examining the research topic and serves as a blueprint for the entire study through guiding its construction and support.

Maslow (1970) and Herzberg (1959) posit that motivation theories determine a person's satisfaction and fulfill his five levels of needs. According to Syomwene et al. (2017), the two theories assume that two variables; internal factors such as individual attributes, achievements and recognition, and external factors such as salary, work

environment and relationships with colleagues determine a person's satisfaction and job performance. Therefore, in line with this perception, the current researcher theorizes that if Biology teachers are academically qualified, experienced, have a sense of job satisfaction and like their work-place environment; they will be more committed, retained and hence have optimum productive in the subject. This opinion is in line with the perception that Biology teachers' input determines learning outcome in the subject. Thus, in view of the above explanations, this study was guided by two theories; Human Capital Theory of Occupational Choice and Gagné's Theory of Five Conditions of Learning to assist the researcher explain patterns and relationships of study variables as discussed below.

1.13.1 Human Capital Theory of Occupational Choice

The current study delved majorly on the Human Capital Theory of Occupational Choice (HCTOC) proposed by Becker (1962). The theory provides a framework for an understanding of some underlying factors that may contribute to an individual's decision to become a teacher, remain in the teaching profession or leave. It addresses turnover intentions among teachers and was instrumental in addressing the objectives of study. The theory illustrates the relationships between education and training, migration and the search for a new job opportunity in terms of investment and its returns (Becker, 1962). The core principles of Human Capital Theory of Occupational Choice delve on teachers' attributes such as gender, age, level of academic qualification, job experience and designation. It also addresses teachers' school working conditions and the general teachers' satisfaction with the teaching job.

The Human Capital Theory of Occupational Choice is applicable to this study since it associates human capital assets in terms of individual teacher abilities, competencies,

educational qualification, experience and skills. These human capital assets are vital in generating different learning outcomes which are essential in determining teacher turnover (Becker, 1962). Human capital in this respect are the expenses in form of fees associated with the development of the human capital assets. On the other hand, the individual human capital investments are the costs teachers incur in order to increase their earnings in form of increased pay such as investments associated with higher educational attainment (Becker, 1962). In addition, institutional investments in human capital assets, such as teacher in-service training, seminars and workshops teachers attend increases institutional performance in form of enhanced learning achievement (Becker, 1962).

Teachers increase their store of human capital through formal schooling and on-the-job training which includes induction programs and professional development programs. The training as investment in human capital can be labeled as general or specific. General training that accumulates generic human capital can be defined as any training that can be easily transferred to other professions and can increase a teacher's future wages or benefits (Kirby & Grissmer, 1993). In contrast, specific training that builds up institutional-specific human capital can be defined as training which is specific to the school in which an individual teacher teaches or another school, he /she intends to leave for (Kirby & Grissmer, 1993).

According to studies by Wright et al. (2014) and Onwonga (2018), every year thousands of Kenyan teachers leave teaching profession due to human capital assets gained through experience and additional education. Their leaving is in line with the Human Capital Theory which asserts that the greater the amount of knowledge and skills accumulated in a job over time from investments in education and job training, the higher one's probability of leaving that occupation and vice versa. Ehrenberg and

Smith (2013) postulated that expected utilities from turnover decisions are influenced by entry requirements to the profession and the future benefits: better salary, adequate professional training, higher promotional prospects, improved working conditions, and the genera job satisfaction. The study expounded that if the current value of the benefits associated with turnover exceeded the costs, individual teacher is more likely to make a decision to change job.

From the perspective of human capital theory, monetary benefits from the teaching profession can be viewed as returns on investment in education and training. Such returns may affect teachers' job satisfaction, increase work commitment and make them more productive. This does not only reduce turnover in teachers but also result in higher academic achievement of their learners (Becker, 1962). However, the theory adds that if teachers feel that their returns are being lowered as they work, they will less likely invest in the teaching career and thus leave. In other words, teachers who perceive that they have put too much into teaching in terms of finances and time but have not gotten enough in return will decide to leave the teaching profession (Becker, 1962).

Besides the monetary benefits, teachers also consider non-monetary benefits as one of the most important factors influencing their career decisions. In general, fringe benefits may include support from colleagues and administrators, the quality of school facilities, serenity of the learning environment and the adequacy of resources availability. Additionally, teacher instructional autonomy, participation in school decision-making process, positivity in students' learning attitude and assigned teaching hours also contribute to job satisfaction. Most of the reviewed literature refers to these non-monetary benefits as working conditions (school support systems)

and may vary by school status, school type, school location, and the demographics of students, teachers and parents (Becker, 1962).

Finally, the expenses associated with human capital losses in terms of teacher transferring or exiting the teaching service has varying effects on the learning institutions depending on the teacher's level of education, teaching experience, designation and job commitment (Becker, 1962). The theory delineates that highly experienced, highly-educated and high-performing teachers have disproportionate student learning outcomes hence significantly affect the schools' academic performance upon their exit.

1.13.2 Gagné's Theory of Five Conditions of Learning

Since the first theory did not have any element on learning, the study also borrowed from Gagné's Theory of Five Conditions of Learning (GTFCL) proposed by Gagné (1965) to address specifically the aspect of learning achievement in Biology. The theory states that a child does not receive information passively and thoughts are not simply the products of imitation of others (Gagné, 1965). According to the theory, knowledge is acquired systematically and thinking processes become more complex and efficient as a consequence of the child's interactions with the environment through teaching. The theory discusses the analysis of learning objectives and how the different classes of objectives require specific teaching methodologies.

According to Gagné (1965) quoting from Krathwohl and Bloom (1964), the five conditions of learning fall under the cognitive domain focusing on the idea that objectives are related to cognition, affective domain concerned with feelings and emotions and psycho-motor domain referring to those objectives that are specific to reflex actions and discreet physical functions. The theory points out that for effective

learning to take place, five conditions of learning must be met: verbal information, intellectual skills, cognitive strategies, motor skills and attitude change. The first three are cognitive while the fourth and fifth are psycho-motor and affective respectively. For this reason, there is need for Biology teachers to carefully plan their lessons to address these conditions, if effective learning achievement in the subject is to be attained.

Similarly, the theory asserts that effective learning would take place when learners progress through nine levels of learning and that any teaching session should include a sequence of events through all nine levels. The idea was that these nine levels of instruction activate the five conditions of learning. Thus, effective students' learning is achieved when a teacher; gains attention, informs learners of the lesson objective, stimulates recall of prior learning, presents the content appropriately, provides learning guidance, elicits performance /practice, provides feedback, assesses learning and enhances retention and transfer of content. Accordingly, the theory argues that the classroom instruction should be based on clear instruction to eliminate misinterpretation, improve retention and accelerate learning.

Gagné's Theory of Five Conditions of Learning is used in conjunction with Bloom's taxonomy to provide a framework that teachers can use to plan their lessons and topics. Accordingly, the theory details that knowledge is acquired and thinking processes become more complex and efficient as a consequence of the child's interactions with the knowledge the teacher systematically delivers. The theory's central principle is that learners are active, curious and inventive and construct concepts from the experiences they gain and interact with. Therefore, instructional process should give learners an opportunity to construct scientific knowledge through

‘hands-on’ type of learning (Gagné, 1965). The teacher’s key role during the instructional process should be that of an efficient facilitator and perfect guide to the learning process. This conforms with the basis of activity approach learner-centered or heuristic instructional process where students are exposed to various practical activities to actively learn from those experiences.

Accordingly, the theory postulates that besides the five conditions of learning, the environment under which learning takes place as well influences the way the child perceives reality (Gagné, 1965). Therefore, the learning environment should be a crucial aspect of consideration when teachers plan for lessons. The theory emphasizes the significance of a conducive classroom atmosphere with active learning where instructional process is activity filled and in which the learner’s interest, understanding and retention of knowledge are enhanced.

1.14 The Conceptual Framework of the Study

A conceptual framework according to Ravitch and Riggan (2017) is a graphic narrative form of the main composition and simplifies conceptualization of the study by giving it the general focus. They further expound that it is an argument about the significance of the topic under study and the appropriateness of the proposed methods for investigating it. Similarly, Miles and Huberman (2014) affirm that a conceptual framework is a graphic organizer explaining the main variables under study. The current study’s conceptual framework illustrates a highlighted link between teacher turnover factors and learning achievement in Biology. The conceptual model below (Figure 1.2) forecasts the perceived relationships between the study variables.

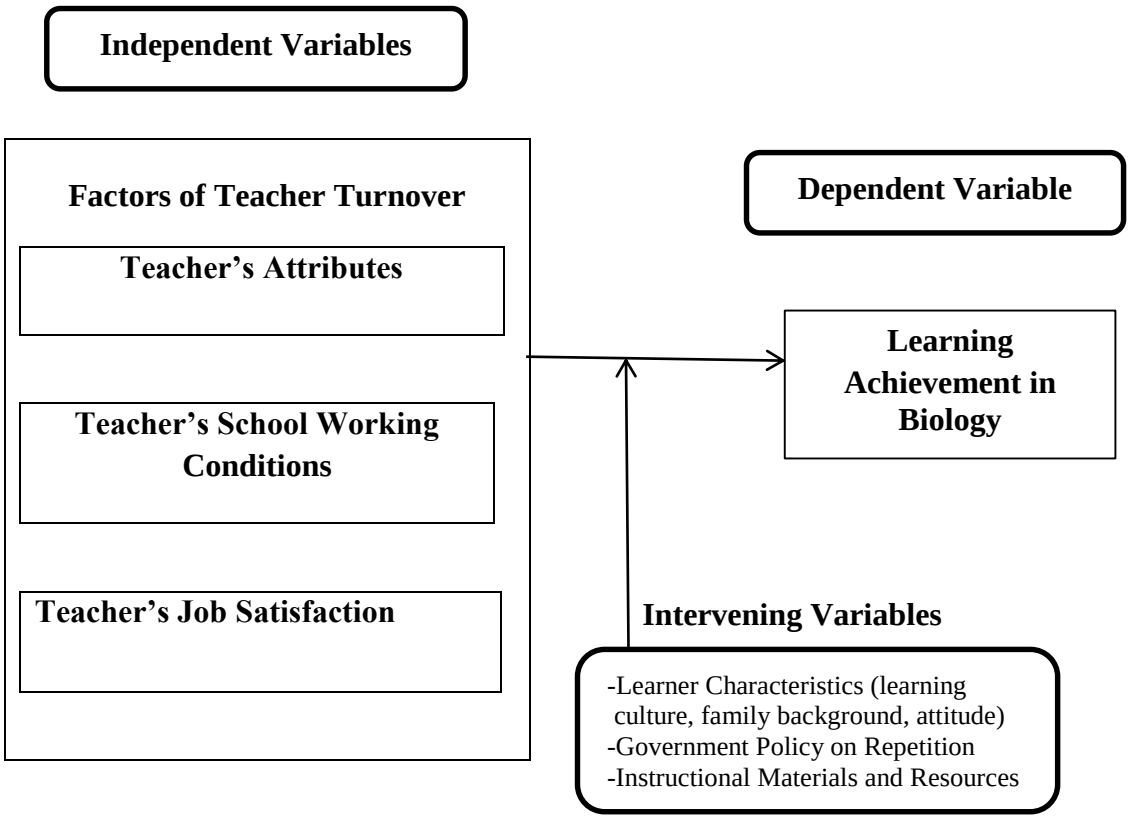

Figure 1.1: Conceptual Framework Showing the Factors of Teacher Turnover on Learning Achievement in Biology

Source: The Researcher, 2023

The above graphic organizer gives a clear relationship between the different independent variables; teacher's attributes, teacher's school working conditions and teacher's job satisfaction. These constructs of teacher turnover were examined to ascertain their influence on the dependent variable; the learning achievement in Biology when the intervening variables (other factors which might have minor influence on the dependent variable) were kept constant (Refer to Figure 1.1 above).

1.15 Operational Definitions of Key Terms

Job satisfaction: According to Armstrong, (2016), job satisfaction refers to the attitude and feelings people have about their work. Positive attitudes towards the job indicate job satisfaction, whereas negative attitudes towards the job indicate job

dissatisfaction. In this study, job satisfaction refers to teachers' attitude toward all aspects of work and the work environment in public secondary schools in Garissa County which influences them to develop turnover intentions.

Influence: refers to power to make other people agree with your opinions or do what you want (Collins English Dictionary, 23rd Ed. 2014). The extent to which teacher attributes, school working conditions and job satisfaction affect teachers in public secondary schools in Garissa County to develop turnover intention.

Instructional materials: are resources teachers use in teaching process and include teachers' guides, course books, reference materials, notes handouts, computers, internet searches, video, radio, television, reading books, etc., (Collins English Dictionary, 23rd Ed. 2014)**.** Teaching and learning resources used during Biology instruction

Instructional strategies: encompasses any type of learning technique a teacher uses to help students learn or gain a better understanding of the course material. (Collins English Dictionary, 23rd Ed. 2014). It's used in this research to refer to instructional decisions, approaches, procedures and routines employed in public secondary schools in Garissa County that teachers use in engaging learners in meaningful learning process of Biology.

Learning achievement: is the level of student success in learning the subject matter in schools that are expressed in form of scores obtained from the results of tests in a particular subject matter (Collins English Dictionary, 23rd Ed. 2014). It is the level of student success in learning the subject matter that are expressed in form of scores obtained from the results of tests in a particular subject, acquisition of knowledge or

skills that are developed by subject matter. In this study, it refers to the students' knowledge, skills and study habits essential in any training course and the effectiveness of students' application to work.

Learning achievement in Biology: is how successful a learner is at understanding biological concepts or how well he/she scores in Biology evaluations, (Collins English Dictionary, 23rd Ed. 2014). In current study, it refers to the Biology marks students score in public secondary schools in Garissa County in both formative and summative evaluations.

Teacher attributes: are qualities or characteristics of a person, place or thing (Collins English Dictionary, 23rd Ed. 2014). They constitute sets of teacher demographics such as age, gender, marital status, level of education, experience etc., that may influence one to seek for a teaching job, remain a teacher or quit the teaching profession.

Turnover: Is the probability of employee's intention to voluntarily and willingly change jobs in the near future (Collins English Dictionary, 23rd Ed. 2014). It's an employee's reported willingness to leave her organization within a given period of time and is often used for studying actual employee turnover. In this study, it is propensity of a teacher to leave the teaching profession or change of schools which impacts on students' learning achievement in Biology. Teacher turnover is manifested in Garissa County by the high rates of absenteeism, transfer requests, duty desertions and resignations.

Teacher Turnover Factors: refer to circumstance, fact or influence that contributes to a result (Collins English Dictionary, 23rd Ed. 2014**).** In this study turnover factors

refer to elements or causative agents influencing teachers in public secondary schools in Garissa County to develop turnover intention.

Teacher working conditions: are school surroundings in which teachers work in relation to physical characteristics (Collins English Dictionary, 23rd Ed. 2014). In this study, they refer to settings in public secondary schools in Garissa County influenced by a variety of variables such as availability of teaching/ learning resources, school location and teacher safety, principal support and leadership, student attitude towards learning, teacher pre-requisite knowledge and instructional strategies.

Retention: is the process by which employers ensure that employees don't quit their jobs (Collins English Dictionary, 23rd Ed. 2014). In the current study, it refers to the relative rate at which teachers in Garissa County are willing to stay in their current schools and or teaching profession.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

Review of related literature in this chapter was done based on the study objectives that guided the formulation of the current study. Since information on factors of teacher turnover on learning achievement does not exist in solitude, the researcher delved into what other scholars have written about: the teacher, teacher turnover and constructs of teacher turnover. The researcher also considered global perspectives of teacher turnover, concept of teacher turnover in Kenya and equally the concept of students' learning achievement in Biology.

The study further explicates the reviewed literature on effective teaching of Biology in Kenyan schools and the influence of teachers' turnover on students' learning achievement in Biology. Finally, literature was also reviewed on teacher's attributes, school working conditions and job satisfaction of teacher's turnover; globally, regionally, nationally and locally.

2.2 Role of the Teacher

In the current times of educational reforms, a teacher is perceived as a facilitator, guide and supervisor of the instructional process (Kiunga, 2016). According to Herati et al (2021), teachers play a significant role in enhancing learners' involvement in the educational process. The study further elucidates that teachers provide students with high quality and timely feedback which is essential assistance and support. Similarly, UNESCO (2014) opines that teachers are directly responsible for the learning achievement of students. In the same vein, Carl (2009) supposes that it is doubtless to state that the most significant person in the entire curriculum implementation process,

and particularly at the classroom level is the teacher. Wiles and Bondi (2014), refer curriculum implementation as to how teachers deliver lesson instructions and assessment using an array of specified resources provided in curriculum.

According to Eakman et al. (2019), teachers play a central role in the curriculum development process owing to their knowledge, experiences and competencies. The report by UNESCO (2014) indicate that teachers are known as instructional supporters because they are most knowledgeable about the art and practice of teaching and are responsible for introducing the curriculum at the classroom level. The study further reiterated that an effective teacher not only guides instructional process but can dramatically alter students' educational outcomes within a specified span of time.

Today, education all over the world continues to experience rapid and regular changes in curricula (McShane & Eden, 2017) that require teachers to be committed besides possessing refined intellect, skills and knowledge in order to implement curricula with fidelity. Recent studies; Lochner et al. (2015) and Wiles & Bondi, 2014) have however, identified various impediments as major setbacks preventing teachers' effectiveness in implementing curriculum meant to support student academic progress. The above studies further expounded that teacher characteristics, student attitudes, inadequate instructional resources and low pay are "the factors chasing teachers from the classroom".

2.2.1 Teacher Turnover

Teacher turnover relates to internal and external factors such as the teacher's thoughts relating to job alternatives as well as economic conditions. Teacher turnover intention occurs prior to actual turnover and is a cognitive, thought process related to desires to quit, plans to leave, or searching for alternative employment other than teaching

(Monks, 2012). According to Imran (2017), teacher turnover refers to the deliberate and conscious willingness of the teacher to voluntarily leave teaching or transfer from one school to another. Armstrong (2012) further states that, teacher turnover is the rate at which teachers leave one institution or the teaching profession voluntarily or involuntarily. In this study, teacher turnover is construed to imply the propensity of a teacher to leave the teaching profession or change of schools.

Studies; Imran (2017), John (2017), Butler (2016) and Heathfield (2014) elaborated that turnover among teachers remains an endless and intricate challenge, wielding a substantial influence on learning achievement across the globe. They further illustrated that widespread implications of teacher turnover elongate beyond the instantaneous disruption of lessons continuity, profound impacts on educational quality standards and effects on institutional stability. According to Kipkebut (2015), teacher turnover in public learning institutions in Kenya is the greatest challenge accompanying the increased number of students following the introduction of free primary and subsidized secondary education.

Teachers' turnover is caused by a myriad of reasons; teacher efficacy, work-related stress career aspirations and personal demographics (Lilly et al., 2016). According to Kontoma et al (2023), quoting Maithya (2012), contrary to the commonly held perceptions that teacher turnover is uniformly high and is indicative of systemic failure within the education sector, more recent studies; Ong (2016) and Ting (2017) have offered a more open and approachable perspective, unravelling the complex web of factors that contribute to it. According to Kontoma et al (2023), teacher turnover varies significantly from one region to another and in many African countries; it is closely associated with environmental-based factors. Lambert et al. (2012) further

postulate that teacher turnover is the largest predictive factor for voluntary turnover and it encompasses a wide range of challenges and circumstances. Demis and Debritu (2020) established that unfair management, inadequacy of salary, lack of good collegial relationships, lack of teacher development and training opportunities, lack of promotional mechanisms based on qualification and work experience together with lack of participatory approach in decision making were the major factors influencing teachers' turnover.

Teacher turnover also vary widely from culture to culture. For instance, according to Kabiri et al., (2018), in some countries, teachers tend to stay at one station for their entire professional lives. Nonetheless, in other countries, the study further expounds that teachers often move from school to school depending on available opportunities, their interests and priorities. Even within one culture or country, keeping good teachers may fluctuate, depending on economic conditions and shifting workplace realities in learning institutions (Waldroop, 2010). Gberevbie (2018) found out that, with exceptions from TSC' policy on transfers, if appropriate teacher retention strategies are adopted and implemented, teachers will definitely remain and work for the successful achievement of institutional goals.

Bidisha and Mukulesh (2015) further observed that the long-term success of any school depends upon the retention of key teachers. This is because hiring of new teachers is far difficult as well as more costly than keeping the current educators in the learning institutions (Baker, 2014). Ng'ethe et al. (2012) further concluded that when teachers continuously leave their jobs or stations, it is often a sign that something wrong is going on within the school or in the teaching profession. Similarly, Long' et al. (2012) noted teacher staff turnover as a serious issue especially

in the field of human resources management. Ali (2013) also observed that high teacher turnover brings destruction to the learning institutions in the form of both direct and indirect costs. Direct costs refer to cost such as expenditures incurred on the selection, recruitment, induction and training of new teachers (Alkahtani, 2015). Indirect costs on the other hand refer to cost of learning, reduced morale, pressure on the existing teachers and the loss of social capital.

There is a consensus among scholars that schools experiencing high teacher turnover either benefit or suffer the cost of turnover depending on the various factors influencing the turnover (Koech, 2011). In most cases, these factors are very disruptive and can be costly when their effects are not identified. They can cause chaos in the affected schools if not maintained to a minimum level. However, if maintained, according to Hanushek & Rivkins (2015), they help in retaining the best teachers that would in turn improve classroom performance and result in enhanced learning productivity among students. This is in line with Helman (2017) who asserted that turnover among highly-productive key employees is costly to schools.

According to a study by Ingersoll (2013), high levels of teachers' turnover constitute a serious concern for affected schools as it obstructs the implementation of coordinated instructional programs throughout the school. Johnson et al. (2012), supposes that teacher turnover often forces schools to hire Board of Management (BOM) teachers with low preparation and experience, a move which has negative implications on the students' learning process. Scholars Gberevbie (2018) and Gupta (2016) agree that a learning institution's inability to formulate and implement strategies capable of recruiting competent teachers and retaining them is one of the main challenges facing schools in the area of academic performance. According to Gomez-Mejia et al.

(2010), well managed schools monitor teacher turnover rate because as turnover rate increases, the cost of replacement and loss of productivity increases.

Isaac et al. (2015), found out that turnover intention predicts the actual turnover and therefore studying teacher turnover intention is equally significant. In this study, the researcher looked at teacher turnover intentions to understand causes of teacher turnover in schools and its influence on students' learning achievement in Biology. According to Rosenblatt and Shirom (2016), teachers who intend to quit their profession usually reduce their efforts at work long before the actual exit. Choong et al. (2013) also opined that many employed teachers are constantly in search of better opportunities. The study further explicated that as teachers nurse their turnover intentions, they leave the learning institutions in quagmire as teacher turnover usually reflects low-level job satisfaction hence affects teacher effectiveness and productivity (Saeed, 2014). This scenario therefore, prompted the current study aimed at assessing the influence of teacher turnover factors on learning achievement in Biology in public secondary schools in Garissa County.

2.2.2 Teacher Turnover Factors

Turnover among teachers refers to the likelihood of a teacher to change schools or leave the teaching profession entirely (Ngamkroeckjoti et al., 2013). Today, most learning institutions regardless of their location, history, size or nature of learners have always given a key concern about teachers' turnover (Nyamubarwa, 2013). Kumar (2014) posits that turnover is a critical human resource issue affecting all sectors of the economy which according to him affects productivity, service provision, quality and profitability.

According to Biswakarma (2016), the factors causing teacher turnover in learning institutions are varied and differ from school to school. He argued that no single factor can solely be attributed to teacher turnover and proposed a holistic approach in studying them. According to the study, school heads leadership style topped the list. Other factors of significant impact in accelerating teacher attrition were teachers' demographic variables, salary, institutional commitment, institutional justice, institutional climate, promotional opportunities and job satisfaction (Biswakarma, 2016). However, this list on factors influencing teacher turnover may not be exhaustive. Some factors still remain as predictors of turnover while others might act as mediators or moderators of the same. The current study, therefore, specifically intended to investigate teacher turnover factors on learning achievement in Biology in public secondary schools in Garissa County.

2.2.3 Global Perspectives of Teacher Turnover

High teacher turnover and low learning achievement are the two urgent issues threatening the education prosperity of the present world (Murnane & Steele, 2007). Teacher turnover is a global challenge and by its nature, it is an extremely complex occurrence that is influenced by several factors like institutional factors, personal factors and community factors (Ingersoll, 2013). Studies have revealed that teacher turnover in developed countries is a common problem. For instance, studies by Herbert and Ingersoll (2013) and Ramsay (2014), indicated a rise in in teacher turnover in USA. Specifically, Herbert and Ingersoll (2013) recorded that, one out of two newly employed teachers leave the teaching career at the end of every five years in USA. In the same vein, Rowan et al. (2012) estimated that up to one quarter of fresh teachers abandon the profession within the first four years in USA. In other countries like Britain, Sweden, Germany and New Zealand it has also been reported

that workforce shortages in schools is a major problem (Alkahtani, 2015; Allen & Bryant, 2012).

In Africa, South African teachers are resigning from the teaching profession in drove (IOL News, 2017). Similarly, in Nigeria, Zambia, New Guinea and Malawi there have been reports of high teacher turnover. According to this study, and with specific emphasis in Gambia, there is a massive exodus of teachers from the profession owing to such factors as lack of adequate salaries, allowances, housing and promotion. Closer home in Tanzania, a study by Demis and Debritu (2020), found out that many educators are leaving the teaching profession for other well-paying job opportunities compromising the quality of education in this East African Country. Therefore, the current study attempted to investigate teacher turnover factors on learning achievement in Biology in public secondary schools in Garissa County in order to improve the students' learning achievement in the subject.

2.2.4 Concept of Teacher Turnover in Kenya

Koech et al. (2014) found that high turnover rate is a common occurrence in the teaching profession in Kenya. According to Teachers' Service Commission report of 2020, about 44 teachers retire, die or resign daily putting a strain on the sector that is facing a shortage of about 100,000 tutors. In spite of numerous applicants scrambling for a few TSC advertised slots in teaching, a few years into employment, there are increased reported cases of teacher absenteeism, low morale and expressed desire by many to leave the profession (Onwonga, 2012). Many educators are leaving the teaching profession for other well-paying job opportunities (Demis & Debritu, 2020).

A study by Ekabu in 2018 revealed that about 68.31% of teachers in Meru County had applied for the position of sub county administrators in the County in 2013. This

comes in spite of government's effort to resolve teachers' turnover by increasing yearly recruitment, harmonization of teachers' salaries and allowances with those of other public servants and investing heavily in their in-service teacher training such as workshops, seminars and SMASSE (Ekabu, 2018). In spite of all these efforts, teachers' turnover intention which most often, results to actual quitting behavior still persists. Earlier studies on turnover failed to establish the influence individual teacher attributes had on turnover. The current study endeavored to do so.

The high teacher turnover has for a long time been attributed to unconducive working conditions, job dissatisfaction (as a result of poor salaries, low prospects of promotions and career growth, large classes due to free primary, subsidized secondary education and government policy of 100% transition of pupils from primary to secondary schools), insecurity in some regions of the country, lack of TSC to recognize higher qualifications (Masters and PhD degrees) among teachers. This according to Ekabu (2018) may lead to job dissatisfaction and eventually pave way for turnover. The essence of this study was to examine the relationship between teachers' turnover factors on learning achievement in Biology in public secondary schools in Garissa County then recommend practical solutions to the problem which can be generalized to the entire country.

2.3 Concept of Students' Learning Achievement

De Jager and Gbadamosi (2010) defined learning achievement as the change that occurs after an individual has undergone training or planned experience, particularly with regard to individual behavior, knowledge or skills. He further stated that learning relates to students' achievement and success in their course of study. In this study, learning achievement is construed to imply the process of students' acquisition of knowledge in Biology.

Student learning is reflected in a broad array of outcome measures, including attendance, participation, engagement, and motivation (Harris, 2014). It is the growth in subject-matter knowledge, understanding, and skills over time (Guskey, 2013). Essentially, it is an improvement in academic achievement that constitutes learning. Central to this notion of learning as growth is change over time. Knowing whether student learning has occurred requires tracking the growth in what students know and can do. It is only by comparing student mastery at successive points in time that the nature and extent of learning can be gauged (Marzano et al., 2015).

The notion of student learning achievement is the goal of nearly every aspect of education and as a result it is a concept that is difficult to define (Guskey, 2013). Aduda (2009) linked students' learning achievement to effectiveness in thinking or task performance. He described it as the ability of the individual to be productive after formal or vocational training or planned experience. This effectiveness can be exhibited in individual behavior, knowledge or skill. Therefore, these definitions depict learning achievement as that which can be observed after training.

In international research, the debate on student achievement centers mainly on measurability of learning outcome through administration of tests and exams (Bos & Schwippert, 2013). Student achievement is susceptible to differences in conceptualization, measurement and interpretation. Due to these differences, the conceptualization and use of 'student achievement' has been questioned both within and outside the educational arena (Bos & Schwippert, 2013). This questioning hints at the existence of different beliefs regarding student achievement among the various school-level stakeholders (Norton et al., 2015).

According to Marzano et al., (2013), learning achievement reflects the quality of education of a country. The study further expounds that since in recent decades education and student achievement have become important issues in political and employers' debates, learning achievement has equally received much attention globally. This according to Fives and Gill (2014) is partly due to the current focus on fostering a knowledge-based economy and reducing dropout rates in order to reduce governmental expenditures and attainment of Millennium Development Goals and Sustainable Development Goals.

According to recent studies carried out in America and Asia by UNICEF in 2016, most school going children are unable to read and write. The studies also established that in several countries, student learning achievement is still too low. UIS (2013) had also opined that millions of children in primary schools were illiterate, half of which were found in Sub-Saharan Africa. Indeed, research on West African countries indicates that school-level stakeholders; parents, school administration, teachers and students themselves, influence student learning achievement (Marzano et al., 2013). Other studies; Harris (2009) and Hanushek & Raymond (2005) found out that governmental policies on education do influence student learning achievement. They posited that it is not only through system or regulation-related changes but also by holding the school management accountable for enhanced students' learning outcome to be achieved. UNESCO (2015) had earlier established that students learning outcome and assessment system is critical. The study done on three East African Countries; Tanzania, Uganda and Kenya offered a snapshot and a useful indicator of student learning achievement in the region.

The Government of Kenya Economic Recovery Strategy for Wealth and Employment Creation (2003-2008) blueprint on education recommends that education is meant to

provide an exit route from poverty. The Sessional Paper No. 1 of 2005 consists of the Millennium Development Goal on Education whose target is the achievement of Universal Primary Education by 2005 and the Education for All by 2015. Kenya Educations Sector Support Program (KESSP) (2005-2010) puts more emphasis on the strategic role that education plays in both social and economic development of the country. In achieving these targets, the stakeholders play a key role of ensuring quality at all levels of the education system aimed at the attainment of literacy and numeracy through effective instructional processes and enhanced student learning outcomes (UNESCO, 2015). An existing gap in reviewed literature was failure of earlier studies to relate the influence the teacher attributes, school working conditions and teachers' job satisfaction of turnover to the student learning achievement in schools.

2.3.1 Students' Learning Achievement in Biology

According to Kenya Literature Bureau (2018), Biology is a natural science that studies life and living organisms, including their physical structure, chemical processes, molecular interactions, physiological mechanisms, development and evolution. The modern propensity towards multi-disciplinary research and the alignment of scientific knowledge from different fields has resulted in significant overlap of the field of Biology with other scientific disciplines. Modern principles of other fields such as chemistry, medicine, and physics, for instance are integrated with those of Biology in areas such as Biochemistry, Biomedicine, and Biophysics, making Biology a valuable subject to humankind. In this respect therefore, KICD (2021) emphasizes the significance of studying Biology as a subject. According to this curriculum development body, Biology gives a learner an in-depth understanding of the natural world, helps one learn to conduct research, solve problems, be organized

and think critically. Furthermore, globally, graduating with Biology degree opens the door to many exciting job opportunities (KLB, 2018).

In the recent years, in spite of the afore-mentioned benefits in Biology, learning achievement in the subject in public secondary schools in Kenya has remained low. This has resulted in Kenya University and Colleges Central Placement (KUCCP) making Biology a key filter or determining subject in many vital career prospects. Studies; Kontoma et al (2023), Abdiaziz (2019) and Kimani et al. (2013) have revealed inadequate teachers and instructional resources, poor teaching methods and unsuitable learning environment among the main factors contributing to the dismal learning achievement in sciences. Similarly, according to Likoko et al., (2018), teacher's gender and age is also considered an important factor influencing learners' interest and attitude towards learning Biology. The foregoing discussion is summarized in Table 2.1 and Table 2.2.

Table 2.1: Trends in Biology Learning Achievement at KCSE Countrywide

Year	Paper	Candidature	Max. Score	Mean Score	Standard Deviation
2015	I	515888	80	27.42	14.46
	2		80	19.56	11.86
	3		40	22.62	09.15
	Overall		200	63.65	31.55
2016	I	509982	80	27.30	10.40
	2		80	20.11	09.14
	3		40	10.99	06.16
	Overall		200	58.37	25.70
2017	I	545663	80	13.81	10.24
	2		80	16.43	10.37
	3		40	07.68	05.05
	Overall		200	37.85	23.45
2018	I	589900	80	15.81	09.26
	2		80	11.92	08.67
	3		40	13.65	07.38
	Overall		200	51.38	23.26
2019	I	618654	80	18.00	11.21
	2		80	18.00	10.03
	3		40	16.10	06.48
	Overall		200	51.38	26.72

Source: KNEC 2021 Biology Analysis

The table above shows dwindling performance in Biology countrywide with the performance.

Table 2.2: Trends in Biology Learning Achievement Compared to other Sciences at KCSE Countrywide

Subject	2016	2017	2018	2019
Biology	25.7	23.8	23.4	26.2
Chemistry	27.3	27.2	28.1	30.1
Physics	40.6	38.4	36.4	36.4

Source: KNEC Report on Sciences, 2023

Of the three sciences shown in the Table 2.2 above, the results further reveal Biology as the worst performed subject countrywide for the years 2016, 2017, 2018 and finally 2019. It is also worth noting that the average scores in Biology from public secondary schools in Garissa Count are worse than the national mean scores in the subject as illustrated in the Table 2.3 below.

Table 2.3: Trends in Biology Learning Achievement at KCSE in Garissa County

Year	2016	2017	2018	2019
Biology Mean Score	21.7	20.4	22.9	23.6

Source: Garissa County MOE Report on Sciences, 2023

If the current learning achievement in Biology is not rectified, it will result in several students opting out of many Biology related courses offered at universities and colleges and eventually opt out of many job opportunities such as medicine, nursing and teaching KNEC (2021). Additionally, if the recent pattern in learning achievement in Biology suggests a new norm in the subject, much has to be done to reverse the trend otherwise it will lead to closure of several Biology related institutions and eventually lead to detrimental effects as the country will experience shortage of professionals where Biology is a major cluster determinant.

Loeb et al. (2015) suppose that the constant in and out of new and experienced teachers creates major instructional deficiencies and challenges to effective instructional process and learning achievement in Biology. KICD (2021) further recommends that for the subject to be taught properly, it requires the services of committed, competent, knowledgeable and experienced teachers, employing suitable methodologies.

2.3.2 Effective Teaching of Biology in Kenyan Schools

Learning achievement being an outcome of instruction emphasizes well developed and carefully planned lessons (Okwuduba & Okigbo, 2018). The lessons in Biology subject ought to provide small learning increments and clearly defined and prescribed teaching tasks (Njagi, 2014). The lessons should be based on the theory that clear instruction eliminates misinterpretation and greatly improves and accelerates learning. It requires new pedagogical skills that are all inclusive learner-centered. The subject ought to be taught properly by competent, knowledgeable and experienced teachers using suitable methodologies.

KICD (2021) recommends instructional strategies in Biology to be designed to facilitate learning process with the teacher deliberately providing guiding experiences. This allows learners to experience learning through common activities that allow them to build on prior knowledge. According to Garissa SMASSE Inset (2019), the teacher of Biology's key role during the instructional process is to monitor the learners' exploration of content by guiding their inquiry and promoting new patterns of thinking in a systematic way. Okwuduba and Okigbo (2018) state that instructional methods in Biology should be geared towards objective-oriented activities where there is flow of information between teachers and learners. Knowledge on pedagogy is important as instructional methods influence different types of learning outcomes in the cognitive, affective and psychomotor domains (Yang et al., 2015). According to UNESCO (2016), the choice of teaching methods in Biology is dependent on the kind of teaching approach preferred.

Traditionally, instruction in Biology was deductive and comprised the principles and methods used for instruction which basically were teacher-centered (Ashman, 2015). The study expounds that in this approach, teachers were authorities and learners' key

role was to passively receive information through lectures and direct instruction. On the contrary, according to Arunga (2015), KICD puts a lot of emphasis on the teaching approaches that are inductive where instruction commences with observations then leads to collection of experimental data to interpret the problem being solved. In this learner-centered approach to instruction, teachers and students play an equally active role in the learning process (Okwuduba & Okigbo, 2018). The approach stipulates that the Biology teacher's primary role is to guide and facilitate learning process and not the sole source of information (Ashman, 2015).

In order to fill the gap and address some of the challenges in Biology teaching strategies, KICD curriculum espouses the need for the teacher to include a feedback mechanism in lessons for learner evaluation. This, according to KICD (2021) is key to improvement of lesson delivery by answering students' questions, explanation of concepts, ability to follow procedures and get desired results. In the same view, Njagi (2014) expounds that improvement in learning achievement in Biology is then done by incorporating information obtained from feedback during and after lessons. This is a continuous activity which ensures that as the teachers' skills and confidence improve, their instructional strategies are equally enriched. This approach promotes effective teaching practices and efficient learning. According to Okwuduba and Okigbo (2018), its impact on the learners includes acquisition of positive attitude, actively involved students, arousing interest and curiosity and showing responsiveness which translates to improved learning achievement in the subject (Njagi, 2014).

Teaching Biology theory should link abstract concepts to practical work by asking questions in Biology, engaging in Biology discussions beyond class time, attending classes punctually and doing assignments completely, accurately and timely. According to Arunga (2015) the teaching of Biology theory should include planning

lessons better and more consistently and inculcating positive attitude change, confidence, appreciating teamwork, use of teaching aids and models, enhanced ability to improvise, attending to students' needs, and making teaching interesting in a conducive classroom atmosphere (Mugo & Njiru, 2016).

According to Njagi (2014), the learner is supposed to actively participate in the Biology learning activities while the teacher should be innovative to captivate the learners' interest and link their previous experiences. In summary, there should be a link between the practical activity and the theoretical concept earlier taught. A gap existing in the reviewed literature is that in spite of the Kenyan government's efforts to enhance learning achievement in Biology by annual teacher recruitments and subsidizing secondary education, the Kenya Certificate of Secondary Examination (KCSE) results in the subject continues to dwindle yearly. The current study endeavored to investigate the extent to which the teacher attributes, school working conditions and job satisfaction in the context of turnover influenced student learning achievement in Biology in public secondary schools in Garissa County.

2.4 Influence of Teacher Turnover on Students' Leaning Achievement

The academic performance and survival of learning institutions is largely dependent on teachers. The inadequacy of staffing schools with qualified and experienced teachers is however a major cause for lack of learning achievement in most schools today. More so, the staffing problem is attributed to teacher shortages occasioned basically by high teacher turnover. It is therefore essential that teacher retention in schools should be given equal priority as the process of teacher hiring.

According to Stanulis and Floden (2009), when learning institutions retain their teachers, both professional and institutional knowledge is kept since novice teachers

need time to develop essential skills. Ronfeldt et al. (2013) posit that low teacher retention rates imply that institutions continuously have to commence over instead of dealing with the existing key educational issues. The study adds that low teacher retention creates lack of professional continuity and disturbs staff cohesion result to the disruption of student learning achievement.

Studies related to teacher turnover and learning achievement often tend to assume that teacher turnover harms student learning achievement (Ingersoll, 2013; Kiunga, 2016; Kini & Podolsky, 2016; John, 2017). Teacher turnover loses institutional memory besides huge resources being spent on the hiring and induction process. Currently, little empirical evidence exists in relation to influence of teacher turnover on student learning achievement (Guin, 2004). Much as Abelson and Baysinger (1984) demonstrated that some level of teacher turnover was beneficial to the learning institutions and students, such cases are rare. This is because some teacher turnover may result in better person-job matches and infusion of new ideas into schools. Nonetheless, Hussain and Asif (2012) argue that the benefits of teacher turnover are more enhanced if it is the less effective teachers leaving schools.

Literature on turnover indicates that teachers who produce higher student learning achievement are less likely to stay in schools and in the teaching profession than their less effective peers (Hanushek & Rivkin, 2010). A study by Boyd et al. (2011) uncovered the category of teachers that were more likely to transfer from New York City Schools. The study elucidated that educators who produced higher student learning achievement and those with more teaching experience were more likely to seek for transfer. In the same vein, IOL News (2019) established that in South Africa, teachers who left a given school as a result of professional attrition tended to be more effective than those who stayed. However, Hanushek and Rivkin (2010) vividly

established whether the teachers who transferred from various schools were more effective than those who replaced them making it difficult to conclude about the overall effect of teacher turnover on student learning achievement.

In Kenya, teacher turnover has continued to rob the teacher employers a significant percentage of new teachers who leave the profession before the elapse of five years (Ingersoll & Merrill, 2017). A study by Ingersoll and Merrill (2017) further revealed that the rate of teacher turnover is over fifty percent higher in high-poverty and marginalized schools compared to those located in resource-bound urban areas. Additionally, the study expounded that teacher turnover also tended to be higher in low-performing schools in urban slums. Accordingly, a report presented by the Teacher Service Commission 2020 revealed that teachers had left the public schools in Garissa, Wajir and Mandera counties in droves due to their marginalized nature and insecurity. Ingersoll and Merrill (2017) argue that individual teacher attributes and unpleasant school working conditions can be very strong incentives to seek transfer or alternative employment opportunities. The constant attrition of these skilled personnel from the learning institutions has led to adverse effect on the capacity of the former North Eastern Province to realize its academic excellence.

According to Helman (2017), teacher turnover often impacts on student's learning achievement beyond the relative effectiveness of teachers who stay as compared to those who left the institution. Daniele (2016) posits that when teachers leave, the quality of trust between teachers and learners is affected and this affects student learning achievement. Studies have also revealed that teacher turnover, besides infusing new ideas into the learning institutions which may help in raising student learning achievement; it is known to disrupt the instructional processes (Helman, 2017).

2.4.1 Influence of Teacher's Attributes of Turnover on Learning Achievement in Biology

Erlier empirical studies demonstrated that turnover among teachers is associated with teacher attributes such as gender, age, marital status, academic qualifications, and religious affiliation (Omolara, 2010). Similarly, this study aimed at critically evaluating the Biology teachers' attribute variables of turnover (gender, age, marital status, academic qualification, experience and designation) and their influence on student learning achievement in Biology in sampled public secondary schools in Garissa County.

2.4.1.1 Teacher's Gender of Turnover on Learning Achievement in Biology

Lachman & Diamant (2017) define gender as a range of characteristics pertaining to and differentiating between masculinity and femininity. In various contexts, this range of characteristics may include biological sex, sex-based social structures such as gender roles or gender identity. In this study gender was construed to mean a state of a teacher being either male or female.

Literature on gender as a teacher's attribute influencing turnover is conflicting. Some researchers have noted no significant differences between male and female teachers' intent to leave work (Nelson, 2015) while others have reported that female teachers' intent to leave more frequently than their male counterparts (Tsui et al., 1992; Lachman & Diamant, 2017). According to Crossman and Harris (2006), male teachers are slightly more satisfied in teaching profession than female teachers hence likely to stay. Contrastingly, other researchers reveal that male teachers intended to leave more than female (Foley et al., 2015; Lilly et al., 2016; Tipton, 2013). This view is in congruence with research done by Cushman (2015) on societal norms for perceptions

of gender roles which is more pronounced in the teaching profession. According to this study, many female teachers choose teaching primarily because of its working conditions such as suitable working hours and holidays that match their children's schedules (Cushman, 2015). In contrast, most male teachers choose the career as a means of social mobility (Ladebo, 2012) thus increasing their intent to quit.

Scholars have noted a significant connection between a teacher's gender and learners' academic performance. It has also been established that a teacher's gender does play a key role on job satisfaction, commitment and teacher's effectiveness in instructional process (Tipton, 2013). In accordance with Nelson (2015), female teachers tend to perform better in teaching than their male counterparts. This perception is also affirmed by Mwamwenda (2012), who suggested that learners taught by female teachers performed significantly better than those taught by male teachers in English language, Mathematics and Sciences in Botswana. In a similar manner, Zuzovsky (2013) in her study in Israel also reported that learners taught by female teachers had higher academic achievement than those taught by male teachers.

Contrastingly, several researches conducted have demonstrated the positive impact male teachers can have on learners (Cushman, 2010; Mills et al., 2011; McGrath, 2013). These studies advocated for more males to pursue teaching profession because men were seen as positive role models to learners. Researchers Gibbs (2012) and Tucker (2015) established that many schools were calling for more male teachers in profession because "young children, particularly boys, need 'male role models' in their lives".

The study of Arbuckle and Williams (2003) also established that, male teachers outperformed their female counterparts in areas of pure science disciplines, asserting

authority, classroom management and using meaningful voice tones during instructional process. This finding conforms to that of Martin and Smith (2018) who opined that male teachers were rated higher as facilitators of academic performance than their female colleagues. Literature on the same study concluded that the exit of male teachers from the classrooms had more adverse effects on the academic outcome of learners (boys) as compared to that of female teachers.

Contrary to this assertion, a study by Zuzovsky (2013) posited that in comparison to male teachers, students taught by female teachers perform better. She argued that female teachers are clearly capable of completing Biology syllabus efficiently within the allotted time than their male counterparts. The study added that the key reason why women outshined men in teaching is because women have better self-discipline and are more focused. The scholar argued that teacher turnover involving female teachers is likely to affect student learning achievement in Biology more as compared to that of male teachers. A gap that existed in reviewed literature was to relate the influence the teacher's gender had on the student learning achievement in Biology. The current study sought to unravel this.

2.4.1.2 Teacher's Age of Turnover on Learning Achievement in Biology

Age is the length of time a teacher has lived. A teacher's age, has a varying effect on turnover (Osafuke, 2014). According to a study by Omolara, (2010), a teacher's age is related to leaving rates, with the youngest, mid-career and oldest categories of teachers having different rates of turnover. Further studies on predictors of intention to leave current jobs indicate high turnover among young teachers compared with their older colleagues (Aquino et al., 2007; Benjamin et al., 2012; Egu et al., 2011; Mfaume, 2012).

A few studies have related teachers' age to students' academic achievement with some having established a significant connection between the teachers' classroom effectiveness and their chronological age. According to the findings of the previous empirical study by Lopina et al. (2012), a teacher's age is a key factor of consideration for students' learning achievement. A further study by Lee (2013) regarding teachers' age carried out in Turkey grouped teachers into three categories; young age, middle age and old age. The study revealed that middle aged teachers were perceived by students to be more effective and competent in classroom organization, management, motivation and communication. On contrary, the study of Cushman (2015) rated old teachers lower on teaching skills than young or middle-aged teachers. In Riley and Ryan (2009), younger teachers were rated highest in dedication and job commitment. However, a study by Kong (2015), found no significant difference between the ratings of young, mid-career and old teachers. This rating on teacher's age vis-avi teaching competence is in line with Abrami and Apolloia (2014).

Nonetheless, a study by Khatri et al. (2017) concerning investigation of student academic scores against teacher's age showed no evidence that younger teachers have greater content mastery to outperform mid-career or older ones in student scores. Indeed, age in this case was considered unimportant in predicting learning achievement among students. Yet recently, study by Lee (2013) on association of teacher's age and learners' scores in sciences across public learning institutions in Asian countries discovered that learners taught by older teachers posed low scores than those taught by younger teachers. The study finding registered a huge setback to traditional perception that older teachers are better at instructional strategies and subject content mastery. However, Hayes (2015) asserted that the health problems

associated with old age is a hindrance to teachers' instructional methodologies and vigor explaining the low learning achievement in students. The study concluded that as teachers' age increase their students' academic performance diminishes.

According to Burke & Larry (2014), younger teachers are more entrepreneurial and more accepting new psychological contract of employment that increases their mobility intent. In line with this thinking therefore, the study adds that young teachers are not dedicated and lack job commitment hence their learners are likely to be affected less with their departure. This study sought to find out whether teacher's age, being a significant predictor of teacher turnover does influence learning achievement in students. However, the reviewed literature did not expound on how teacher's age influenced the students' learning achievement. Therefore, the current study purported to find out.

2.4.1.3 Teacher's Marital Status of Turnover on Learning Achievement in Biology

A teacher's marital status is a situation with regard to whether the teacher is single, married, separated, divorced or widowed. Several studies (Fitzmaurice, 2012; Eyupoglu & Saner, 2013; Kibkebut, 2013; Olatunjis & Mokuolu, 2014) have been carried out to determine the relationship between marital status, teacher turnover and learning achievement in students. The findings of most studies showed that teacher marital status has a continual commitment on teaching career and the institution where services are offered with the married teachers being much happier in their teaching career compared to the other statuses.

In a study carried out in Britain, Gazioglu & Tansel (2006) investigated individual teachers and job-related factors that had an impact on their turnover. The study

revealed that married individuals had a lower turnover than the unmarried. On the other hand, Olatunjis and Mokuolu (2014) examined marital status-turnover relationship in higher education in Turkey and showed that turnover of married teachers was much higher than those who were not married. The same views are shared by Zhang and Fang's (2017) study.

According to Kong (2015) learners taught by single and married teachers had higher scores compared to those taught by separated and divorced teachers. In accordance with Zhang and Fang's (2017) study, psychological problems associated with death of spouse, separation and divorce affect teachers' dedication to duty hence performance and productivity. A study by Kong (2015), nonetheless, posited that single teachers because of lacking any family issues are more dedicated and committed to their jobs hence their learners pose good academic results compared to their colleagues of other marital statuses. Finally, a study by Ayeop (2013) affirmed that married teachers have higher job satisfaction compared to single, separated or divorced teachers hence teach best.

In a study carried out in Britain by Gazioglu and Tansel (2006) it was discovered that married teachers had a lower job-related stress than unmarried ones. The study explored marital status in terms of married and single. The current study looked at the marital status in terms of single, married, separated and divorced. In this way, it was possible to compare if differing levels of student learning achievement experienced were as a result of the differences in marital status.

Eyupoglu and Saner (2013) further examined teacher marital status against student academic performance relationship in higher education in Turkey. The results showed that scores of students taught by married teachers was much higher than those of

learners taught by unmarried counterparts (single, separated and divorced teachers). The afore-reviewed studies, reveal existence of evidence that the overall student academic achievement levels varied in relation to different teacher marital status. Accordingly, the studies emphasize that whether married or single, teacher retention in schools is vital for effective learning achievement.

The reviewed study was carried out in Turkey on teachers and learners from a particular race, culture and religion. Its findings may therefore not be generalized to the Kenyan context. There was thus need for another study to be carried out locally which evaluates the influence of teachers' marital status of turnover on students' learning achievement. The current study made an effort to accomplish this.

2.4.1.4 Teacher's Academic Qualification of Turnover on Learning Achievement in Biology

According to UNESCO (2015) teacher academic qualification refers to a complex process of a teacher professional preparation, acquisition of values and ability to practice those values by making sound judgment in school setting situations through teaching experience. In this study, the concept is understood as the certification awarded to teachers upon successful completion of courses in higher education, typically at college or university.

Challenges to retain highly educated staff have been reported in several studies. For instance, Rambur et al. (2013) found out that differences in intention to leave vary with education attainment and that highly educated staff display higher intention to leave than the lower counterparts. In congruence, Sousa-Poza & Henneberger (2012) obtained significant positive effect for the level of education on intention to leave in that turnover intention increases with education. Benson (2015) and Butler (2016)

posit that when employees attain higher qualifications, they tend to improve their chances of getting better jobs so this increases their levels of intention to leave. However, a study conducted by Choong et al. (2013) suggests no significant difference from educational levels towards turnover.

Furthermore, empirical studies over the years have confirmed existence of the relationships between teacher's qualifications and learners' academic achievement. Koedel (2017) established that variation in teacher quality to be a major contributor to student learning achievement. According to Unanma et al. (2013), a teacher who is highly qualified academically has a good biological knowledge than a less qualified teacher who is likely to produce students that have low learning achievement in the subject. Butler (2016) further expounded that poorly qualified teachers lack subject content mastery and instructional methodologies essential in pedagogical requirement in sciences. According to Koedel (2017), a well-trained teacher is in command of subject matter and has ability to identify the learners' strengths and weaknesses thereby making teaching and learning process simpler and enjoyable.

Islam et al. (2013) established that teacher turnover in schools were more likely for teachers with advanced levels of education. According to the study, learners lost academic guidance when these highly-educated individuals sought employment opportunities elsewhere. Most of reviewed literature lacked the information correlating the influence of teacher's academic qualification on students' learning achievement in Biology, making the current study significant.

2.4.1.5 Teacher's Teaching Experience of Turnover on Learning Achievement in Biology

According to UNESCO (2010), teaching experience entails the culmination of skills, exposure or training acquired over time that enables a teacher to perform an existing job better or prepare for teaching position. Teaching experience in the current study is defined as the tenure or the length of time the teacher has spent in the teaching profession from the time of employment by TSC.

Maden (2014), Begüm et al. (2015) and Likoko et al. (2018) in their separate studies on turnover established that employees (teachers) who have stayed for long time in a learning institution are usually reluctant to leave. This is so because the long period spent has enabled them to acquire institutional investment in form of experience and skills acquired and relations developed over time. A study by Kamau et al. (2020), on relationship between experience and turnover found out that teachers with low experience had a high intention to leave than their highly experienced colleagues. Additionally, highly experienced teachers exhibit higher levels of job satisfaction and professionalism and are thus associated with lower rate of turnover (Maden, 2014).

Numerous earlier studies established a positive correlation between a teacher's experience and students' learning achievements; (Nyagah & Gathumbi, 2017; Rice, 2013; Provasnik & Young, 2013; Goldhaber, 2007). In the same vein, Strauss and Vogt (2011) argued that teaching experience is a strong determinant of student academic achievement. According to Odumbe et al. (2015) teachers with long teaching experience enhance learners' academic performance because they are hands-on, hearts-on and keen on learner digression from performance. Ongele (2017)' further posits that long teaching experience in actual classroom produces better

learner results than short teaching experience. Teaching experience gained over time has been known globally to improve knowledge, skills and productivity. Teaching experience was traditionally held as a system influencer for efficiency and effective learner academic performance in learning institutions.

A study by UNESCO (2010) found out that teachers' level of experience is considered as one of the fundamental aspects aimed at enhancing and improving learning achievement in students. A similar view is also shared by Martin (2017). Specifically, he opines that the longer the teachers stay in teaching the more they concentrate on classroom teaching which sharpens their preparedness skills. This often results in better classroom management and content delivery to learners. Thuranira (2010) affirms that teaching experience in teachers also creates mutual bonds between teachers and learners resulting in improved teacher preparedness and student learning outcome.

Teachers with highest teaching experiences according to Jayasingam and Yong (2013) were rated high quality and high-performing educators. Their turnover according to the study decreased the likeliness of enhanced students learning outcomes. A gap that existed in the existing literature was to correlate the influence of teaching experience on the students' learning achievement. This study aimed at finding out influence the teaching experience as an attribute of teacher turnover had on student learning achievement in Biology in public secondary schools in Garissa County.

2.4.1.6 Teacher's Designation of Turnover on Learning Achievement in Biology

Designation is the phenomenon of deciding a position for a particular profession or giving it a particular rank (Chatzoglou et al., 2013). According to MacIntosh (2013),

designation encompasses the quality of work life a teacher enjoys in and out of school he /she teaches.

A study by Irbil et al. (2011) linked school work-position a teacher held and its direct or indirect influence on turnover. The study detailed that teachers' intention to quit teaching or leave learning institutions was determined by their designations at schools they taught. It further elaborated that assistant teachers and class teachers expressed higher turnover in comparison to heads of departments, deputy principals and principals. Similarly, MacIntosh (2013) supposes that teachers' job designations and privileges that come with those positions influence intention to either leave or stay.

Moreover, as whether teacher's designation did influence students' learning achievement, a study by Irbil et al. (2011) revealed that teachers with higher job designations are highly committed due to obvious restraints and pose good academic results in learners as compared to those with low job designations. MacIntosh (2013) also affirmed that designation being expertise, qualification or teacher's rank at school usually determines job satisfaction or dissatisfaction. He argued that higher job contentment enhances a teacher's productivity, effectiveness, and performance resulting in improved learners' academic outcome. The study concluded that students' learning achievement is likely to drop if teachers of higher designations continually transferred or exited the profession.

However, Kimani et al (2013) argued that teachers' academic qualification, teaching experience and designation did not have any statistically significant correlation with students' learning outcome dismissing earlier held beliefs. The reviewed literature as well lacked adequate information on the influence of teacher's designation on students' learning achievement in Biology making the current study significant.

2.4.2 Influence of Teachers' School Working Conditions of Turnover on Learning Achievement in Biology

According to Johnson et al. (2012), school working conditions refers to different aspects that shape and influence the teaching experience. Loeb et al. (2015), further expounded that good school working conditions should include teacher support systems and mentorship programs.

Several studies have linked poor school working conditions with teachers' intent to leave. For instance, a study by Cottini et al. (2011) established that teachers in unpleasant school workplace conditions are more likely to seek transfer or leave teaching entirely unless the necessary measures to improve the work conditions are taken. According to Hom et al. (2008), teachers prefer working in learning institutions that have serene environment and conducive infrastructure. Gatsinzi and Makewa (2014) further stated that a school is more likely to retain effective teachers if it is led by a principal who promotes teachers' professionalism and provides an orderly learning environment. In the same vein, Firestone and Pennell (2012) observed that teachers stay longer and are more satisfied in schools that have independent student demographic characteristics, financial incentives, good administrative support, safety, social colleagues, easy accessibility and cultural elements that support learning.

According to Ong, (2016), hardships encompassing various challenges teachers face as a result of working in unsuitable environmental conditions that limit access to basic amenities can significantly influence high turnover rates. He asserted that limited access to clean water, poor transport network, inadequate housing and challenging climatic conditions teachers face are bound to negatively affect their quality of life and job satisfaction. The study further pointed out that teachers perceiving these

hardships as insurmountable are more likely inclined to seek transfer from their current schools or leave teaching in search of better living conditions.

A significant number of studies have also linked school working atmosphere with student academic achievement. Suzanne (2011) opines that supportive school environmental conditions can enhance effective classroom instruction and improve students' learning achievement. Johnson et al. (2012), further expounds that a conducive school working environment increases teacher retention and leads to an improvement in students' learning achievement. Specifically, Rosenholtz (2019) emphasized that teachers would be unable to put ideas into practice if the school setting lacks equipment and materials necessary for translation of teacher competences into reality. Further studies conducted by Greher and Tobin (2006) and Boyd et al. (2007) identify school's physical conditions, administrative support, collaborations and mentorship, teacher autonomy and workload as major factors in school working conditions influencing learner academic performance. This study expounds more on these factors in the ensuing discussion.

2.4.2.1 Teachers' School Physical Conditions of Turnover on Learning Achievement in Biology

According to Ijaduola (2007), school physical conditions refer to things that enable the teacher and students to carry out the teaching and learning process effectively. Firestone and Pennell (2012) opined that the school physical facilities, infrastructure, site and space are very necessary in ensuring the effectiveness and efficiency of the school as an instructional system.

The Kenya Ministry of Education Policy (2013) further recommends that the school physical conditions ought to be made conducive to facilitate and enhance the learning

process. The policy stipulates that classrooms, laboratories and libraries should be well constructed and spacious. Besides, there is need for provision of playing grounds, toilets and staff rooms for effective teaching and learning process. In this study, the school physical conditions are understood to mean setting influenced by a variety of variables such as availability of teaching/ learning resources, school location and teacher safety, principal support and leadership, student attitude towards learning, pre-requisite knowledge and instructional strategies employed by teachers. According to IOL News (2017), school physical conditions can be a very strong incentive for a teacher to seek alternative employment opportunities elsewhere. Moreover, teachers perceive to work in inadequate school physical conditions tend to feel less valued and are more prone to seek transfer or leave their job position (Firestone & Pennell, 2012; Hansen & Corcoran, 2014).

Lyons (2012), argued that learning being a complex activity involving interplay of students' motivation, teaching skills and curriculum demands requires adequate supply of physical facilities and teaching resources. The study adds that availability of teaching and learning resources therefore enhances the effectiveness of schools as they are the basic resources that bring about good academic performance in the students. Provision of good physical facilities in schools significantly promotes students' academic performance. For instance, studies by Henkins and Holliman (2009); Horg (2009) and Hansen and Corcoran (2014) have linked size of classrooms and availability of instructional material resources to high students' learning achievement in sciences. In particular, availability, relevance and adequacy of school physical conditions have been associated with helping in providing the learners with the desired education and attracting them towards the different school programs. Similarly, studies by Ajayi and Emoruwa (2012) and Hallack (2010) have established

a positive correlation between school physical conditions and student learning achievement. The school physical conditions go hand in hand with instructional materials for effective classroom instruction.

According to Obanya (1989), instructional materials are viewed as didactic material things which are supposed to make learning and teaching possible. Abdullahi (2010) considers instructional materials as locally made or imported teaching resources that could make tremendous enhancement of lesson impact if intelligently used. In similar view, Ikerionwu and Isola (2015) referred to them as objects or devices, which help the teacher to make a lesson much clearer to the learner. They are, according to Agina-obu (2015), concrete or physical objects which provide sound, visual or both to the sense organs during the teaching process thus enhancing the learning achievement.

Saad and Sankaran (2020) opine that instructional resources equip students with vital knowledge and skills essential in problem-solving and critical analytical thinking. The study established that availability and adequacy of resource materials is key in bringing positive changes to the academic development of students. Syomwene et al. (2016) further expound that teachers when teaching should incorporate instructional resources that are various, arouse interest in learners, are relevant and adequate to cater for the learners' educational needs. Wambua et al., (2018) opine that lack of or inadequacy of instructional resources lead to abstract instruction exhibited by passive learning which ultimately transcends to poor academic performance.

Twoli (2016) argued that text books enable the learners to follow the teacher's sequence of presentation and aids in understanding of lessons. It is further supported by findings of Ubogu (2014) who alleged that resources not only provide concrete

experiences, but also help students to integrate prior experiences with new learning hence aid in understanding. According to study by Isola (2013), the adequacy and use of teaching and learning materials affects the effectiveness of a teacher's lesson delivery. Livumbaze and Achoka (2017) suggested that underperforming schools need to be provided with adequate learning and teaching resources and build essential physical infrastructure to improve their academic performance.

2.4.2.2 School Access to Clean Water and Electric Connectivity of Teacher Turnover on Learning Achievement in Biology

Teacher working conditions are a major challenge contributing to teacher turnover all over the world. Teachers working in hardship regions characterized by unlit schools as a result of lack of electricity connectivity, water shortages, inadequate housing and health facilities are likely to develop higher intent to transfer or leave teaching (Nyaga, 2019).

According to UN General Assembly of 2014 that declared "Water for Life", the unsafe drinking water is the major contributor of numerous cases of waterborne diseases in school going children, especially those found in ASAL. In line with the above preposition, a study by UNICEF and WHO Joint Monitoring Program (2018), showed that the school children exposed to clean surrounding and basic facilities such as safe drinking water, clean school toilets, hand washing facilities and basic information on hygiene learn better and can bring concepts and practices on sanitation and hygiene back to their families, thus bringing about behavioral changes in the entire community. UNICEF and WHO (2018), affirm that to achieve this goal, schools need to be provided with sufficient and reliable water system that provides water for all institutional needs. The learning institutions ought to have adequate toilet

facilities for learners and teachers that are safe, clean and gender segregated as emphasized by the study.

UNICEF and WHO (2018) insists that access to safe drinking water is essential to health, a basic human right and a component of effective policy for health protection for both the school and community. Reviewed literature also indicates that provision of safe drinking water to learners as a way of reducing sanitation related diseases and improving health, retention and academic performance for all learners has serious positive effects on students' academic performance and school attendance rates. However, study by Obura (2018) has confirmed that the provision of safe drinking water to schools is still a large deficiency in rural schools in Kenya.

On the other hand, lack of electricity in learning institutions is unfortunate due to the multiple services it can provide in the classroom. According to a study by Kuo (2017), lighting as a result of electricity connectivity can enable children in classes to be taught both early in the morning and late at night. Furthermore, school access to electricity facilitates the integration of Information and Communication Technologies (ICTs) into the classroom teaching such as using computers, overhead projectors and televisions which leads to learner improvements on both test scores and graduation rates.

Study findings by Berger and Fisher, (2013) have correlated major impact of electrification to reducing illiteracy and improving the quality of education. The provision of lighting in schools enables longer studying hours and is associated with enhanced academic achievement. The study adds that school illumination enables students to study at more flexible hours, and potentially longer. According to Kuo

(2017), limited lighting as a result of lack of electric connectivity is rated as the biggest obstacle to students' quest to learn and do homework.

2.4.2.3 Teacher's School Location and Safety of Turnover on Learning Achievement in Biology

According to Akinyele (2014), school location refers to the area surrounding the school while school safety are measures undertaken by schools, teachers, learners, parents and other education stakeholders to either minimize or eliminate risky conditions or threats in schools that may hinder effective instructional process and students' learning achievement. According to United Nation Report (2015), insecurity damages schools and limits educational opportunities causing teachers and learners to run for their lives. For instance, according to Onwonga (2018), insecurity associated with conflicts and terror groups such as Al shabaab in Kenya and the insurgence of the Lord's Resistance Army in Uganda and Boko Haram in Nigeria keep children out of school. The study expounded that such unrest has resulted to loss of lives, destruction of homesteads and schools and displacement of families.

Obura (2018) further emphasizes that security is an issue of critical consideration affecting every teacher working in insecurity prone regions and plays a pivotal role in influencing teacher turnover. The study expounded that security being a broad term specifically encompasses personal safety and the safety of teachers' possessions and has led to increased teacher turnover intentions with those feeling unsafe in their working and living environments taking fore front in seeking for transfer or employment opportunities in areas they perceive have better security measures. Ong (2016) posit that teachers prefer working in serene environments surrounded by friendly and supportive neighborhood for improved educational attainment.

Obura (2018) also established that both Kenya Defense Force and Kenya Police Reservists deployed in pastoralists' communities and most parts of North Eastern Region to offer security to schools were inadequate. The study further alluded that the rampant insecurity in most parts of ASAL in Kenya was the greatest barrier to the provision of quality education to the school going children. Onwonga (2018) as well posits that understanding and addressing the aspects of insecurity is essential for educational policymakers in their efforts to enhance teacher retention and improve the education standards of a region.

On the other hand, a study by MacIntosh (2013) also observed that school location influences teachers' turnover. According to the study, majority of the teachers are reluctant to teach in schools found in rural, marginalized or far-flung remote areas faced with insecurity issues. Akinyele (2014) argued that majority of the teachers are often observed scrambling for schools located in urban centers or along the major road systems for perceived good working conditions and ease in access.

A study by Macmillan (2012) established that school locations besides influencing teacher turnover also play a big role in students' learning achievement. According to MacIntosh (2013), schools located in rural areas usually face several challenges such as teacher shortage, lack of adequate learning facilities and resources, insecurity, poor roads, among others. The study added that the fore listed challenges negatively affect both teachers' and students' motivation and productivity leading to low student learning achievement.

Adesoji (2013) and Hu (2015) corroborated the above findings and pointed out that there is a relationship between the school location and students' learning achievement in terms of learner motivation and teachers' retention. They opined that compared

with urban students, the study established that rural school learners tend to have lower educational aspiration, less value attached to education and are lowly motivated to learn.

Yara (2016) further argued that rural schools have the tendency of being disliked by highly qualified teachers and most parents. Specifically, the majority of parents in rural schools are reluctant to entrust their daughters to male teachers of different religious and cultural backgrounds sabotaging the educational aspirations of a country. However, studies of Yusuf and Adigun (2010) and Ajaja (2015) observed that there is no significant difference between students' learning achievement in urban schools and those in rural schools putting a stop to earlier held perceptions by most people.

In Kenya, the Teacher Service Commission pays teachers house allowance depending on school location (Kamau et al., 2020). Teachers in urban schools are also paid more house allowance compared to their counterparts in rural schools. According to Kamau et al., (2020), the teacher employer as well pays teachers hardship allowances depending on their school locations. MacIntosh (2013) supposes that school locations influence teachers' turnover depending on allowances they get. This implies that teachers are likely to seek transfers to schools they will get more house or hardship allowances thus bringing about teacher shortages in some schools which eventually affect learning achievement.

2.4.2.4 Teacher's Administrative Support and Leadership Style of Turnover on Learning Achievement in Biology

Leadership style is the approach used by principals to exercise their leadership function (Habib, 2015). According to Nge'the (2012) it refers to a particular behavior

applied by the school principal to motivate his or her subordinates to achieve the objectives of the institution. According to Puni et al. (2016), transactional, transformational, authoritarian, democratic and laisez-fair are among various leadership styles school heads employ in running their schools. In this study, the terms administrative support and leadership style are used to refer to daily activities carried out by school principals to modify and bring about change in the variables within the school environment.

Reviewed literature reveals the influence of the principals' leadership styles on teacher turnover intentions. For example, a study by Shuck et al. (2011) reveals that teachers' job commitment varies according to the school leadership styles. According to the findings of the study by Thibodeaux et al. (2015), principals' leadership play crucial roles in the retention of teachers; hence, school administrators ought to be mindful of how their leadership styles and actions impact on the teachers. Chang and Lyons (2012) further expounded that when a teacher believes his /her school manager is unwilling to listen and respond to his needs, the teacher's morale is diminished.

Specifically, Puni et al. (2016) found out that teachers under autocratic leaders are more prone to quit teaching job mainly as a result of the school heads over emphasis on production than teachers. However, Chowdhury (2015) established a negative insignificant association between school leadership style and teacher turnover. Besides, recent studies also indicate the influence of school leadership style on students' learning achievement (Liebowitz & Porter, 2019).

Leithwood et al. (2016) purported that the principal's leadership style is the second influence on student learning achievement besides classroom instructional strategies. According to Day et al. (2016), instructional leadership theory posts that the school

heads ought to concentrate their efforts and energies in promoting enhanced student learning achievements in schools. In the same vein, Muasya (2018) opined that instructional leadership practices are strongly associated with student learning achievement. The theory asserts that transformational leadership strives to establish institutional culture and vision aimed at enhancing teaching and learning quality.

The study by Bass and Avolio (2014), opines that school principals should exercise transformational leadership styles to stimulate and inspire teachers in achieving highest academic performance beyond expectation and in the process develop their own capacities. The study adds that a transformational school head aims at building shared vision, responds to subordinates' individual and institutional needs through empowerment and aligns institutional goals with those of teachers. The study further expounded that transformational leadership style is associated with high level of teacher commitment which translates to highest performance that results to enhanced learning achievement.

Cyprus et al. (2010) interrogated longitudinally the effect of principals' leadership styles on student academic achievement and established that the school heads' leadership styles play prominent roles in students' academic outcomes. A study by Leithwood et al. (2016) revealed that principals' supervisory role of reviewing teachers' lesson notes and assessing them in class positively and significantly relates to enhanced student learning achievement. The current study was conducted to interrogate how the school heads' administrative support and leadership styles influenced student learning achievement in public secondary schools.

2.4.2.5 Teachers' Collaboration and Mentorship of Turnover on Learning Achievement in Biology

Collaboration is where two or more teachers perform a task together. Such interaction can occur under the form of planning programs, peer coaching or team teaching (Firestone & Pennell, 2012). On the other hand, mentoring is all those activities that promote collaborative and constructive discussions between experienced teachers and novice ones through reflecting together on educational issues (Bey, 2011). Thibodeaux et al. (2015) observe that principals should always support new teachers through mentoring. Fransson and Frelin (2016) further states that mentorship programs are adopted in the education sector in an effort to help new teacher recruits acclimatize to their new job demands. In the same vein, Firestone and Pennell (2012) observe that the program helps new teachers in knowing their job expectations, increasing job satisfaction and student learning achievement.

Mentoring has been found by several scholars to affect teachers' turnover intentions (Martinez-pons, 1990; Harrington, 1987; Singh & Billingsley, 1998). According to Stanulis and Floden (2009), 50% of teachers exit teaching within five years of teaching, when their influence on student learning is at peak. They affirmed that novice teachers intensively mentored remained in the teaching profession. In the same vein, Mathur et al. (2012) established that 40 of the 42 new mentored teachers never exited the teaching profession. The study, in addition, argues that effective mentoring of new teachers would more likely retain such teachers in the teaching profession due to the experience of more support and suitable working conditions. Fransson and Frelin (2016) argued that teachers who experienced mentorship were more prone to stay in the profession compared to those who did not.

Besides teacher retention, a study by Stanulis and Floden (2009) supposed that mentoring provides instructional support and promotes unity between newly employed teachers and the rest of the staff. The study concluded that mentoring programs ideally promotes teacher efficacy, performance, alleviates stress associated with being in a new profession and encourages teacher retention. In spite of availability of a plethora of literature relating to the different themes on teacher mentorship programs being relevant to this study, a few scholars have so far considered the influence of teacher mentoring on student learning achievement. This study aimed at providing useful insight on this aspect.

2.4.2.6 Teachers' Autonomy of Turnover on Learning Achievement in Biology

Ingersoll and May (2012) define autonomy as the degree of teacher control over classroom activities. According to the two scholars, such control is related to factors like selecting textbooks and other instructional materials, selecting content; topics and skills to be taught, selecting teaching techniques, evaluating and grading students, determining the amount of homework to be assigned and disciplining students. In this study teachers' autonomy was used to refer to self-directing freedom and particularly independence in teachers' choice of instructional strategies.

Research has found that teachers' autonomy has an influence on their turnover. For instance, studies conducted by Boyd et al. (2008) and Ingersoll and May (2012) revealed that, teachers who perceive to have poor autonomy are more inclined to move to another school or leave the profession compared to those perceived to have good autonomy. Crookes (2017) expounds that education programs which limit teacher autonomy can create feelings of powerlessness, anxiety, and resentment resulting in development of turnover intentions. In the same vein Pearson and

Moomaw (2015) note that, teacher autonomy is strongly related to feelings of professionalism and it is a key factor in influencing teachers to stay in education. Mayer et al. (2013) further asserts that teacher autonomy enhances student learning outcome.

Teacher autonomy relates to practice of independence and self-directive to one's instructional process (Alshumaimeri & Borg, 2019). Teachers practicing autonomy reflect in their teaching by setting realistic goals. Autonomous teachers have high levels of self-esteem, are analytical and aware of their strengths and weaknesses. Autonomous teachers use evaluation criteria in gauging themselves and demonstrating high levels of instructional skills essential for improved student academic achievement (Ata et al., 2015). Kabiri et al. (2018), assert that autonomous teachers are self-driven, initiative and pursue instructional tasks unsupervised from their seniors. The current study attempted to find out how teacher autonomy in public secondary schools influences the students' learning achievement in Biology.

2.4.3 Influence of Teachers' Job Satisfaction of Turnover on Learning Achievement in Biology

According to Cho (2019), satisfaction is the fulfilment of conditions or desires. Job satisfaction is a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences (Boduszek, 2014). However, according to Ali and Anwar (2021), job satisfaction is defined as an attitude related with an individual's degree of their like or dislike of their current job and is determined by a consequence of various elements such as satisfaction, salary and allowances, promotional prospects and relationships with colleague teachers. The current study defines job satisfaction as a feeling of fulfilment or enjoyment a person derives from a job.

Walker (2014) opines that the growth in demand placed on teachers continue to take a toll on the teaching profession as a result of teacher burnout, stress and unhappiness which may lead to job dissatisfaction. Tracey & Hinkin (2016) argued that numerous studies explaining high attrition rate in teachers is because majority of the professionals entered teaching perceiving high intrinsic motivation only to be disappointed by meagre pay. Scholars Morello (2014) and Raziq & Maulabakhsh (2015) argued that educational prosperity of a country is challenged by high teacher turnover rates in schools that are directly related to job dissatisfaction. Tracey & Hinkin (2016) further added that teachers' turnover rates are influenced by dissatisfaction within the job environment that reduce their contribution to the job.

Many scholars, according to Kusluvan et al. (2010) have studied the factors which probably force a teacher into a quitting decision. The study reiterates that teacher's turnover is preceded by the teacher evaluating other work environments which will lead to the intent of seeking other opportunities. Masri (2009) noted that job satisfaction is the most important antecedent variable for directly anticipating turnover intention in teachers. Similarly, Raziq and Maulabakhsh (2015) opine that teachers are satisfied when their expectations or desires are met by their employer. According to the study, satisfied teachers are deemed an effective labor force and become an important asset for the learning institution's effectiveness in knowledge transmission to learners. Rigopoulou et al. (2011) asserts that satisfied teachers are more optimistic, show more commitment to work and their students show enhanced academic prowess.

Prodromos et al. (2013) posit that teacher job satisfaction can be enhanced not only by providing a satisfactory salary, incentives or other institutional benefits but also through strengthening the variables that are related to it. Teachers' job satisfaction is

associated with higher performance, higher learner academic achievement, work ethics, higher work enthusiasm and less absenteeism, fatigue and turnover. A study by Emeka et al. (2012) found out that the greater the job satisfaction rate in teachers, the less likely is the turnover intention. This thus confirms previous literature that teachers with a high level of job satisfaction hold positive attitude toward the jobs and will retain their jobs and produce good results pertaining academic excellence.

Studies by Ting (1997); Blan (1999) and Raziq and Maulabakhsh (2015) identified a number of important environmental antecedents and linked extrinsic rewards such as salary, promotional prospects, career growth, school head, job design and overall school working environment to increased job satisfaction. They documented several significant negative links between job dissatisfaction and teacher turnover. Other recent studies; Ayele (2014) and Adedamola (2016) have however documented existence of positive relationship between type of principal's leadership and teachers' job satisfaction suggesting that job satisfaction is negatively related to turnover.

According to Tracey and Hinkin (2016), the best predictor of job satisfaction is when the teachers' personal values match those of the employer. Emeka et al. (2012) posit that teachers do teach their assigned lessons, mark examinations and assignments, are involved in co-curricular activities, supervisory duties and counselling of learners. All these duties according to the study make teachers to be overworked and may lead to job dissatisfaction if their personal values, interests and expectations are out-matched by employer's demands against remunerations. Vroom (1964) reiterated that job satisfaction is a positive direction a teacher moves towards, in his presently occupied working roles. In the same line, Pathak (2012) affirmed that the teachers' job dissatisfaction will affect their commitment to work and lead them to either switch schools or exit profession.

Dziuba et al. (2020) posits that the influence of teacher job satisfaction on the students' learning achievement cannot be underestimated. According to Park and Shaw (2013), every 10% increase in teacher turnover rate causes a significant decline in learners' academic achievement. Ayuninnisa and Saptoto (2015) opined that teachers' turnover at whatever rate or magnitude causes schools a lot of energy in maintaining the good results of their learners. Teacher job satisfaction needs to be given paramount attention in order to enhance teacher productivity and performance (Masri, 2009). Masri (2009) further posits that teachers displaying highest job satisfaction equally display highest academic performance in learners. The study asserts that a satisfied teacher devotes himself to work, performs orders well, cares for learners' academic achievement and is highly committed. On the other hand, Adedamola (2016) supposed that a less satisfied teacher constantly nurses turnover intention which has a detrimental effect on the sustained growth and performance of any school. In accordance with Ayele (2014), education being the mother of all other professions, its fundamental goals can be achieved with the aid of satisfied teaching staff. The study further expounded that increasing teacher job satisfaction would lead to their commitment levels resulting in high job performance and better student academic performance.

According to Bharwani and Butt (2012), teachers are human resources enhancing the institutional image and academic productivity. As in other industries, teaching highly depends on committed teacher having direct contact with their learners to enhance academic performance in schools. Kusluvan et al (2010) argue that satisfied teachers with the help of adequate instructional resources, learning institutions will be able to enhance their students' academic productivity and excellence. However, the study concludes that due to teachers' various needs, it becomes difficult to retain them

(Masri, 2009). The study illustrates that improvement in teacher satisfaction will definitely persuade the educators to stay in schools thus preventing students from being left in the hands of underqualified or less-experienced individuals.

2.4.3.1 Teachers' Salary of Turnover on Learning Achievement in Biology

Heathfield (2014) defines salary as a fixed amount of money and compensation paid to an employee by an employer in return of work performed. Literature related to salary and teacher turnover highlights salary as one of the greatest significant components of turnover decisions (Ovadje, 2009; Sattar & Ahmad, 2014).

According to the study by Miller (2014), majority of teachers rated salary very important, making it the number one contributor to overall teacher job satisfaction. A study by Mertler (2016) indicated that a significant number of teachers hinted that if provided with the opportunity again, they would not choose teaching as a career. The study also established the number one reason teachers left the profession was in search of a better salary. In this regard, majority of the previous literature revealed that when teachers perceive better and equitable salaries within the institutions of learning, they are less likely to leave the profession (Kroon & Freese, 2013; A'yuninnisa & Saptato, 2015).

It's worth noting that not many studies have credibly isolated the causal effect of merit pay programs rewarding individual teachers for the learning achievement of their students. A study by Glewwe et al. (2010) opined that salary on its own might not adequately increase teacher job satisfaction. Bennell and Akyeampong (2017) further expounded that beyond a reasonable salary, there is evidence that further pay to teachers in form of incentives increases job satisfaction.

Reviewed literature further indicates that job satisfaction affects the status of the teaching profession due to low salaries and incentives, poor conditions of services, lack of accommodation and other incentives. Studies by Bennel et al. (2009) and Komba and Nkumbi (2013) argued that low job satisfaction is bound to affect the quality of education provided in any country as it influences teacher turnover which is bound to affect the learning process.

Moreover, many studies linking teacher salary to job satisfaction is important for both schools and government as it pegs on teacher retention as well. Studies by Kipkebut (2013) and Kamau et al. (2020) indicate that the highly qualified KCSE candidates find teaching less attractive than other career options. This notion of the perceived salary discrepancy of teachers and other government employees impacts on the power for the profession to attract the best and brightest candidates into the classroom.

According to Hanushek (2016), there is a link between teacher quality and student academic performance. However, employing and retaining high quality teachers with their commensurate salary is a complicated endeavor in many countries. The study added that since teachers are paid on a structured scale, it is rare and impossible to increase salaries for effective and highly performing teachers without increasing salaries for ineffective ones. This is a setback according to Fransson & Frelin (2016), that kills the morale and demotivates the devoted and hardworking teachers.

As opposed to Spherion (2013) who quoted that 49 percent of teachers considered promotion prospects as a vital concern in retaining them in schools, Saira et al. (2014) notes that teachers' devotion, commitment and willingness to stay in schools largely depended on the salary they received from their employers. The influence that salaries have on teachers' job satisfaction is an aspect widely demonstrated by existing

literature (Hanushek et al., 2004; Dolton, 2009; Kirby et al., 2019) who in their respective studies asserted that low salary increases were the major reason why teachers switched jobs.

Hasibuan et al. (2019) indicate that unsatisfactory remuneration practices lead to increase in turnover intentions among teachers, making salary satisfaction a primary concern to both Teacher Service Commission and school boards of management. Within studies done on multiple occupations and employee satisfaction, salary demonstrates a positive relationship to job satisfaction (Judge et al., 2010). Kelly (2014) demonstrated in his analysis how a salary increase caused a significant turnover decrease in teachers and led to significant increase in academic scores in students.

2.4.3.2 Teachers' Promotion Prospects of Turnover on Learning Achievement in Biology

According to Kinyili et al. (2015), a job promotion is when an employer moves a teacher up in the hierarchical levels within a learning institution. It typically allows a teacher to progress to higher position, a higher level of responsibility and higher levels of authority within the school (Steven, 2011). Kinyili et al. (2015) posit that promotion enables teachers to occupy senior positions within the learning institutions. According to Price (2009), promotional prospects carry with them satisfaction in teachers and decrease their intent of leaving the learning institutions. Studies; Ekabu (2018), Kipkebut (2015) and Kinyili et al. (2015) that link teacher promotional prospects and turnover agree that teachers' intent to leave are less among teachers who work for schools and teacher employers that are perceived to have organized career growth.

Nyamubarwa and Zainuddin (2013) opine that promotion prospects influence a teacher's job satisfaction, affecting their commitment, performance and productivity. The study expounds that teacher promotional prospects also reduce turnover. According to Stah et al. (2013), teachers will consider leaving their current job when they perceive promotion opportunities in other careers as being higher compared to teaching. However, Ekabu (2018) stated that teachers' promotion is an uphill task for a majority of classroom teachers in schools lacking adequate infrastructure and learners with high academic achievement. Kinyili et al. (2015), further submits that if teachers stagnate in one position for a considerable length of time, they will unlikely stay in such schools and unfulfilling positions.

Teachers' perception of promotion prospects within Teacher Service Commission is one of the fundamental factors that influence their academic productivity and intention to remain or quit the teaching career. According to Kinyili et al. (2015), a teacher would feel more satisfied to work with an employer who provides him/her with promotional prospects to new challenging positions. Danish and Usman (2010) reported a positive relationship between teachers' promotional opportunities, their job satisfaction and a corresponding students' academic prowess. Steven (2011) expounds by postulating that promotion opportunities usually comes with increased remuneration, higher status, boosted self-esteem leading to more authority, responsibility, independence as well as higher job satisfaction among teachers leading to the enhancement of interest in the job which translates to higher students' learning achievement. In Kenya, teachers' promotions are governed by the laws and regulations from the teacher employer TSC, however, the way the exercise is implemented has left many educators disillusioned (Kipkebut, 2015).

Kinyili et al. (2015) reiterated that when a teacher stagnates in one position for long, he or she is unlikely to stay in such unfulfilling institution or job. The study supposed that when teachers stagnate in their current positions, their motivation to stay in such positions usually fades and would most certainly not remain in such unfulfilling positions. The study further opined that the affected teachers usually opt out leaving their learners to substitutes (BOM teachers) who according to Steven (2011) often have less expertise and experience.

2.4.3.3 Teachers' Work Environment of Turnover on Learning Achievement in Biology

Barnabe and Burns (1994) describe a satisfying learning environment as the school atmosphere which is fulfilling and add value to instructional-learning process. A study by Boyd et al. (2007), established that besides the key source of job discontentment in teachers being lack of correlation between their pay and the performance, learning environment cannot be underestimated. According to Herati et al. (2021), good learning environment benefits learners by providing them with appropriate instructional tools, space and facilities for learning process. The study stated that a suitable classroom environment should be one that is more congenial for learners, support learning and motivate students in enhancing their perception towards instructional process. Unconducive work environment such as unprofessional administration, lack of support from parents and surrounding community, overload of paperwork and undisciplined students may lead to job dissatisfaction thus triggering teacher turnover (Imran, (2017).

When teachers perceive their school learning environment as supportive, they are more likely to feel positive and motivated in providing quality teaching services. Tsui et al. (2012) asserted that teachers' perceptions of their contributions to the learning

institution were significant since they influence their satisfaction level beyond the classrooms. The study, in addition added that school culture characterized by collegiality and collaboration promoted teacher job satisfaction and feeling of professionalism which is essential for cultivating a conducive atmosphere for classroom instruction.

2.5 Related Studies of Teacher Turnover on Learning Achievement

Previous studies on teachers' turnover in Kenya indicate a worrying trend of high turnover intention among teachers leading to low learning achievement in students. Mburu (2016) on The Impact of Job Satisfaction on Turnover Intentions among Teachers in Public Secondary Schools in Gatanga District, Murang'a County, found out that most teachers in the district were not satisfied with the most aspects of their work and were thus planning to quit teaching. Inadequate compensation was identified as the main reason for their intention to quit. Mburu (2016), surmised that those teachers intending to transfer from their current institutions cited dissatisfaction with type of leadership and inappropriate motivation strategies adopted

Ekabu (2018), in his study on Motivational Factors and Turnover Intentions of Teachers in Public Secondary Schools in Meru County showed that teachers' motivation in public secondary schools in Meru County was low and education system appeared to be staffed with teachers with poor morale and low levels of commitment to their teaching job leading to high turnover. Mbuno (2019) on Governance Practices Influencing Teacher Retention in Public Secondary Schools in Makueni County showed that most teachers' workload was moderate and most were satisfied with available incentives such as money from remedial lessons, prizes and recreational trips making them stay in teaching. In the current study, the researcher

investigated to what extent the teacher attributes of turnover influenced learning achievement in Biology in public secondary schools which the aforementioned studies did not dwell on.

Moreover, a study by Kamau et al. (2020) on Logit Test of Turnover of Teachers Professionals in Public Secondary Schools in Murang'a County, Kenya, established that demographic factors had an association with teachers' turnover intentions. The findings revealed that age had significant association with turnover of public secondary schools' teachers in Murang'a County while gender, tenure and educational level did not and therefore this formed part of this study that looked the teacher attributes of turnover on learning achievement in Biology in public secondary schools in Garissa County. Furthermore, a study by Mulee (2021) on Determinants of Employee Turnover Intentions among the Teaching Staff at the University of Nairobi, established that career development, employee achievement, job responsibility and recognition related negatively and statistically significant with employee turnover.

Finally, Kontoma et al. (2023) on Influence of Environmental Factors on Teacher Turnover in Wajir West Sub County revealed that there exists a complex interplay of environmental factors in influencing teacher turnover. The study isolated geographical remoteness and challenging climate conditions as factors impacting on teachers' job dissatisfaction. Insecurity and inadequate access to basic amenities as well played a pivotal role in teachers' decisions to leave the county. However, the study did not relate how these teachers' leaving the public secondary schools in the study area influenced the student learning achievement, a move the current study endeavors to tackle.

2.6 Literature Review and the Knowledge Gaps

According to Moeini (2014), gaps in the literature constitute missing pieces or insufficient information in the research literature. He further asserts that research gaps characterize questions or problems in literature that were not adequately addressed in the reviewed literature. They constitute grey areas, which are fields that have scope for further research, are unexplored, under-explored, or outdated. According to Marini (2014), research gaps provide viability for research as they essentially alert the readers and others in the field to places in the study that need more attention.

In regards to the study topic, there is very little and scanty literature known about the influence of teacher turnover factors, particularly the teacher attributes on student learning achievement in Biology in Garissa County. Secondly, most studies recently done in the country on turnover; [Ogembo et al. (2015); Chepkemboi et al. (2015); Njung'e (2015); Mburu (2016); Ekabu (2018) and, Mbuno (2019)] linked teacher turnover with other aspects such as lack of teacher motivation, job dissatisfaction and workload and their recommendations on student learning achievement are mentioned in passing. No recent study has adequately linked the influence of attributes, school working conditions and job satisfaction of teacher's turnover on student learning achievement in schools making the current study a venture in virgin land.

Finally, earlier researchers mostly employed either purely qualitative or quantitative approaches in data collection and analysis. However, Tashakkori and Teddlie (2010), assert that mixed methods research approach delves on looking for multiple approaches for collecting and analyzing data because they aim at collecting rich information that work to provide the best understanding of a research problem and results in more reliable, replicable and generalizable findings. From the literature reviewed, no previous research had been adequately done on the topic hence the

current study endeavored to assess the influence of teacher turnover factors on learning achievement in Biology in public secondary schools in Garissa County. The main focus was to relate the influence of the independent variables with students' learning achievement in Biology.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The study focus of this convergent mixed-methods design was to investigate the influence of teacher turnover factors on learning achievement in Biology in public secondary schools in Garissa County. The following research researches guided the study: To what extent do the attributes of teachers' turnover influence learning achievement in Biology in public secondary schools? How do the school working conditions of teachers' turnover influence learning achievement in Biology in public secondary schools? To what extent does job satisfaction of teachers' turnover influence learning achievement in Biology in public secondary schools?

To achieve the study objectives, an appropriate outline describing the research design and methodology was adopted. It mainly focused on the following areas; research philosophy, research design, study area, the target population, sample and sampling frame, research instruments, validity and reliability of research tools, data collection procedures, data presentation and analysis, and logistical and ethical considerations.

3.2 Research Paradigm

Research is systematic investigation undertaken in order to come up with the resolutions to a problem. Hale (2011) supposes that the key aim of research is to contribute to the body of knowledge which aims at shaping and guiding academic disciplines. On the other hand, a research paradigm according to Guba (1990) is "a basic set of beliefs that guide actions". Maswoswere (2019) refers to it as a viewpoint or a way a researcher looks at the world and its presuppositions that direct thoughts and actions. According to Kaushik and Walsh (2019), it is a terminology referring to

generalizations, values and beliefs that a community of experts shares in regard to the nature of reality and knowledge.

There are two main research paradigms; scientific and naturalistic. The synonyms for the scientific approach are the objectivist or the positivist. The positivist represents the traditional form of research and its assumptions hold true for quantitative research (Phillips & Burbules, 2000). In the scientific approach, quantitative research methods are employed in an attempt to establish general laws or principles that are applicable to other situations. Creswell (2014) opines that this worldview values scientific objectivity, researcher neutrality, and study replicability. The approach according to Babbie (2010) assumes that social reality is objective and external to the individual hence unbiased. Hesse-Biber and Leavy (2011) further expound that the epistemological position of positivists informs on the role of the researcher and the understanding of the relationship between the researcher and the research participants. Alternatively, the synonyms for the naturalistic approach are the subjectivist or the anti-positivist.

The Constructivist Worldview is a philosophical position used in qualitative research. Its proponents believe that individuals seek understanding of the world in which they live and work, and develop subjective meanings of their experiences. On the other hand, the Transformative Worldview scholars felt that the positivists' assumptions imposed structural laws and theories that did not fit marginalized individuals in societies such as critical theorists, Marxists, feminists, and ethnic minorities. On the other hand, the Pragmatic Worldview arose out of actions, situations, and consequences rather than antecedent conditions.

The current study adopted the Pragmatic Worldview which derives from the works of the 19th Century writers such as Peirce and Dewey (Cherryholmes, 2012). This philosophy arises out of actions, situations, and consequences and its premises are concerned with applications on what-works and solutions to problems (Patton, 2013). Pragmatism is applicable to this study because, it is a philosophical underpinning for mixed methods studies (Tashakkori & Teddlie, 2010). According to Creswell and Plano (2018), pragmatism provides a philosophical basis for mixed methods research approach in that inquirers draw liberally from both quantitative and qualitative assumptions and are free to select the methods, study techniques, and procedures that best accommodate their needs and study purposes.

The study adopted this philosophical worldview because it allows for simultaneous collection of both quantitative and qualitative data sets and focuses mainly on what works rather than what might be considered absolutely and objectively true or real in order to generate evidence that supports the best practice. Further, pragmatist philosophy is applicable to this study because it is premised on the epistemology that there is no single way to learning. According to Saunders et al. (2012) and Wilson (2010) (as cited in Maswoswere (2019), pragmatists argue that there are many different ways of learning and understanding because there are multiple realities. They opine that instead of focusing on single method, researchers should emphasize the research problem and use all possible approaches available to understand the problem in breadth and depth (Rossman, 2012).

The current study's objectives were of mixed methods nature, therefore the researcher opted to employ a Mixed Methods Research approach as the most suitable methodology to address the study problem. According to Leedy and Ormron (2016),

mixed method research approach is a process for gathering, analyzing and mixing quantitative and qualitative research paradigms in a single study to thoroughly comprehend a study problem. In this course, researchers look for many approaches for collecting and analyzing data rather than subscribing to only one way that is either quantitative or qualitative. Thus, the investigators use both quantitative and qualitative data since they aim at collecting rich information that work to provide the best understanding of a research problem (Tashakkori & Teddlie, 2010).

The methodology is specifically useful in understanding contradictions between quantitative and qualitative results and gives a voice to study participants besides ensuring that the study findings are unbiased and grounded in participants' experiences (Orodho, 2014). According to Poth and Munce (2020), mixed methods research approach is superior to a single method as it provides rich insights into the research phenomena which cannot be fully understood by solely using either quantitative or qualitative methods. In the same vein, Shorten and Smith (2017) argue that mixed-methods research has ability to integrate and synergize various data sources essential in studying complex problems. The study further expounds that application of mixed-methods research allows researchers to seek a wider glimpse of their studies by enabling them view different phenomena from different perspectives of research lenses.

Further, the researcher employed mixed methods research approach because of its strength of drawing on both quantitative and qualitative research and minimizing the limitations of using either of the approaches (Creswell & Creswell, 2018). It provides a sophisticated, complex approach to research that appeals to those on the forefront of new research procedures and is also an ideal approach if the researcher has adequate

access to both quantitative and qualitative data. Babbie (2010), also add that the approach is the most suitable and commonly used research method in social research as results obtained can easily be extrapolated to the entire population.

According to various scholars; Ivankova (2016), Creswell and Plano (2018) and Wilkinson and Staley (2019), there are four core mixed methods research designs; convergent mixed-methods, explanatory sequential, exploratory sequential and complex mixed methods. When using convergent mixed-methods design, firstly, the researcher collects two types of data sets concurrently. Secondly, the two types of data sets are analyzed independently using quantitative and qualitative analytical approaches (Schoonenboom & Johnson, 2017). On the other hand, scholars using explanatory sequential design begin with the collection and analysis of the quantitative data to expand the first phase of quantitative results followed by the designing of the second, qualitative phase on the basis of the quantitative findings (Creswell & Plano, 2018). However, contrary to explanatory sequential design researchers using exploratory sequential design begin with the collection and analysis of qualitative data and then building from the qualitative findings, quantitative measures are developed (Creswell & Plano, 2018). In the same vein, a researcher using complex mixed methods design embeds one or more core designs into a major framework or a process, meant to augment its findings (Creswell & Creswell, 2023).

Based on the above discussion, the researcher considered convergent mixed-methods research design, also referred to as concurrent triangulation mixed-methods research design as the most appropriate design for the current study. According to Creswell and Plano (2018), a convergent design following pragmatism theoretical assumption, is an effective and most popular approach employed in mixed methods research.

3.3 Research Design

Research ought to be transparent and this emanates from the logic and premises the researchers use to generate conclusions for their inquiries (Ketokivi & Choi, 2014). In this respect therefore, a research design is vital. Orodho (2014) defines research design as the scheme, outline or plan that is used to generate answers to research problems. Scholars have regarded it as an arrangement of conditions for effective collection and analysis of data in a manner that aims to combine relevance with study purpose. It is a conceptual structure for conducting research and constitutes the blueprint for data collection, measurement and analysis. Kothari and Garge (2014), and Parahoo (2014) also described a research design as a plan that describes *how, when* and *where* data are to be collected and analyzed.

Of the four central mixed methods research designs; convergent, explanatory sequential, exploratory sequential and complex mixed methods, the researcher adopted, according to Creswell and Creswell (2023) and Wilkinson and Staley (2019), convergent mixed methods research design. This was done in line with the study problem, its objectives, and aimed at merging or converging both quantitative and qualitative data that had been collected concurrently to provide a comprehensive analysis of the research problem (refer to figure 3.1 below).

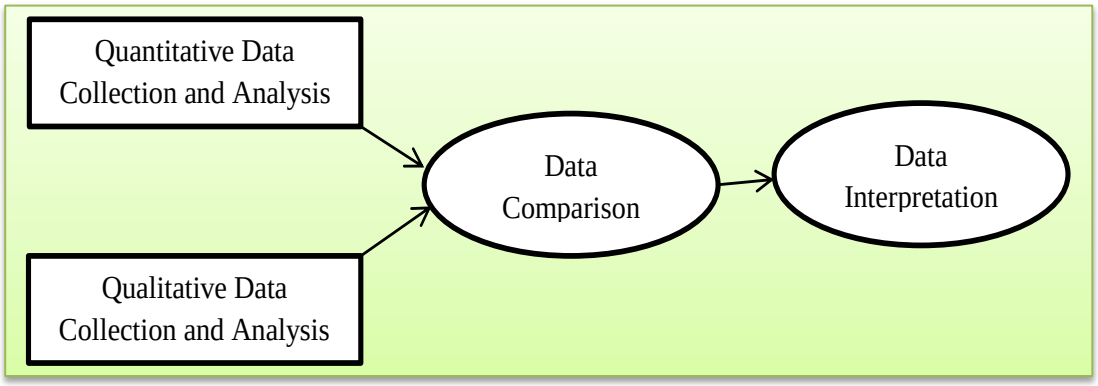

Figure 3.1: Convergent Mixed -Methods Research Design

Source: Creswell & Creswell, 2023

The two strands of quantitative and qualitative data had been collected differently but at the same time to give detailed and elaborate information of the study problem (Creswell and Creswell, 2023). The essence of this design was to typically collect a wide range of complementary data on the same research problem at roughly the same time then integrate the information in the overall results interpretation, which in the current study was a point of interphase, in order to have a comprehensive understanding of research challenge than the one provided by either quantitative or qualitative results separately. Creswell and Plano (2018) and Creswell and Creswell (2023) argue that the research design besides obtaining the triangulated results aims at combining the two data sets to get a complete and wider picture of the issue being explored and also assists in validating one set of findings with the other. In this view therefore, the current study combined both results from quantitative and qualitative data sets to have a broader understanding of the influence teacher turnover factors had on students' learning achievement in Biology in the study area.

According to Creswell and Plano (2018), a convergent mixed-methods design has four major steps. Initially, the researcher collects quantitative and qualitative data on the topic of interest concurrently but separately. Secondly, the two sets of collected data are analyzed separately and independently using appropriate analytic procedures. Thirdly, the researcher merges the results of the two data sets once interphase is researched. Finally, the researcher interprets the extent to which the two sets of obtained results converge or diverge from one another. That is, comparing the two different sets of data in a discussion as they relate to each other. In the case of the current study pertaining the influence teacher turnover factors had on learning achievement in Biology in Garissa County, the researcher merged the quantitative data from the Biology Teacher Questionnaire and the qualitative data from the

document analysis guide at the data interpretation phase to have an across the board understanding of the study topic. In accordance with suggestions of Creswell and Plano (2018) and Creswell and Creswell (2023), the study adopted this design because the researcher had limited time, needed both quantitative and qualitative information from the participants to extensively understand the study topic and also had adequate required skills to handle both quantitative and qualitative research methods.

The researcher employed cross-sectional survey in quantitative data collection. Cohen et al, (2018) opine that cross-sectional survey produces a snapshot of a population as it gathers a lot of pertinent information about particular groups of people within a short period of time. This approach besides connecting philosophical hypotheses to particular procedures, attempts to identify the characteristics of a problem through description. Facts are carefully selected and gathered according to pre-determined criteria. Its main purpose is to demonstrate relationships of interest and provide one with a generalized understanding of a phenomenon that in turn can be extrapolated to universe to understand other specific problems.

According to Bean (2013), qualitative studies serve five specific research purposes; understanding the meaning of the events, situations and actions involved, understanding the process by which events and actions take place, understanding the particular context within which the study participants act, understanding and developing causal explanations and finally, identifying unanticipated phenomena and generating new grounded theories. At times, one study may achieve more than one of the above research purposes. The current study being a mixed methods in nature employed the qualitative data collection in order to have candid causal explanation

and interpretation of phenomena that led to the development of teachers' turnover intentions, and the extent to which they influenced the student learning achievement in Biology.

3.4 The Study Area

This study was conducted in Garissa County, which is one of the 47 counties forming the Republic of Kenya. It is located in what was formerly known as North Eastern Province. The Counties of Wajir, Tana River, Isiolo, Lamu and the Republic of Somalia border this vast County. Garissa is a typical example of the most marginalized parts of the country with the highest levels of poverty, unemployment and insecurity. It covers a total area of approximately 44,753 square km with an estimated population of 480,146 people (Kenya Population Census, 2019). The sub counties making up the county are; Garissa Township, Fafi, Ijara, Lagdera, Daadab, Balambala and Hulugho.

The current research problem is universal as high teacher turnover rate is a global phenomenon. Today in Kenya, low learning achievement in Biology is the country's major issue of concern, attributed to teacher turnover. The study site was specifically selected because students' learning achievement in Biology in the study area for a long period has been far much below the education stakeholders' expectations.

Based on the study by Abdiaziz (2019), the public secondary schools in Garissa County are characterized by low teacher-students ration, inadequate physical facilities, poor roads, insecurity, and highest percentage of teacher turnover. The study further established that it is in this county where a student may be taught a single subject by more than ten different teachers between form one and form four due to problems associated with teacher retention. Garissa County was also purposely

selected as the study site based on the familiarity of the area by the researcher as guided by Singleton (1993), who asserted that the ideal setting for any study site rests on the researcher's interest.

3.5 The Target Population

According to Haber et al (2010), the word population in research constitutes elements forming the study focus and can be categorized by specified criteria. Orodho (2014), defines population as a group of individuals from which samples are taken for measurements. It refers to a group of people or study subject who are similar in one way or another and which forms the subject of investigation in a particular study (Flicker, 2017). Further, the study expounds that it is the aggregate of all cases that conform to some designated set of specifications and comprises all the members of a factual or hypothetical group of people or events to which a researcher wishes to generalize the results of the study. In the context of the current study, the target population comprised all Form Three Biology students and the Teachers of Biology currently teaching Biology in form three class.

According to the Ministry of Education data of 2023, Garissa County has 2691 form three students and 95 teachers of Biology drawn from 40 registered public secondary schools. The schools consist of two national, three extra-county and several county and sub county schools. Public secondary schools were purposely selected as they reflect the true scenario of the typical working conditions in the majority of learning institutions in Garissa County which exhibit high rates of teacher turnover. The study's target population comprising the teachers of Biology against the school category they teach are summarized in the Table 3.1 below.

Table 3.1: Target Population

School Category	No per Category	No of Teachers
National	02	13
Extra County	03	11
County	08	20
Sub County	27	51
Total	**40**	**95**

Source: Garissa County Director of Education's Office, 2023

3.6 Sample Size and Sampling Procedures

Sampling in accordance with Cohen and Arieli (2011), refers to the process of selecting a representative sample from a population to obtain information in regard to a phenomenon under study in such a way that ensures the population is well represented. Similarly, a sample in research study refers to any group from which information is obtained. According to Maina (2013), it is a small unit or proportion of population selected by the researcher for observation and analysis and the researcher uses it to make inferences about the characteristics of the entire population. Creswell (2012) defines a sample as a subset of the target population that the researcher intends to study in order to draw conclusions about the target population as a whole.

According to Orodho (2014), a sample population should contain components that are representative of the characteristics of the entire group. Ghosh (1982), proposes a minimum of 30% of target population to be included in the sample when dealing with a heterogeneous sample. On the other hand, Kothari (2016) recommends at least sample sizes of 10% for population of over 1000 respondents, 30% for population of over 100 but less than 1000 and 50% for population of over 10 but less than 100. The

current research adopted recommendations put forward by Kothari (2016) in selecting the sample sizes for the study.

Initially, the study embraced stratified sampling technique in dividing the population into categories based on their demographic designation. According to Gorrel (2013), a population is divided into small strata and a sample selected from each stratum. This category included teachers currently teaching Biology in form three and the form three students. The categorization was done to separate the population into homogenous subjects that share similar characteristics so as to ensure equitable representation of the population in the sample (Kothari & Garge, 2014). All the sub county public secondary schools in the study site were then purposively selected and studied. This is because this category of schools is the majority and reflects the true scenario of the typical working conditions in public secondary schools in Garissa County with the highest rate of teacher turnover.

The research approach being quantitatively driven, the selection of the participating entities and the settings were determined by the concept of representativeness whose major emphasis was objectivity (Cohen et al., 2017). Moreover, the selection of Garissa County as a study area followed a purposive sampling technique. Cohen et al. (2017) point out that purposive sampling is useful and acceptable in empirical surveys.

In regard to sampling, units of analysis identification, is an essential part of any study. The selection of units of analysis forms part of the process of the researcher deciding on a research method and its operationalization (Polanin et al., 2017). The unit of analysis, being the object under study in terms of research variables constitutes the construct of interest. In the current study therefore, the teachers of Biology and the

form three students constituted the units of analysis, which were constructs located in the study sample.

The researcher purposely targeted all the Biology teachers currently teaching form three classes in all sub-county public secondary schools in Garissa County. This sampling frame was selected since they are a group of people believed to have true, realistic and the most reliable information as appertains to the study topic. According to Bryman & Bell (2014), the power of purposive sampling lies in selecting information rich cases for in–depth analysis related to the central issue being studied. Of equal strength, form three students were considered in the study to ensure the participation of students who have been exposed to both Form One and Form Two Biology content, which is about 50% of the entire secondary school Biology curriculum. Moreover, form three Biology students were preferred because they had chosen to pursue Biology to KCSE level hence their attitudes towards the subject had stabilized and could easily be projected. In addition, most schools and Biology teachers usually give a lot of attention in terms of teaching and evaluation to form four students in preparation of KCSE examination at the expense of form three and the other lower forms.

Table 3.2: Target Population and Sample Size

Respondents	Target Population	Sample	Percentage
Teachers of Biology	95	51	53.0%
Form Three Students	2691	336	12.5%
Total	2786	387	65.5%

Source: Field Data, 2023

The form three students' sample size estimation from the target population agrees with Krejcie and Morgan (1970) formula of sample size determination as shown below;

$$n = \frac{X^2 * N * P * (1-P)}{(ME^2 * (N-1)) + (X^2 * P * (1-P))}$$

Where:

n = sample size

X^2 = Chi – square for the specified confidence level at 1 degree of freedom

N = Population Size

P = population proportion (.50 in this table)

ME = desired Margin of Error (expressed as a proportion)

$$n = \frac{1.96^2 \times 2691 \times 0.5 \times 0.5}{0.05^2 \times 2690 + 1.96^2 \times 0.5 \times 0.5}$$

$$n = \frac{2584.4364}{6.728 + 0.9604} = \frac{2584.4364}{7.6884}$$

$$n = 336$$

Thus, a sample size of *336* form three students is in agreement with recommendations of Sample Size Determination Table proposed by Fowler (2009) as shown below;

Table 3.3: Sample Size Table

	Size of population					
Margin of error	**>5000**	**5000**	**2500**	**1000**	**500**	**200**
±10%	96	94	93	88	81	65
±7.5%	171	165	160	146	127	92
±5%	384	357	333	278	217	132
±3%	1067	880	748	516	341	169

Source: Fowler F.J., 2009

Thus, a total sample of *387* participants was used in this study and comprised 51 teachers of Biology and 336 form three students.

In every sampled school, all the teachers currently teaching Biology in form three were purposively selected irrespective of the number of form three streams a school had. On the other hand, systematic random sampling technique was used to select 12 students from every sampled school who were arranged according to their admission numbers in ascending order and thereafter students in even positions selected. Similarly, stratified random sampling technique with proportionate allocation was used to select 16 students in three schools that had larger population of more than 70 form three learners. This aimed at choosing samples sizes that were proportionate to the size of sample unit in order to increase the chances of representativeness (Orodho et al., 2016). This view is in line with Lauren's (2020) definition of stratified sampling as being a random selection of strata within the target population.

Finally, the small study sample comprising 51teachers of Biology is in consonance with the suggestions of various researchers; Creswell (2018), Saunders (2016) and Morse 1994 who suggested that mixed methods studies with qualitative approach in data collection and analysis requires small samples between 5-25, 2-30 and 20-50 participants respectively. These recommendations aim at assisting a researcher estimate how many participants will be needed since the ultimate goal of data collection is in the attainment of saturation when no new information is available from the respondents (Yin, 2011).

3.7 Research Instruments

An instrument in research is a tool that is required to get information. Gay and Airasian (2006) stated that research instruments are tools that are used in collecting

data. While, Arikunto (2021) revealed that an instrument in collecting data is a tool that is used by researchers to help them in collecting data in order to make it more meaningful, systematic and easy in interpretation. In this study questionnaire and document analysis guide were used to generate detailed data on the influence of teacher turnover factors on student learning achievement in Biology. The selection of these tools was guided by the nature of data to be collected as well as the study objectives.

3.7.1 Biology Teachers' Questionnaire (BTQ)

According to Kipkebut (2013), a questionnaire is a carefully designed instrument for collecting data direct from people. It involves use of written down items to which the respondents individually respond to in writing or through interview. In this study, the researcher collected data from teachers of Biology using a questionnaire.

A questionnaire was the most ideal tool for collecting data in this study since the sample size was quite large and sparsely distributed. The Biology Teacher Questionnaire (BTQ) consisted of five sections; A, B C D and E. Section A comprised of socio-demographics of the respondents and aspects of teacher turnover factors. Section B collected data on the teachers' attributes of turnover such as gender, age, marital status, academic qualification, teaching experience and current designation in their schools. The data collection tool was useful in capturing information on the extent teacher attributes of turnover influenced student learning achievement in Biology. Moreover, section C collected data on teachers' school working conditions while section D captured data on teachers' job satisfaction. Finally, section E of the Biology teacher's questionnaire collected data on the student learning achievement in Biology (Refer to the questionnaire tool in the Appendix C).

Most of the questionnaire sections consisted of closed ended questions that were carefully designed to address specific research objectives and test the hypotheses (Mugenda & Mugenda, 2019). However, the study as well employed closed ended questions that took the format of five-Likert scale based on five-point rating from strongly disagree to strongly agree as recommended by Kipkebut (2010).

The questionnaires were administered face to face to ensure 100% return. In particular, the researcher distributed the questionnaires personally to the sampled Biology teachers and collected them a few hours later after dispensing them to ensure high response rate and avoid their loss. By doing so, the researcher was able to reduce the weakness associated with use of questionnaires that relates to their lack of capacity to motivate respondents to answer all questions leading to low response rate (Bryman & Bell, 2014).

3.7.2 Document Analysis Guide (DAG)

This method involves deriving information by carefully studying written documents or usually information from sources called documents. It collects secondary data through observation of relevant documents. These could be text books, documents, newspapers, articles, speeches and advertisements. In a school set up, the documents analyzed could include daily staff log in and log out, teacher and learner lesson attendance records, teacher management books, value added progress records and previous KCSE results among others.

In this study, the document analysis guide (Appendix D) was vital in discerning teachers' turnover indicators such as chronic absenteeism, massive transfer requests and duty desertions. These documents were sought analyzed and interpreted by the researcher to establish the rate and trend of teacher turnover in public secondary

schools in Garissa County. Equally, the document analysis guide was significant in analyzing the form three students' learning achievement in Biology. Form three Biology students' notes, Biology Mid and End Term CATS and the schools' KCSE results for the previous years were sought from the Directors of Studies Offices and analyzed to gauge the learning achievement in Biology.

The use of document analysis guide suited this study as it allowed for in-depth data collection that would not have been possible had the researcher solely relied on the Biology Teacher Questionnaire (Mugenda & Mugenda, 2019). The technique further complemented the relevant information gathered on the study objectives through the questionnaire (Bryman & Bell, 2014). It allowed for data access at a time that was convenient to the researcher and contained written evidence thus saving the researcher time and expense of transcribing (Creswell, 2014).

3.8 Validity and Reliability of Research Instruments

3.8.1 Validity of Research Instruments

Validity in the research perspective is the degree to which a research instrument collects the data it purposes to collect. Validity in mixed methods research according to Creswell and Creswell (2018) refers to strategies that address potential threats in drawing correct inferences and making accurate assessments of integrated data. Validity of the study instrument is characterized by the extent of its accuracy (Kothari & Garge, 2014). According to Hair et al. (1998), data collection tool validity is the extent to which measuring scales accurately represent the concept of interest.

Oluwatayo (2012) establishes the existence of four types of validity; content validity, criterion-related validity, construct validity and consequential validity. The study further elaborated content validity as that addressing the match between the subject

matter and the test questions. Similarly, according to Burns et al 2017, criterion-related validity assesses the relationship between the test and outcome. It aims at correlating the obtained results and another criterion of interest. On the other hand, construct validity is the degree to which a test evaluates the underlying theoretical construct it meant to assess (Bluelow & Hinkle 2008). Finally, Messick (2005) asserts consequential validity as relating to the rationale of assessing the intended and unintended significance of a score interpretation for both short- and long-term use.

The current study majorly used content validity as the most important and relevant of research instruments' validity. According to Saunders (2016), it refers to a measure to which data collected using a particular research instrument represents content of a concept measured. It included the extent to which test items in the Biology teachers' questionnaire were representative of all the possible factors causing teacher turnover and the influence they had on student learning achievement in Biology. The content validity tested verified how appropriate and comprehensive the content was, whether it was logical at the intended study variables, and how adequate the samples of items in research instruments represented the content being measured (Orodho et al., 2016). Construct and criterion validity were also considered in the research instruments construction. The research instruments were designed in such a way to include only relevant questions that were specific to the study objectives and measured known indicators of teacher turnover factors in relation to influence they had on students' learning achievement in Biology.

For validation purposes, the researcher initially submitted the set of survey questionnaires for peer review after which he sought the approval from the university supervisors who were experts in the study area. The researcher made appropriate

amendments (particularly on the relevance of research instruments and study objectives) in relation to the corrections and recommendations given by the supervisors. Expert opinions, literature searches through review of related literature on the study variables such as teacher attributes, school working conditions and job satisfaction of turnover, followed by pre-testing of the questionnaire in pilot study helped to establish the study's content validity (Creswell & Creswell, 2018).

3.8.2 Reliability of the Research Instruments

Reliability is a measure of the extent to which a research instrument returns consistent results after numerous trials (Mugenda & Mugenda, 2019). It refers to the level of internal consistency or stability of the measuring instruments over time (Mugenda & Mugenda, 2019). According to Orodho et al. (2016), reliability is the degree to which a particular measuring instrument gives equivalent results if repeated severally. In the same vein, Jwan and Ong'ondo (2011) affirmed that reliability is the extent to which a study provides comprehensive details and clarity on entire process of research in order to make it feasible for another scholar to visualize and appreciate and if necessary to replicate the study. According to Jwan and Ong'ondo (2011), reliability purposely minimizes the errors and biases in a study.

The reliability of the research instruments; Biology Teachers' Questionnaire and Document Analysis Guide was determined after the two had been pilot tested to determine their Cronbach alpha coefficient values using the data collected from the trial study. Piloting, according to Creswell (2014) is a small-scale prelude study conducted to evaluate practicability, time and cost in attempt to forecast suitable sample size and make improvement on study design prior to actual performance.

During this feasibility study, the researcher was in accordance with Orodho et al. (2016), keen on the number of various test items and item interrelatedness.

Piloting was done on a small representative sample among three sub-county public secondary schools (1 boys' school, 1 girls' school and 1 mixed school) from the neighboring Tana River County. Although the sampled schools did not take part in real study, the trial study students had almost the same learning environment, learning culture, learning achievement and similar trends in teacher turnover rates. The researcher contacted six teachers of Biology drawn from the three pilot schools which was 11% of the sampled population of 51 teachers meant for the actual study. This is according to suggestions of Connelly (2018) that a pilot sample should be at least 10% of the sample projected for the larger parent study. Since numbers were used to represent the response choices, analysis of internal consistency of questions was accomplished using Cronbach's alpha coefficient (Gay, 2013) with the help of SPSS Version 21.

Thus; $\propto = \frac{n}{n-1}[1 - \frac{\sum S^2}{\delta^2}]$

Where;

α = reliability coefficient

n = number of items in the tool

δ^2 = variance in the obtained test scores

$\sum S^2$ = sum of the variance of the single items

According to Tayakol and Dennick (2011), Cronbach's alpha is the universally used measure for testing reliability in inter item phenomenon. It is a measure of internal consistency, that is, how closely related a set of items are as a group. Pre-study results on research instruments are shown in the Table **3**.4 below.

Table 3.4: Results of Construct Reliability Coefficients of Study

Variables	No of Items Tested	Cronbach's alpha
Teacher Attributes	06	0.861
School Working Conditions	12	0.793
Job Satisfaction	06	0.813
Learning Achievement	07	0.821

Table 3.5: Results of Internal Reliability of the Study

Reliability Statistics		
Cronbach's Alpha (Reliability Coefficients)	Reliability Coefficient on Standardized Items	Total Number of Tested Items
.816	.823	31

Results of construct reliability coefficients on study variables and internal reliability of the study obtained indicated that the instruments were reliable. Maizura et al. (2013) and Kipkebut (2010) affirm that a statistical alpha of 0.5 and above is reliable for testing reliability of research instrument. According to Tayakol and Dennick (2011), it is ideal when it is 0.9 or above. However other researchers (Yucel, 2012; Buttigieg & West, 2013) have recommended 0.70-0.95 Cronbach's Alpha coefficient values for questionnaire. Had the reliability coefficient fell below 0.5, the questionnaire items would have been checked again and improved upon.

Pilot study according to Porta (2011) was vital for testing reliability and establishing the content validity scores of data collection instruments, establishing effectiveness of sampling frame and workability of research protocol. The researcher tried out both questionnaire and document analysis guide before using them to gauge their appropriateness and adequacy. The feasibility study revealed research instruments' weaknesses such as ambiguous statements, identifying the problems with the way questions were formulated and noting insufficient writing spaces. It also verified

according to Creswell (2014), whether the responses given fulfilled the research objectives.

After the pilot study, the researcher improved on question formats in questionnaire in accordance with Kimberlin and Winterstein (2013), Creswell (2014) and Connelly (2018) to ensure accuracy and avoid ambiguity that might arise in the actual data collection process. In summary, the trial study established the clarity, meaning and how comprehensive each item in the data collection tools was, as well as validating the research instruments (Kerlinger, 2014).

3.8.3 Trustworthiness of the Qualitative Research Instruments

The application of trustworthiness in qualitative studies according to Lincoln and Guba (2000) operates in conflation between technique and interpretation as opposed to quantitative paradigm that stresses the prominence of method over interpretation. The researcher evaluated the study's credibility, dependability and conformability in order to ensure its trustworthiness. Jwan and Ong'ondo (2011) posit that credibility is the extent to which the study keenly investigates what it claims to investigate and reports the true phenomena as they actually occurred on the ground. According to the recommendations of Creswell and Creswell (2018), the researcher ensured credibility of qualitative data from document analysis guide and open-ended questions in the Biology teachers' questionnaire through triangulation of data sources to establish trustfulness. According to Jwan and Ong'ondo (2011), triangulation, which means the use of multiple approaches, methods, techniques and data sources aims at strengthening the trustworthiness of a study by facilitating the researcher to gain a deeper understanding of the phenomenon under study.

The researcher also checked the dependability of the qualitative data. According to Jwan and Ong'ondo (2011), dependability is the stability and traceability of the changes in data over time and conditions. It is the degree to which a study offers adequate details and clarity in entirety making it possible for another researcher to duplicate it later in another study (Creswell and Creswell, 2018). In this technique, the supervisors review the activities of the researcher to see how well the techniques for meeting the credibility and transferability (generalization or fitness of findings to other settings) standards are being followed. Creswell and Miller (2000) had stated that dependability audit involves developing a detailed audit trail by maintaining a log of all research activities, documenting all data collection and analysis procedures throughout the study. Yin (2011), affirm that reliability in qualitative study is being sure that should another investigator follow the same procedures as described by an earlier researcher or conducted the same study all over again, the same findings and conclusions should be attained.

Finally, the researcher employed the technique of conformability, which according to Lincoln and Guba (2000) ensures that the study conclusions are influenced by participants and circumstances of the inquiry rather than the researcher's prejudices and viewpoints. The current study upheld rigor, systematic methodological approach and data triangulation strategy to address confirmability. The ultimate goal was to minimize the study errors and biases.

3.9 Data Collection Procedures

Data collection for the study took place between February and March, 2023. Kombo and Tromp (2009) define data collection as the process of gathering information to serve the study. After approval of the research proposal by the Moi University School

of Education and the School of Post-graduate studies, clearance to conduct the study was sought from the Ministry of Education through the National Council of Science, Technology and Innovation (NACOSTI).

The research permit obtained was used to obtain permission from the Garissa County Director of Education to carry out the study in Garissa County. The respective Sub-County Directors of Education were informed about the intent of the researcher to collect data from the schools in their areas of jurisdiction. The school managements were informed in advance through writing about the Biology Teachers' Questionnaire to be administered to the teachers as well as the Document Analysis Guide meant to collect data on teachers and from the form three Biology students. This was done in advance to prepare the learning institutions on the research requirements. The informed consent of the Biology teachers from the sampled public secondary schools in the study site was obtained using the relevant documentation, a research permit (Appendix G).

The researcher distributed the questionnaires personally to the sampled teachers of Biology and collected them a few days later to ensure high response rate and avoid their loss. The researcher also using document analysis guide visited both principals' and directors of studies' offices to analyze necessary documents such as past CAT and KCSE exam results records, teacher transfer requests, desertions, resignations, interdictions, clock-in and clock-out registers and teachers' lesson attendance registers among others. The data collected using Document Analysis Guide supplemented the data obtained from the teachers using the Biology Teachers' Questionnaire. This was done in accordance with Creswell and Creswell (2018) which stipulates that

triangulation for convergent mixed-methods research design centers on establishment of a strong link between the two types and stages of data collection.

3.10 Data Presentation and Analysis Procedures

Apfeldorf (2018) asserts that data analysis in a study involves an extensive examination of large sets of different data to uncover the trends and patterns. According to Gay et al., (2006) data analysis attempts to summarize data collected for a study in a dependable and accurate manner. Collected data was accurately scored and systematically organized to facilitate data analysis (Gay et al., 2006). After scoring the data, the researcher tabulated and coded it making it ready to be programmed into the computer by the use of Statistical Package for the Social Sciences (SPSS) Version 27.

Quantitative data from the Biology Teachers' Questionnaire was analyzed by descriptive and inferential statistics using Pearson Product Moment Correlation and Multiple Linear Regressions. Lau (2018) argue that inferential statistics involve using a randomized data sample from a population to make inferences about it. According to Kumari and Yadav (2018), multiple linear regressions is a non-parametric statistical method used to model the relationship between two or more predictor variables and a response variable. On the other hand, Creswell (2009) and Sunder's et al., (2016) posit that Pearson Product Moment Correlation Coefficient, a parametric test measures linear relationship between two variables. In this study, it determined the strength and direction of relationship between the independent variables (the factors of teacher turnover) and the dependent variable (the learning achievement in Biology).

Burney and White (2010) define inferential statistics as a measure between different variables and whose correlation takes any value between +1.0 and –1.0. The interpretation of correlation results (0-1), followed Cohen et al. (2017) guideline in that r = 0.1 to 0.29 (small correlation), r = 0.30 to 0.49 (medium correlation) and r = 0.50 to 1.0 (large correlation). The independent variables of the current study revealed the correlation values as follows; teacher's attributes of turnover; r=0.76, p<0.05, teacher's school working conditions of turnover; r=0.73, p<0.05 and teacher's job satisfaction of turnover; r=0.67, p<0.05, all cases indicating large correlations.

The inferential statistical test was subjected to a test of significance, which is alpha level of 0.05. The researcher rejected the null hypothesis since the p-values were less than the alpha value and would have failed to reject had the p-values been greater than the alpha value. This is in accordance with Mugenda and Mugenda (2019) who asserted that correlation in research is a method used to analyze the degree of relationships between two variables.

During the data analysis process, results of Likert scales was done descriptively by adding responses of *Strongly Disagree* to *Disagree* percentages and those of *Strongly Agree* to A*gree* percentages. These values were then analyzed as recommended by Gwavuya (2011) to determine the influence of teacher turnover factors on students' learning achievement in Biology in the study area. The researcher equally measured the central tendency of the quantitative data to establish the mean, measures of dispersion and distribution. The results obtained were interpreted based on the mean limits of five-point Likert scale as proposed by Robinson and Beesley (2013), Erasian (2016) and Aziz et al. (2020) as shown in Table 3.6 below.

Table 3.6: Interpretation of Means

Mean score	Interpretation
1.00-1.79	Very Low (Strongly Disagree)
1.80-259	Low (Disagree)
2.60-3.39	Moderate (Neutral/Undecided)
3.40-4.19	High (Agree)
4.20-500	Very High (Strongly Agree)

Data from document analysis guide and open-ended questions from Biology Teachers' Questionnaire were analyzed qualitatively. According to Jwan and Ong'ondo, (2011), qualitative data analysis involves scrutinizing the data, assigning categories and then placing together emerging issues into themes in effort to respond to the research questions. It is a systematic process of data transcribing, collating, editing, coding followed by reporting it in a manner that makes sense to the researcher and reader for purposes of interpretation and discussion.

In this view therefore, qualitative data were analyzed thematically, initially by reading and listing the categories of teachers' opinions on correlation between the specific teacher turnover factor and student learning achievement from the transcribed data and field notes. The related categories were then combined into emerging themes from the respondents. The researcher analyzed the qualitative data deductively where themes originated from pre-determined objectives conceptualized during the process of reviewing related literature. The qualitative data, being subjective in nature, rich, and comprehensive text-based information, its analysis is often a tedious and time-consuming process. It thus involved the pursuant of the correlations between data categories and themes in order to seek and establish comprehensive understanding of the phenomenon under study. Qualitative study's data analysis usually follows a six-

point step process involving data transcription, data re-familiarization, 1st phase coding, 2nd phase coding, 3rd phase coding, and production of a research report (Judger, 2016). The study's data analysis techniques against the study objectives are summarized in the Table 3.7 below.

Table 3.7: Data Analysis Matrix

Research Objective	Variables	Tools for Data Generation	Items used to Measure Variable	Analysis Technique/ Statistical Test
To examine the attributes of teacher's turnover on learning achievement in Biology	Teachers' attributes	Questionnaire Document Analysis Guide	Items 1-6	-Descriptive -Pearson r -Thematic Analysis
To analyze the school working conditions of teacher's turnover on learning achievement in Biology	School working conditions	Questionnaire Document Analysis Guide	Items 7-18	-Descriptive -Pearson r -Thematic Analysis
To evaluate the job satisfaction of teacher's turnover on the learning achievement in Biology	Job satisfaction	Questionnaire Document Analysis Guide	Items 19-24	-Descriptive -Pearson r -Thematic Analysis
To establish the relationship between Independent Variables and the Dependent Variable	Learning achievement in Biology	Questionnaire Document Analysis Guide	Items 25-31	-Descriptive -Pearson r -Multiple Regression

3.11 Ethical Considerations

An issue of ethics in research entails confidentiality, anonymity, volunteerism and appropriateness of researcher's behavior as relates to the rights of respondents (Orodho et al., 2016). Huma (2017) defines ethics as doing what is morally and legally right, and constitutes principles governing a researcher's behavior throughout the entire research process. Similarly, Praveen and Showkat (2017) opine that research ethics entails the norms required in distinguishing between right and wrong during the research process.

In line with the current study, the researcher sought permission from the National Council of Science, Technology and Innovations (NACOSTI) to conduct research in the selected sample schools in Garissa County, a study site selected without the researcher's vested interest. According to the recommendations of Creswell and Creswell (2018), selection of study site with researcher's vested interest is a breach of research ethics.

During the research process, anonymity of study participants and confidentiality of the information obtained were given high priority by not sharing the collected data with anyone else. The questionnaires were designed such that the respondents did not have to indicate their names and the participants who voluntarily turned up remained safe and were not exposed to undue risks (Bryman 2004; Gay et al., 2006). Moreover, the schools from which the data were generated remain undisclosed and the collected data were used for academic purposes only.

Prior to data collection process, the participants were thoroughly informed about the study purpose before the research instruments were distributed for them to make informed consent (Creswell, 2014). This was done to refrain the researcher from

pressurizing the participants thus ensuring that participation in the study was purely voluntary. The researcher purposely strove for honesty in all communications, avoided plagiarism and honestly collected data, analyzed it and reported the true data results and conclusions. Further, the researcher avoided fabricating (making up data), falsifying (manipulating research materials), or misrepresenting data to deceive the public.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION OF FINDINGS

4.1 Introduction

The purpose of this convergent mixed methods research design in data collection and analysis was to investigate the factors of teacher turnover on learning achievement in Biology in public secondary schools in Garissa County. This chapter mainly focuses on the information from teachers of Biology from the selected public secondary schools in Garissa County. The chapter further presents the data analyses, interpretations and discussions of findings based on the research objectives.

The factors isolated from the research instruments for analysis, presentation and interpretation of results were done under the following sub-headings; influence of; influence of teacher's attributes, teacher's school working conditions and teacher's job satisfaction in the context of turnover on students' learning achievement in Biology. The data presentation, analysis, interpretation and discussion were systematically done with respect to the independent and dependent variables. It consisted of correlations between the influence of teacher turnover factors and students' learning achievement in Biology.

The analysis and discussion were guided by the following research questions: To what extent do the attributes of teachers' turnover influence learning achievement in Biology in public secondary schools? How do the school working conditions of teachers' turnover influence learning achievement in Biology in public secondary schools? To what extent does the job satisfaction of teachers' turnover influence learning achievement in Biology in public secondary schools? Finally, test of the study hypotheses using Pearson Product Moment Correlation and Multiple Linear

Regressions was done based on hypothesized relationship between the independent variables, (IVs) and the learning achievement in Biology, (DV).

4.2 Data Presentation and Interpretation

The analyzed data was presented using tables and figures. The presentation and interpretation of the analyzed data was done in the order of the response rate and the participants' demographic information after which descriptive statistics of the findings are presented with regard to the study variables. Finally, the inferential statistical data is presented in respect to a multiple regression analysis that was performed on how teachers' attributes, school working conditions and job satisfaction of turnover influenced the learning achievements of students in Biology.

4.3 Response Return Rate

Response rate is the percentage of participants who responded to a survey. According to Orodho (2014), it is the extent to which data sets including all sampled individuals are calculated as the number of respondents from whom questionnaires are completely filled and divided by the total number of respondents. The current study used two data collection instruments; Biology teachers' questionnaire (BTQ) and the document analysis guide (DAG).

For this purpose, 51 questionnaires were administered to 51 teachers of Biology from the sampled sub county secondary schools to respond to the study items. The exercise aimed at measuring various variables underlying the specific objectives of the study. Of the administered questionnaires, 49 out of 51 Biology teachers returned those that were dully filled. This figure corresponds to 96.08% of the study participants. Similarly, using the document analysis guide, the researcher contacted all the 336 form three students from the sampled schools, which corresponds to 100% of the

study participants. This response rate according to Creswell (2012) was deemed significant for the study. Mugenda and Mugenda (2019) opine that a response rate of 50% is adequate, 60% is good and 70% and above is very good. Based on this fact, the average 98.04% response rate attained is deemed excellent to make valid and most reliable conclusions for the study.

The small number of study sample comprising the teachers of Biology (51 individuals) is in line with suggestions of various researchers; McMillan and Schumacher (2011), Saunders (2016) and Creswell (2018) who separately supposed that the sample size determination in quantitative research depends on study type. Their studies recommended a minimum of 30 participants for correlational studies and a minimum of 15 respondents for comparing group studies as ideal sample since the ultimate goal of data collection is attainment of objectivity.

4.4 Demographic Information of the Respondents

Demographics are characteristics of human population such as income used especially to identify markets or segments. Available literature from past studies (Mohamed et al., 2012) has shown a significant correlation between employee demographic variables and turnover. The current study sought to identify the characteristics of the teachers of Biology in terms of their gender, age, marital status, level of education, experience and current job designation in relation to turnover and influence stated attributes have on students' academic outcome. The results on demographic characteristics of the teachers of Biology in sub county public secondary schools in Garissa County were presented as shown in Table 4.1.

Table 4.1: Demographical Information of Biology Teachers in Garissa County Showing Teacher Attributes

Characteristics	Category	Frequency	Percentage
Gender	Male	42	85.7
	Female	07	14.3
	Total	**49**	**100.0**
Age	20-30	22	44.9
	30-40	19	38.8
	40-50	05	10.2
	Above 50	02	06.1
	Total	**49**	**100.0**
Marital Status	Single	11	22.4
	Married	29	59.2
	Separated	07	14.3
	Divorced	02	04.1
	Total	**49**	**100.0**
Level of Education	M.Ed.	04	08.2
	PGDE	07	14.3
	B.Ed.	28	57.1
	Diploma in Ed.	10	20.4
	Total	**49**	**100.0**
Teaching Experience With TSC	Less than 5	14	28.6
	5-10	17	34.7
	10-20	12	24.5
	Over 20	06	12.2
	Total	**49**	**100.0**
Teacher Current Designation	Assistant Teachers	13	26.5
	Class Teachers	11	22.5
	Head of Subjects	08	16.3
	Heads of Depart.	15	30.6
	Deputy Principals	02	04.1
	Total	**49**	**100.0**

Source: Field Data, 2023

In regard to the gender of teachers who participated in the study as summarized in the Table 4.1, out of the 49 teachers who responded, 42(85.7%) were male while 7(14.3%) were female. The finding on gender lies far below the national gender rule of at least 30 percent of any gender participation in public service. The low turn up of female participants in the study is due to un-conduciveness of Garissa County as a result of harsh and hostile living conditions experienced in the region. As a result, a majority of female job seekers get discouraged to take up teaching jobs in the County.

A response rate of 42(85.7%) male and 7(14.3%) female is an indication that Garissa County has more male teachers than female teachers. This implies that although both genders were represented in the County, the study almost suffered from gender biasness. This finding contrasts other counties in Kenya such as Nairobi, Mombasa and Nakuru in which earlier study by Wambugu (2017) indicated had majority of the teaching staff being female. It is also important to note that the aforementioned counties have suitable environmental conditions and relatively safe from attacks by Al-Shabaab hence attracting several job seekers of both genders.

Secondly, on Biology teacher's age, the study finding shows that 41(83.7%) of respondents were between the ages of 20-40 years with only 8(16.3%) of teachers being above 40 years. Most of these youthful teachers (ages of 20-40 years) is due to the consistency in employment by Teacher Service Commission to take up teaching slots in public secondary schools within Garissa County. It is also as a result of TSC Policy of teachers staying in their first posted schools for at least five years before one could qualify to seek for transfer. A small fraction of the teachers; 8(16.3%) aged above 40 years is an indication of effects of teacher turnover as majority of teachers in this age bracket got employed but had already left the county either through transfers, desertions or resignation.

Besides age, the study also sought to establish the teachers' marital status in public secondary schools in Garissa County. It was noted that 29(59.2%) were married, 11(22.4%) were single, 7(14.3%) were separated and 2(4.1%) were divorced. None was widowed. The study finding is an indication that majority of the teachers had dependents and therefore had good reasons to keep their teaching job so that they could cater for their family needs.

With respect to the academic qualifications of teachers of Biology, the results indicate that majority of the respondents had undergraduate degrees in education; 28(57.1%), diplomas in education; 10(20.4%), PGDE; 7(14.2%) and a significant, 4(08.2%) having attained a master's degree in education. This is an indication that all the teachers of Biology in public secondary schools in Garissa County were qualified to teach the subject and should therefore pose good results. The revelation of 4(08.2%) of the teachers of Biology having attained master's degree in education is an indicator of the quest for high academic qualification and possible intention of leaving teaching. None of the respondents had a PhD indicating that possibly teachers with such high qualifications had already left teaching for other lucrative careers.

With respect to teaching experience with TSC, the results in the Table 4.1 above indicate that 43(87.8%) of the teachers reported to have been in teaching profession for less than 20 years while only a paltry 6(12.2 %) had been in teaching career for over 20 years. The low percentage of teachers in the profession for over 20 years could possibly imply that majority of their peers had already transferred from the County or left teaching for other job opportunities.

Finally, the research finding from the above table also indicates that 36(73.5%) of the teachers held responsibility positions in the schools they taught; 2(4.1%) as deputy

principals, 15(30.6%) as heads of departments, 8(16.3%) as heads of Biology subject and 11(22.5%) as class teachers. Only a small percentage 13(26.5%) of teachers of Biology from the study site did not hold responsibility positions in their schools.

Table 4.2: Showing Results on Turnover Intention Rates among Teachers

Turnover Intention Rate	Frequency	Percentage
Low (1-10 %)	01	02.0
Moderate (11-30 %)	07	14.3
High (31-50 %)	23	46.9
Very High (51 % and above)	18	36.7
Total	**49**	**100.0**

In regards to whether Biology teachers in public secondary schools in Garissa County planned to either transfer from their current schools or quit teaching entirely, the researcher assessed their turnover intention rates. The findings from the Table 4.2 above show that the majority of teachers admitted to have high: 23(46.9%) and very high: 18(36.7%) intention rates to transfer to other schools or leave teaching career. However, a small fraction of the teachers 1(2.0%) and 7(14.3%) showed low and moderate turnover intention rates respectively.

Table 4.3: Results on Teachers' Transfer Requests within the Last Two Years

Transfer Requests Rate	Frequency	Percentage
Less than 10	09	18.4
10-20	22	44.9
Over 20	18	36.7
Total	**49**	**100.0**

On whether teachers in public secondary schools in Garissa County deliberated to leave their current schools, their transfer requests within the previous two years were analyzed. The results in the Table 4.3 above indicate that 22(44.9%) of teachers reported that between 10-20 teachers in their institutions had persistently sought to be transferred. Similarly, 18(36.7%) of the teacher participants reported that over 20 teachers from their schools had shown intent to transfer to other schools. Only a paltry 9(18.4%) of the teachers reported that less than 10 teachers from their schools had requested for transfer.

Table 4.4: Results on the Frequency the Teacher Sought Permission to be away from School within the last Two Terms

Permission Rate	Frequency	Percentage
1-2	06	12.2
3-4	22	44.9
Over 5	21	42.9
Total	**49**	**100.0**

With respect to finding out how frequent the teachers sought for permission to be away from their schools within the previous two terms, the teacher's permission rate, frequency and percentages were scrutinized. The results from the Table 4.4 above indicate that majority of the teachers; 22(44.9%) had been away from their schools on permission between 3-4 times while 21(42.9%) had been out of schools over 5 times. Only a small percentage of teachers; 6(12.2%) had sought permission to leave schools between 1-2 times.

Table 4.5: Results on the Frequency the Teacher applied for Alternative Jobs other than Teaching

Job Application Rate	Frequency	Percentage
1-2	08	16.3
3-4	22	44.9
Over 5	19	38.8
Total	**49**	**100.0**

Similarly, the researcher was keenly interested in establishing the frequency the teachers from the secondary schools in the study area had applied for alternative jobs within the previous two years. The findings from Table 4.5 above show that majority of the teachers; 22(44.9%) had sent job applications between 3-4 times. The results further indicate that 19(38.8%) of the teachers of Biology admitted to have sent applications for alternative job opportunities over 5 times. Only a small fraction of the teachers 8(16.3%) agreed to have had applied for alternative jobs between 1-2 times.

4.5 Influence of Teachers' Attributes of Turnover on Learning Achievement in Biology

The first objective of the study sought to examine the influence of teachers' attributes of turnover on learning achievement in Biology in Garissa County. Six items were used to study this objective; gender, age, marital status, level of education, teaching experience and job designation. Questionnaire items 1-6 were combined to collect data on the variable; the teacher attributes of turnover. The quantitative data obtained was analyzed by both descriptive and inferential statistics. The study needed to establish whether there was any significant relationship between the specific teachers' attributes of turnover and students' learning achievement in Biology in public secondary schools in the study area.

To address the research objective, the descriptive statistical analysis using a five-point Likert scale was employed where; Strongly Disagree=1, Disagree=2, Undecided=3, Agree=4 and Strongly Agree=5. The Table 4.6 below shows how the teachers of Biology from public secondary schools in Garissa County responded to the questions. The summarized findings are presented as shown in Table 4.6 below. They include frequencies, percentages, means as well as standard deviations displayed alongside Figure 4.1 for additional understanding. The descriptive data tabulated below was supplemented by the qualitative data from document analysis guide for the purpose of data triangulation.

Table 4.6: Influence of Teachers' Attributes of Turnover on Learning Achievement in Biology

Statements	SD (%)	D (%)	U (%)	A (%)	SA (%)	M	SD
1. My gender influences my instructional process in Biology affecting students' learning achievement in the subject	6(12.2)	6(12.2)	10(20.2)	16(32.7)	11(22.4)	3.41	1.396
2. My age influences my instructional process in Biology affecting students' learning achievement in the subject	5(10.2)	10(20.4)	8(16.3)	17(34.7)	9(18.4)	3.31	1.290
3. My marital status influences my instructional process in Biology affecting students' learning achievement in the subject	7(14.3)	10(20.4)	13(26.5)	12(24.5)	7(14.3)	3.04	1.991
4. My academic qualification influences my instructional process in Biology affecting students' learning achievement in the subject	5(10.2)	8(16.3)	8(16.3)	14(28.6)	14(28.6)	3.49	1.324
5. My teaching experience influences my instructional process in Biology affecting students' learning achievement in the subject	6(12.4)	9(18.4)	4(8.2)	17(34.7)	13(26.5)	3.45	1.290
6. My current designation at school influences my instructional process in Biology affecting students' learning achievement in the subject	13(26.5)	14(28.6)	13(26.5)	5(10.2)	4(8.2)	2.44	1.295
Average Mean and SD						3.19	1.292

Source: Research Data, 2023

Legend: **SD**=*Strongly Disagree,* ***D***=*Disagree,* ***U***=*Undecided,* ***A***=*Agree,* ***SA***=*Strongly Agree Mean*=***M,*** *Standard Deviation*=***SD.***

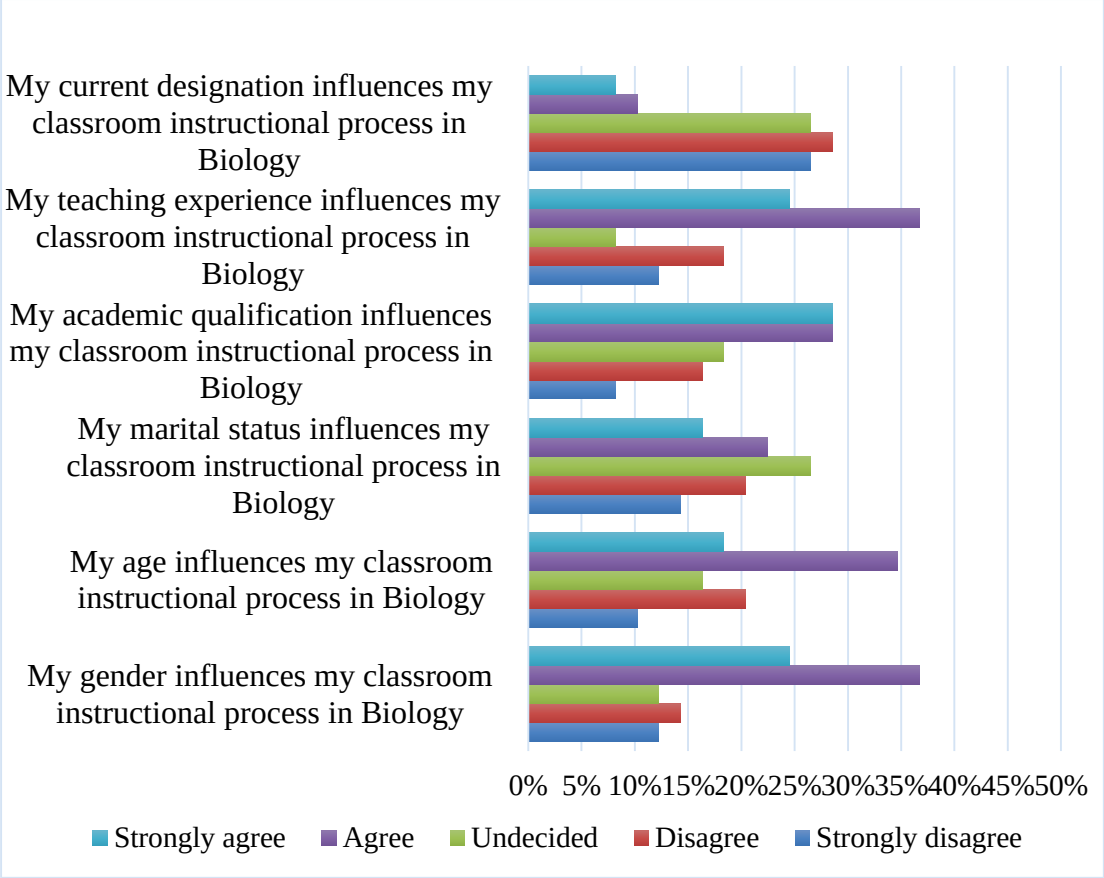

Figure 4.1: Influence of Teachers' Attributes of Turnover on Learning Achievement in Biology

Table 4.6 above presents the study findings on how Biology teachers' attributes of turnover affected the learning achievement in the subject in public secondary schools in Garissa County. The descriptive results indicate that majority of the teachers of Biology represented by 27(55.1 %) agreed that their gender did influence their instructional process in the Biology class. However, 12(24.4%) of teachers disagreed while 10(20.2%) were undecided. This item had a mean rating of 3.41 and a standard deviation of 1.396 implying that Biology teachers' gender highly influenced their classroom instructional process by impacting on their effectiveness in the choice of teaching strategies, methodologies and also content delivery in the subject hence affecting students' learning achievement. Studies; Nelson (2015), Tucker (2015) and Martin and Smith (2018) have shown that knowledge on the influence of teachers'

gender in teaching is vital in assisting education stakeholders worldwide in employing and deploying teachers in schools depending on learners' varied needs. This, according to aforementioned study, knowledge on the influence of teacher's gender is essential for enhanced student learning achievement.

This finding is corroborated by the data collected using the Document Analysis Guide (Appendix C), which revealed a significantly high rate of male teachers' absenteeism, missing of lessons, late duty reporting and early departure from schools as compared to their female counterparts. The records as well showed a sad trend of teachers (both male and female) being absent from their schools during both the initial and final weeks of every term. This implies that there was constant disruption of learning process in their schools at the beginning and also at the end of the terms.

The study findings are in perfect agreement with the reviewed literature on the extent the teachers' gender influenced the students' learning achievement in schools. The results confirm the findings of several other scholars; Mwamwenda (2012), Zuzovsky (2013) and Martin and Smith (2018) who had earlier noted a significant connection between a teacher's gender and the learners' academic performance. For instance, a study by Mwamwenda (2012) had suggested that learners taught by female teachers academically performed significantly better than those taught by male teachers in English language and Biology. According to this study, female teachers are clearly capable of completing the syllabus efficiently and within the allotted time than their male counterparts. The study alludes further that female gender has better self-discipline, is more focused and tends to have a lower turnover rate compared to the male teachers.

The finding also agrees with the study by Tipton (2013), who had established that a teacher's gender do play a key role on job satisfaction, commitment and the teacher's effectiveness in instructional process thus influencing the learning achievement in the subject. The finding is in line with that of Williams (2013) who established that male teachers outperformed their female counterparts in areas of mathematics, sciences, asserting authority, classroom management and using meaningful voice tones during instructional process.

The study finding as well conforms to that of Martin and Smith (2018) who opined that male teachers were rated higher as facilitators of academic performance than their female colleagues. Therefore, based on the reviewed literature and the data from the field, teacher turnover in schools involving both male and female teachers should be minimized as it negatively affects students learning achievement. The current study however, did not have adequate data to succinctly compare the learning achievement in Biology of students taught by male or female teachers in public secondary schools in Garissa County.

Secondly, when asked whether their age influenced their instructional process in Biology class, majority of the teachers represented by 26(53.1%) affirmed that their age indeed had a significant influence on their instructional process in Biology. A significant 15(30.6%) of the teachers however disagreed with 8(16.3%) remaining undecided. The item had a mean rating of 3.31 and a standard deviation of 1.290. The study finding is further authenticated by the qualitative data from staff management records showing high rate of teacher transfer requests, resignations, duty desertions and interdictions. Data from the records also indicated that most of the transfer applicants were male teachers who stated various reasons for their intent to leave. Closer scrutiny of the records revealed a significantly large number of male teachers

serving interdictions and duty desertion cases. Based on this finding therefore, the current study considers teacher's age as a factor affecting turnover in the study site which consequently affects teacher retention and effectiveness in Biology classroom instruction.

The study findings are in congruence with the earlier studies which had established a significant connection between teachers' classroom effectiveness and their chronological age. For instance, studies by Riley and Ryan (2009), Lopina et al. (2012), Lee (2013) and Cushman (2015), had separately submitted that a teacher's age is a key factor of consideration for students' learning achievement in schools. Lee (2013) had candidly demonstrated that middle aged teachers were generally perceived by their students to being more effective in classroom organization, management and communication competence in comparison to young or old aged teachers.

These results also share the same sentiments with Riley & Ryan (2009) who established that younger teachers were rated highest in dedication and job commitment compared to other age brackets. However, the current study findings disagree with the results of the studies by Kong (2015) and Abrami and Apolloia (2014) which found no significant difference between the ratings of young, mid-career and old teachers as concerns students' learning outcome.

The study further sought to evaluate whether teacher's marital status affected the students' learning achievement in Biology. The results from Table 4.6 above show that 19(38.8%) of teachers, representing the majority, agreed that marital status influenced their instructional process in Biology class. However, 17(34.7%) disagreed while 13(26.5%) were undecided. The item had a mean rating of 3.04 and standard deviation of 1.991. This finding therefore, shows that majority of teachers of Biology

in public secondary schools in Garissa County associated their effectiveness in teaching Biology as a factor which was moderately influenced by their marital status. However, a significantly large percentage of teachers; 13(26.5%) expressed indecision. The majority of respondents in this group probably consisted of unmarried, separated or divorced teachers who did not want to commit their responses as a result of their current status. Equally, the Biology Teachers' Questionnaire had not probed further since one's marital status is a sensitive topic. This finding is confirmed by the qualitative data from the schools' staff management records showing high rate of teacher transfer requests by married teachers. The teachers intending to transfer cited desire to be closer to their families, taking care of their ailing parents and reconciliation, for separated spouses.

The current study findings augment the study by Kong (2015), as reviewed in the literature which indicated that teachers' marital statuses did affect their effectiveness in classroom instructional process. The findings are also in consonance with Zhang & Fang (2017) who argued that learners taught by single and married teachers had higher scores compared to those taught by separated and divorced teachers. The findings as well validate the study by Kong (2015) who elucidated that unmarried teachers because of lacking family issues are more dedicated and committed to their jobs hence pose good academic results to their learners.

Contrary to the above assertions, the study findings are in agreement with Ayeop (2013) who affirmed that married teachers have higher job satisfaction hence teach best. According to Zhang and Fang (2017), psychological problems associated with death of a spouse, separation and divorce affect teachers' motivation and dedication to classroom instruction leading to low learning achievement in students taught by affected teachers.

In similar vein, the researcher was interested in establishing whether Biology teachers' academic qualification affected their effectiveness in the teaching of the subject. The study finding on the item showed that 28(57.2%) of the teachers agreed while 13(26.6%) disagreed with 8(16.3%) remaining non-committal. This implies that (as also supported by mean of 3.49 and standard deviation of 1.324) Biology teachers' levels of education highly corresponded to their effectiveness in teaching the subject. Based on this finding therefore, the current study argues that teachers of Biology with high academic qualifications such as Master's degree in education should pose better results in the subjects they teach compared to their colleagues with lower academic qualifications. The finding affirms the study by Adeyemi (2010), who established that a better trained teacher produces students with higher academic performance than the untrained or less trained. This finding implies that the higher the teacher academic qualification, the better the student academic achievement.

This finding is also strongly supported by the qualitative data the study collected on teachers from the staff management records at the respective principals' offices. The records were blotted with information on issues concerning staff warnings, transfer requests, resignations, duty desertions and interdictions. Closer scrutiny of the documents revealed a shockingly large number of teachers had applied for transfers while a significant number were serving interdictions and duty desertion cases. The records also showed that majority of the desertion cases had academic qualifications beyond first degree in education but were merely assistant or class teachers in schools they taught. Frustrations accompanying unrecognized higher academic credentials in individual teachers are bound to initiate turnover intentions. According to Benson (2015) and Butler (2016), when teachers attain higher qualifications, they tend to master content, sharpen their teaching strategies, improve their chances of getting

better jobs and increase their levels of intention to leave. Their departure is in line with the postulations of Human Capital Theory which asserts that the greater the amount of knowledge and skills accumulated in a job over time, the higher one's probability of leaving that occupation.

The study results confirm, as seen in the literature review, an existence of the relationship between teacher's academic qualifications, enhanced learners' academic achievement and increased turnover (Butler, 2016). The results validate the findings of the studies by Unanma et al. (2013) and Koedel (2017) which established that variation in teacher's quality in relation to academic qualification is a major contributor to student learning achievement. The results also share similar sentiments with Butler (2016) which demonstrated that poorly qualified teachers have inadequate subject content mastery and instructional methodologies essential in pedagogical requirements.

Finally, the study finding is also in line with the recommendations of Islam et al., (2013) which stated that a well-trained teacher is in command of subject matter and has ability to identify the learners' strengths and weaknesses thereby making teaching and learning process simpler and enjoyable. This, according to the afore-mentioned studies transcends to enhanced student learning achievement. Additionally, the literature available indicates that learners lose academic guidance when highly-educated teachers transfer or seek employment opportunities elsewhere (Islam et al., 2013).

The Biology teacher's teaching experience is very significant for enhanced student learning outcome in the subject. The study finding further indicates that 30(61.1%) of the Biology teachers agreed that teachers' effectiveness in the subject's instructional

process is highly influenced by teaching experience. This is also indicated by the item's mean of 3.45 and standard deviation of 1.290. The implication of this statement is that teachers who have been in the teaching career for a considerate length of time have better content mastery in the subject, are good at teaching methodologies and their learners pose higher scores in the subject compared to their newly employed colleagues.

The study has shown that the longer the experience of teaching a particular subject, the better the academic achievement of learners taught by such a teacher. This finding verifies those of numerous earlier studies (Maden, 2014; Begüm et al., 2015; and Likoko et al., 2018) that established positive correlations between the two variables. For instance, researchers; Rice (2013), Provasnik and Young (2013) and Goldhaber et al. (2019), in their respective studies found a significant relationship between teachers' experience in teaching and students' learning achievements.

The study result strongly equally supports Strauss and Vogt (2011) who argued that teacher's teaching experience is a strong determinant of students' academic achievement. Similarly, the finding is also in consonance with Nyagah and Gathumbi (2017) who established in their cross-sectional survey study in Kenya that older teachers were more likely to improve their students' learning achievement than their young or middle-aged counterparts. According to the two scholars, teaching experience gained over time has been known globally to improve teacher's knowledge, skills and productivity, essential in learners' enhanced academic performance.

In addition, this finding corroborates that of Odumbe et al. (2015) who postulated that teachers with long teaching experience enhance learners' academic performance

because they are hands-on, hearts-on and keen on learner digression from performance. The finding as well agrees with a study by UNESCO (2017) which specifically opined that the longer teachers' stay in teaching the more they concentrate on classroom instruction which sharpens their preparedness skills resulting in better classroom management and content delivery. However, the finding disconfirms Ng and Feldman's (2013) study which found no relationship between increased teacher tenure and job performance.

Also, on whether the teachers' current designation in their schools had an influence on their instructional process in Biology, 27(55.1%) of the teachers disagreed. However, the minority of the teachers; 9(18.4%) agreed with 13(26.5 %) being unsure. This implies that teachers' designation in schools they taught did not affect their effectiveness in teaching Biology. This finding is supported by the study item's mean of 2.44 and standard deviation of 1.295.

The study finding regarding the influence of teacher's school designation on students' learning achievement in Biology is in consonance with Kimani et al (2013) who argued that teachers' academic qualification, teaching experience and designation did not have any statistically significant correlation with students' learning achievement. However, the study result is inconsistent with the findings of studies by Irbil et al. (2011) and MacIntosh (2013) as indicated in the reviewed literature. The two studies had explicitly demonstrated that teachers with higher job designations were highly committed due to obvious restraints and posed better academic results in learners than those with lower designations. The study finding also disagreed with the literature reviewed in this study by Chatzoglou et al. (2013) that argued that designation being expertise, qualification or teacher's rank at school usually determines job satisfaction

or dissatisfaction thus enhancing teachers' productivity, effectiveness, and performance that results in improved learners' academic outcome.

The average mean and standard deviation for the influence of teachers' attributes of turnover on learning achievement in Biology is 3.19 and 1.292 respectively. This therefore, implies that Biology teachers' attributes significantly influenced the effectiveness with which Biology classroom instruction process was conducted in public secondary schools in Garissa County which affected the learning achievement in the subject.

4.5.1 H_01: There is no statistically significant relationship between the teachers' attributes of turnover and learning achievement in Biology

The second part of the generated data analysis involved the researcher working out the inferential statistics of the variable; teacher attributes of turnover and the learning achievement in Biology by testing the stated hypothesis. The hypothesis was initially tested using Pearson Product Moment Correlation at an alpha level of 0.05 and degrees of freedom of 47 (49-2). The *p* value and *r* value were used to establish the relationship between the study variable. It was purposely done to determine the strength and direction of the relationship between the independent and the dependent variables.

The study intended to determine if there was any significant relationship between the teachers' attributes of turnover and the learning achievement in Biology in public secondary school in Garissa County. The teachers' attributes of turnover had a Mean = 3.19 and S.D = 1.292 while the learning achievement in Biology had Mean = 1.95 and S.D = 0.879, (refer to Table 4.15). The computation output is as shown in the Table 4.7 below.

Table 4.7: Pearson's Correlation Analysis between Teachers' Attributes and Learning achievements in Biology

		Teachers Attributes'	Learning Achievement in Biology
Teachers' Attributes	Pearson Correlation	1	.76**
	Sig. (2-tailed)		.000
	N	49	45
Learning Achievement in Biology	Pearson Correlation	.76**	1
	Sig. (2-tailed)	.000	
	N	49	49

From Table 4.7 above, the observed results (r = 0.76, p = 0.000) show a significant relationship between teachers' attributes of turnover and learning achievement in Biology. A correlation of r = 0.76 indicates a strong positive relationship between the two variables (large correlation). The results imply that the degree of learning achievement in Biology in public secondary schools in Garissa County is influenced by the specific teacher attributes of turnover (teacher's gender, age, marital status, academic qualification, experience and designation). As indicated in the study, the p-value of .000 is less than the alpha level of 0.05, hence providing evidence against the stated null hypothesis which is consequently rejected.

The implication of this statement therefore, is that there exists a significant relationship between the attributes of teachers' turnover and learning achievement in Biology in public secondary schools in Garissa County. The study results further confirm that the teachers' attributes of turnover were predictive factors for students' learning achievement in Biology. This finding is consistent with the presentation of results characterized by the Human Capital Theory of Occupational Choice. The theory reveals the existence of a relationship between the teachers' gender, age,

marital status, level of education, teaching experience and the probability of leaving their current occupations if unsatisfied, for search of new and better job opportunities.

4.6 Influence of School Working Conditions of Teacher's Turnover on Learning Achievement in Biology

Since the instructional process in Biology goes on in a school setting, an analysis of the influence of school working conditions of teachers' turnover on learning achievement was inevitable. To address the second objective of the study, the questionnaire items 7-18 were combined to form one variable; "teachers' school working conditions". Both the descriptive and the inferential statistics were employed to analyze the quantitative data obtained. The descriptive statistical analysis using a five-point Likert scale was employed where; Strongly Disagree=1, Disagree=2, Undecided=3, Agree=4 and Strongly Agree=5.

The researcher's keen interest was in finding out whether there was any relationship between school working conditions of teachers' turnover and students' learning achievement in Biology. To this end, inferential statistics using Pearson Product Moment Correlation Coefficient (r) was employed. Table 4.8 shows how the teachers of Biology from public secondary schools in Garissa County responded to the questions. The Table 4.8, in addition shows the summary of the study findings including frequencies, percentages, means and standard deviations displayed alongside Figure 4.2 for additional understanding.

Table 4.8: Influence of School Working Conditions of Teacher's Turnover on Learning Achievement in Biology

Statements	SD (%)	D (%)	U (%)	A (%)	SA (%)	M	SD
7. i. My school has adequate Playgrounds	20(40.8)	22(44.9)	1(2.0)	4(8.2)	2(4.1)	1.89	1.15
ii. My school has adequate washrooms	21(42.9)	9(38.8)	5(10.2)	4(8.2)	0(0.0)	1.79	0.92
iii. My school has adequate classrooms	15(30.6)	18(36.7)	3(6.1)	9(18.4)	4(8.2)	2.16	1.30
8. i. My school has adequate Biology reference books	17(34.7)	23(46.9)	2(4.1)	6(12.2)	1(2.0)	2.04	1.04
ii. My school has adequate Biology charts & models	18(36.7)	19(38.8)	6(12.2)	5(10.2)	1(2.0)	2.02	1.02
9. i. My school has adequate Laboratory &lab equip.	14(28.6)	17(34.7)	7(14.3)	9(18.4)	2(4.1)	2.36	1.20
ii. My school has adequate and spacious library	18(36.7)	21(42.9)	5(10.2)	3(6.1)	1(2.0)	1.88	.97
10.i. My school has adequate clean water supply	20(40.8)	21(42.9)	2(4.1)	4(8.2)	2(4.1)	1.93	.98
ii. My school has reliable electric connectivity	16(32.7)	18(36.7)	5(10.2)	7(14.3)	3(6.1)	2.31	1.22
11. My school location is safe	14(28.6)	16(32.7)	7(14.3)	6(12.2)	6(12.2)	2.19	1.29
12. My school has friendly and supportive neighbors	13(26.5)	18(36.7)	9(18.4)	8(16.3)	1(2.0)	2.32	1.06
13. Security post in my school is adequate to protect me	7(14.3)	15(30.6)	8(16.3)	9(18.4)	7(14.3)	2.82	1.32
14.i. My principal supports my instructional needs	17(34.7)	14(28.9)	8(16.3)	7(14.3)	3(6.1)	2.06	1.25
ii. My principal is a transformative leader	17(34.7)	19(38.8)	3(6.1)	6(12.2)	4(8.2)	1.32	1.28
15. My school encourages collaborative teaching	15(30.6)	18(36.7)	6(12.2)	8(16.3)	2(4.1)	2.26	1.17
16. My school has a sound mentorship program	13(26.5)	20(40.8)	8(16.3)	7(14.3)	1(2.0)	2.35	1.03
17. My principal allows for my instructional independency	16(32.7)	18(36.7)	7(14.3)	7(14.3)	1(2.0)	2.08	1.08
18. My principal incorporates my ideas in school policies	20(40.8)	14(28.6)	5(10.2)	8(16.3)	2(4.1)	2.22	1.25
Average Mean and SD						**2.11**	**1.14**

Source: Research Data, 2023

Legend: SD=*Strongly Disagree,* ***D=****Disagree,* ***U****=Undecided,* ***A****=Agree,* ***SA****=Strongly Agree*

*Mean=****M,*** *Standard Deviation=****SD.***

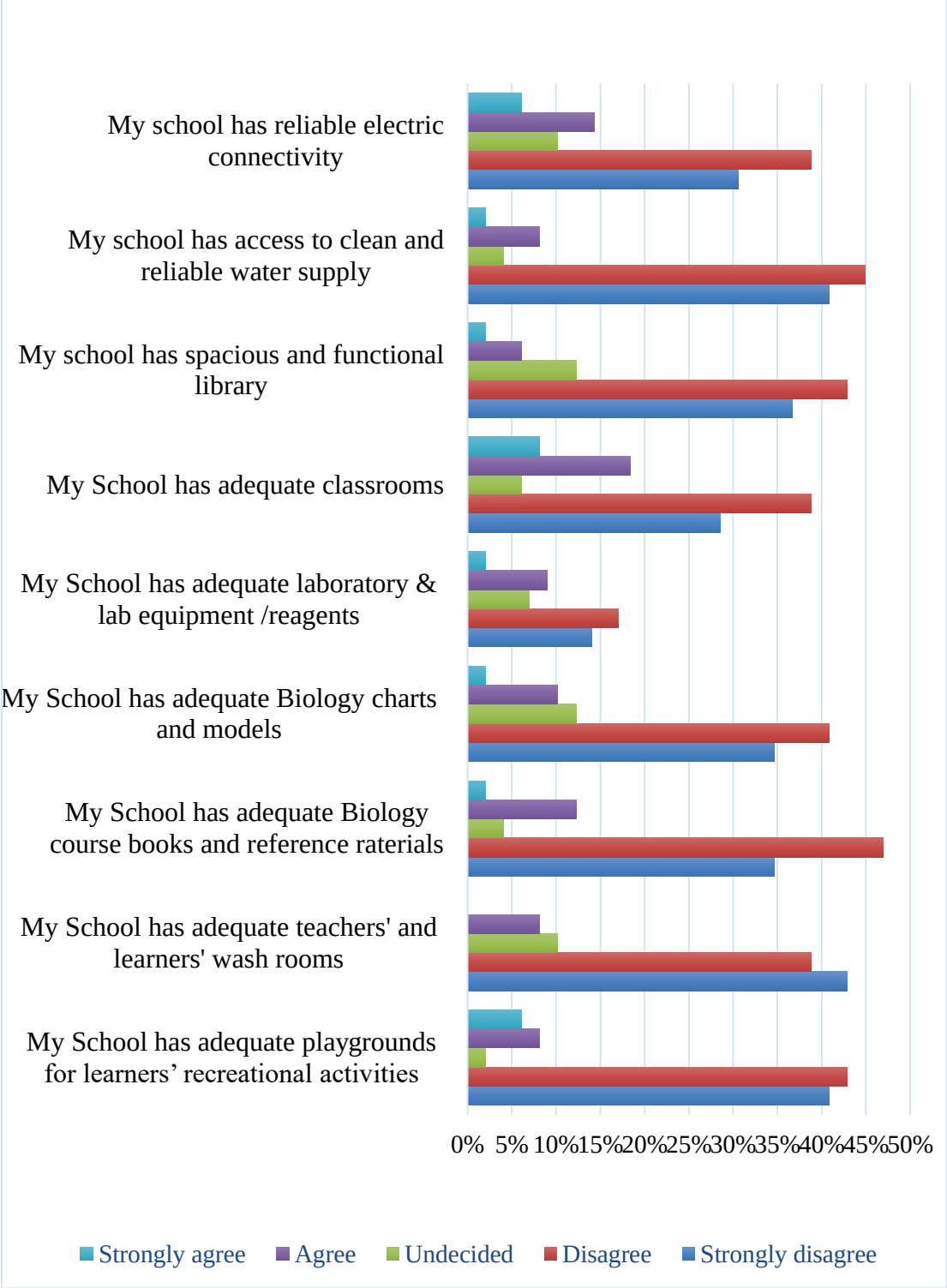

Figure 4.2(a): Influence of School Working Conditions of Teacher's Turnover on Learning Achievement in Biology

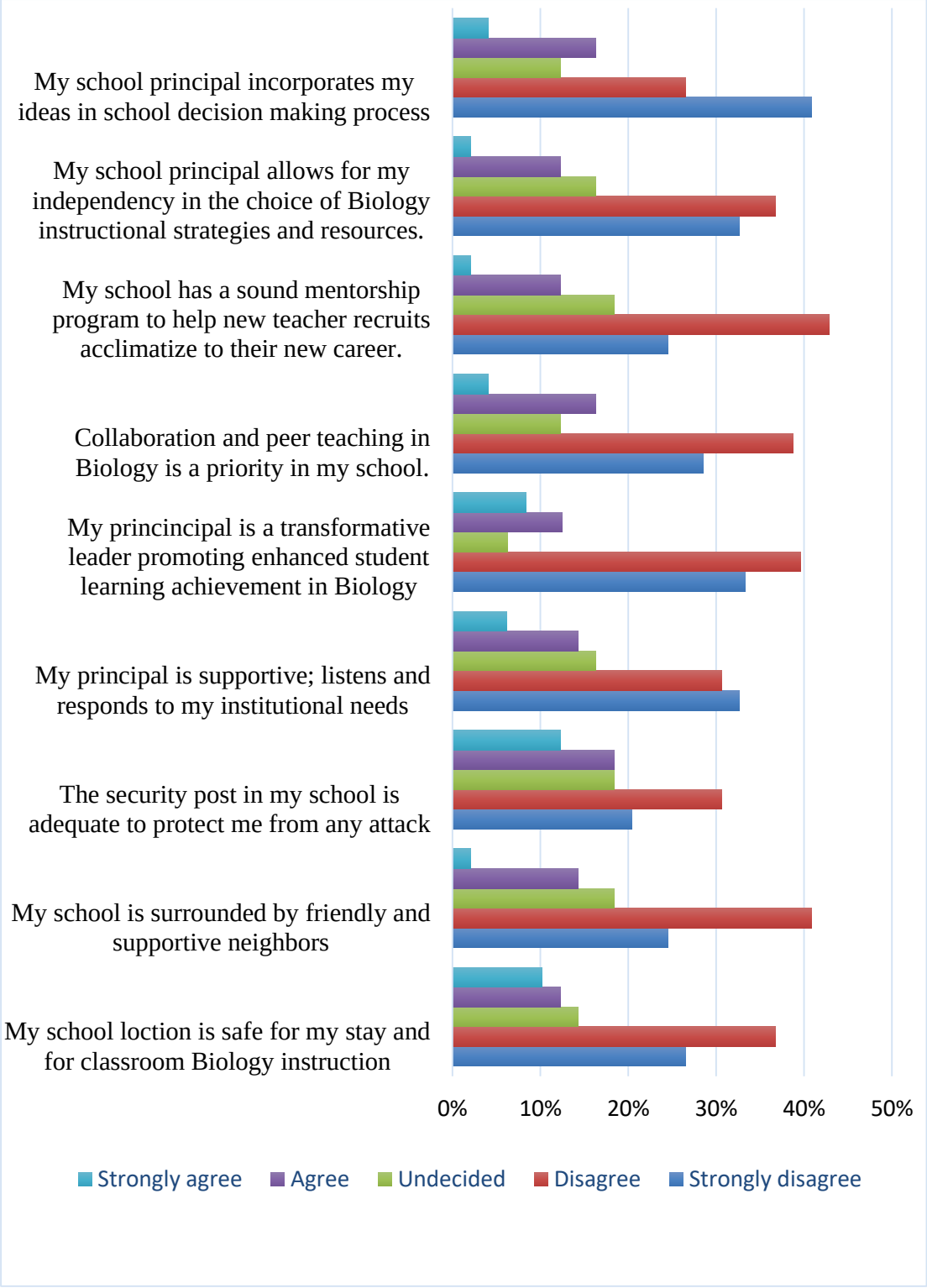

Figure 4.2(b): Influence of School Working Conditions of Teacher's Turnover on Learning Achievement in Biology

The items under the second study objective sought to analyze how the school working conditions of teachers' turnover influenced learning achievement in Biology in public

secondary schools in Garissa County. To ascertain this, the researcher analyzed various aspects of teachers' school working conditions.

The study examined the availability and adequacy of the schools' playgrounds, washrooms and classrooms under the institutional physical infrastructure. From the descriptive statistics shown in Table 4.8, the results indicate that 42(85.7%) of the teachers disagreed that their schools did not have adequate playgrounds for learners' recreational activities which enhance learning environment in Biology. Only 6(12.3%) of teachers agreed while 1(2.0%) were undecided. The mean rating for this item was 1.89 and had a standard deviation of 1.15 implying that majority of teachers of Biology in public secondary schools in Garissa County believed that learning achievement in their subject was low due to most learning institutions lacking adequate recreational facilities. These facilities are basic need for learner development of social attributes and learning skills hence should be availed to encourage proactive activities.

Secondly, on availability and adequacy of both learners' and teachers' washrooms in schools, the descriptive results indicate that majority of the teachers of Biology; 40(81.7%) disagreed on adequacy of the facility while only 4(8.2%) agreed with 5(10.2%) expressing indecision. This item had a mean rating of 1.79 and standard deviation of 0.92 implying that majority of the teachers believed that learning achievement in Biology was low because most of the schools in the study site did not have adequate washrooms which besides being essential in provision of a conducive learning environment, demonstrate the school values, cleanliness, hygiene and well-being of both teachers and learners, a recipe for enhanced instructional process.

Classrooms are important for Biology instruction. On whether schools had adequate classrooms, the results indicate that 33(67.3%) of the teachers of Biology disagreed that although the Kenyan government through CDF and some other non-governmental organizations had constructed classrooms in some schools in the region, they were far from adequate. Only a paltry 13(26.6%) of the teachers agreed while 3(6.1%) were undecided. The item had a mean rating of 2.16 and a standard deviation of 1.30 implying that learning achievement in Biology in public secondary schools in Garissa County was jeopardized as a result of schools lacking adequate classrooms which provide best educational space. Inadequate classrooms therefore resulted to overpopulated and congested classes.

When asked whether their schools had libraries, majority of the teachers represented by 39(79.6%) affirmed that most of the schools in the County lacked libraries (Mean=1.88, SD=0.97). This implies that most of the learners did not have special rooms where adequate reference materials in Biology could be kept and also quiet places that were ideal for individualized studies. Lack of such important resource in schools impinges on the teaching and learning process in Biology leading to low scores since learners lacked access to reference materials where they could refer to or conduct thorough research on their own.

In this task at hand, the researcher was interested in establishing how far school physical conditions influence the students' learning achievement in Biology. Studies have shown that when schools' physical infrastructures are unavailable or inadequate, student learning achievement deteriorates due to low morale and a feeling of inadequacy. The current study's finding on influence of schools' physical infrastructures on learning achievement is supported by available literature from various scholars; Ijaduola (2007), Firestone and Pennell (2012) and IOL News (2017).

These studies indicate that conducive school physical facilities are essential resources in enabling the teacher and students carry out the teaching and learning process effectively. The results also agree with the views of researchers like Gatsinzi and Makewa (2014), Rosenholtz (2019) and Cottini et al. (2011) who found a significant relationship between unpleasant school workplace conditions and ineffective classroom instruction which according to the scholars was considered perfect ingredients to low students' learning achievement.

Moreover, these findings are in congruence with those of Lyons (2012) who posited that learning being a complex activity requires the provision of adequate supply of physical facilities suitable in enhancing the effectiveness of the process in order to bring about the desired academic performance in students. The study finding as well confirms the recommendations made by studies of Corcoran (2014) and Livumbaze and Achoka (2017) which linked the size and adequacy of classrooms with improved student learning achievement. Accordingly, the study findings substantiate the views of Corcoran (2014) and Livumbaze and Achoka (2017) which postulated that overpopulated classes result in straining of teachers as they move about during the instructional process, giving individualized attention to learners needing additional support, effectively managing their classes and getting all learners to participate in lessons.

According to IOL News (2017), a teacher becomes less innovative and creative due to low intrinsic motivation resulting from straining in unpleasant work atmosphere. The current study has established a positive correlation between school physical conditions and student learning achievement in Biology.

The descriptive results also indicate that majority of the teachers 40(81.6%) disagreed that their schools had adequate course and reference books for Biology instructional process. Only 7(14.2%) of respondents agreed while 2(4.1%) remained undecided. This item had a mean rating of 2.04 and a standard deviation of 1.04 indicating that most teachers of Biology associated low learning achievement in Biology as a result of unavailability of instructional books in the subject which affects the teaching and learning process by providing clarification, revision or further exploration. In some schools both course and reference books were completely unavailable, inadequate, outdated or torn.

More so, when asked whether their schools had adequate Biology charts and models, the statistical results show that majority of the teachers; 37(75.6%) disagreed while 6(12.2%) agreed. However, 6(12.2%) were undecided. The item had a mean of 2.02 and a standard deviation of 1.04 implying that majority of teachers of Biology from public secondary schools in the study area associated low learning achievement in Biology with inadequacy of charts and models which are essential tools in the subject's instructional process. Biology charts and models are known to link abstract concepts learned theoretically to a three-dimensional practical aspect hence enhancing the concept of comprehension, especially in Biology.

Moreover, on the availability and adequacy of laboratories, laboratory equipment and reagents in their schools, the results indicate that 31(63.2%) of the teachers disagreed while 11(22.5%) agreed. However, a small percentage of teachers 7(14.3%) were undecided. This item had a mean rating and standard deviation of 2.36 and 1.20 respectively indicating that majority of public secondary school teachers of Biology in Garissa County insinuated that learning achievement in Biology was low because most schools lacked the aforementioned resources which are essential for teaching

practical concepts in the subject. Currently, KICD espouses the teaching of sciences in Kenyan schools by aligning theoretical knowledge to practical activities to improve learning achievements in those subjects.

The above findings are authenticated by the data collected using the Document Analysis Guide, where records revealed that some schools due to unavailability of laboratories, their learners had occasionally to walk long distances to neighboring schools to carry out Biology practical lessons. Unavailability or inadequacies in Biology instructional resources in schools affect the effectiveness of teachers in the subject's instructional process.

The study findings contrast the suggestions of such scholars as Obanya (1989); Abdullahi (2010); Ikerionwu and Isola (2015) and Agina-obu (2015) who viewed instructional materials as didactic material things which are supposed to make learning and teaching possible. They opined that instructional materials are locally made or imported teaching resources that could make tremendous enhancement of lesson impact if intelligently used. According to the scholars, instructional materials are objects or devices which help the teachers to make lessons much clearer to the learner. They are, according to above scholars, concrete or physical objects which provide sound, visual or both to the sense organs during the teaching process thus enhancing student learning achievement.

In similar vein, according to the study by Saad and Sankaran (2020), as reviewed in the literature, instructional resources are very important in learning of Biology by equipping the students with vital knowledge and skills essential in problem-solving and critical analytical thinking. Therefore, teachers while teaching should incorporate

instructional resources that are various, arouse interest in learners, are relevant and adequate to cater for the learners' educational needs.

Additionally, the current study's finding on instructional materials as well contrasts the reviewed literature and the suggestions of Twoli (2016) which argued that instructional resources such as text books enable the learners to follow the teacher's sequence of presentation and aids in understanding of lessons. The study results are further supported by opinions of Ubogu (2014) who showed that resources not only provide concrete experiences, but also help students to integrate prior experiences with new learning hence aid in understanding the concepts taught. The findings are also inconsistent with the suggestions of Lyons (2012), Hansen and Corcoran (2014) and Livumbaze and Achoka (2017) which showed that the adequacy and consistent use of teaching and learning materials impacts on the effectiveness of a teacher's lesson delivery which according to these studies transcends to improved student learning achievement.

The findings as well contradict the study by Wambua et al. (2018) that illustrated that inadequacy of instructional resources lead to abstract instruction exhibited by passive learning which ultimately results to low learning achievement. They as well contradict the opinions of Isola (2013) which postulated that teaching/ learning resources simplify or clarify certain concepts or principles which would otherwise appear abstract. According to Rosenholtz (2019), even highly qualified and experienced teachers would be unable to put their ideas into practice if their school setting did not have the adequate infrastructure, the appropriate equipment and right materials necessary for the translation of teacher competences into reality.

The study findings also indicate that 41(83.7%) of the teachers of Biology disagreed on whether their schools had access to clean and reliable water supply (Mean=1.93, SD=0.98). Lack of a basic need such as water makes teachers of Biology in public secondary schools in the study site unsettled and uncomfortable in their stay and will spend a lot of their time in search of this essential commodity at the expense of engaging themselves fully in teaching process. Similarly, the collected data confirms that 34(69.4%) of the teachers disagreed when asked if their schools had electricity. Only 10(20.4%) agreed with 5(10.2%) remaining non-committal. The item had a mean and standard deviation of (M=2.31, SD=1.22) implying that most schools lacked electricity connection hence it was cumbersome to produce voluminous study materials in Biology for instruction or revision. In some instances, teachers still wrote Biology exam on chalkboard or have to bear with poor road system to travel to a nearby market center or school in order to print Biology teaching and revision materials.

The finding on unavailability of clean and reliable water supply in schools in study site contravenes the recommendations of a study by UNICEF and WHO Joint Monitoring Programme (2018) which demonstrated that the school going children exposed to clean surrounding and basic facilities such as safe drinking water, clean school toilets, hand washing facilities and basic information on hygiene learn better. The findings are also inconsistent with the suggestions of UNICEF and WHO (2018) that advocated for schools' access to safe drinking water as an essential ingredient to learners' health. Moreover, the study results contradict the reviewed literature; Obura (2018) who indicated that provision of safe drinking water to learners reduce sanitation related diseases and improve their health and retention in schools, essential for their academic performance.

In same vein, lack of electricity in learning institutions as evidenced by the study results is unfortunate due to the multiple services it can provide in the classroom. This finding is contrary to the study by Kuo (2017) which stated that lighting as a result of electricity can enable children in classes to be taught both early in the morning and late at night. Besides electric current can facilitate the integration of ICT into Biology classroom teaching, which according to the study arouses interest in learners, makes learning enjoyable and enhances students' learning achievement in the subject. Finally, the study finding on lack of electricity in the most of the schools in the study site contradicts the recommendations of Berger and Fisher (2013) which correlated the major impact of electrification to reducing illiteracy and improving the quality of education. According to the study, school illumination reduces fatigue enabling students to study at more flexible hours, and potentially longer.

Concerning the safety of their school locations for stay and for Biology classroom instructional process, majority of the teachers of Biology represented by 30(61.3%) disagreed that they were safe to stay and teach while 12(24.4%) agreed with the statement. Only a paltry 7(14.3%) were undecided. This affirmed that teacher insecurity posed by school location is a major element initiating teacher turnover, a hindrance to effective Biology classroom instructional process in Garissa County (Mean= 2.19, SD=1.29). Stated differently, school location is considered a dreaded security issue in the study site. Majority of the teachers believed that their school location does not guarantee them safety to effectively engage in teaching process. Most schools located in far flung remote areas especially those bordering Somalia are regarded with great fear by non-local teachers as a result of hostile neighborhood and frequent attacks.

The study as well used the Document Analysis Guide to corroborate the information collected using the Biology Teachers' Questionnaire. The researcher was interested in analyzing particularly the teachers' transfer requests, resignations, duty desertions and interdictions. The records obtained from the majority of rural bound schools and those neighboring Somalia were blotted with transfer requests of teachers dating as early as 2012 intending to be transferred to urban schools or schools in their home counties. The records further revealed a large number of teachers from the remote areas of the County whose transfer requests were not honored had registered a considerably large number of resignations, duty desertion and some were serving interdictions as compared to their colleagues in urban schools. The documents also indicated that majority of the teachers intending to transfer had quoted insecurity and un-conduciveness of the learning environment as the main reasons they wished to be transferred.

Similarly, the results from the Table 4.8 indicate that 31(63.2%) of teachers of Biology disagreed that their schools were surrounded by friendly and supportive neighbors. On the other hand, 9(18.4%) of teachers agreed with the questionnaire item while 9(18.4%) were undecided. The item scored M= 2.32 and SD= 1.06 respectively. This implies that majority of teachers of Biology in public secondary schools in study site associated dismal learning achievement in Biology with unfriendly and unsupportive neighbors. A few teachers claimed the neighbors attacked them in school compounds whenever they corrected undisciplined learners and also chased them from communal water points. This animosity between schools as systems with their surroundings is bound to result in unconducive learning environment which impinges on effective classroom instructional process leading to low learning

achievement in Biology. Friendly school neighborhood is known to cultivate constructive relationships ideal for student learning outcome.

Moreover, the descriptive results also show that 22(44.9%) of the teachers disagreed that the security posts in some of their schools were adequate in protecting them from any internal or external attacks. However, 18(36.7%) of the teachers agreed while 8(16.3%) were undecided. This implies that majority of the teachers believed that their schools were moderately unsafe (Mean= 2.82, SD=1.32) for them to feel secure and fully concentrate on teaching of Biology.

These study findings are consistent with the work of United Nation Report (2015) which reported that insecurity damage schools and limits educational opportunities in communities by causing teachers and learners to run for their lives. The study results are also supported by views of Onwonga (2018), who stated that insecurity keep teachers and children out of schools as a result of unrest that cause loss of lives, destruction of schools and displacement of people. This observation, according to MacIntosh (2013), leads to teacher shortages and lack of adequate learning facilities and resources that negatively affect both teachers' and students' motivation and productivity leading to low students' learning achievement.

In similar view, the study findings also conform to Obura (2018) whose study emphasized that insecurity is an issue of critical consideration affecting every teacher working in insecurity prone regions and plays a pivotal role in influencing teacher turnover intentions which results to dismal learning achievement in affected learning institution. The study findings further confirm the views of Ong (2016), which suppose that security being a broad term specifically encompasses personal safety and the safety of teachers' possessions and has led to increased teacher turnover with

those feeling unsafe in their working and living environments taking fore front in seeking for transfer or alternative employment opportunities in areas they perceive to have better security measures. The current study findings as well contravenes the opinions of Ong (2016) whose study opine that teachers get at the peak of their productivity when working in serene environments surrounded by friendly and supportive neighborhood for improved educational attainment.

The study results also indicate that a significant number of the teachers; 31(63.6%) disagreed regarding administrative support for availing Biology instructional materials while only 10(20.4%) agreed. This item had a mean rating of 2.06 and standard deviation of 1.25 implying that majority of Biology teachers in Garissa County doubted if their school administrators offered them adequate support essential in Biology classroom instructional process and also on matters concerning learners' discipline. School heads play key roles in enhancing quality instruction in their schools by ensuring that education policies are adhered to and teaching strategies are in place that support effective learning. They serve as facilitators, guides and supporters of quality instructional practices. Therefore, the contrary perception from the teachers of Biology is bound to demoralize and infringe on their efficiency in curriculum implementation. This in long run will affect their provision of quality teaching and eventually lead to low learning achievement in Biology.

In similar vein the results show that the majority of the teachers of Biology represented by 36(73.5%) claimed that their principals did not promote enhanced student learning achievement in Biology through extrinsic motivation (Mean=1.32, SD=1.28). This implies that in most schools, learners were not motivated either through recognitions, cash rewards or any other form of awards meant to encourage

them put more effort in studying Biology. Lack of learner motivation of any kind from the school administration is doomed to culminate in diminished scores.

The study findings regarding the administrative support in Biology classroom instructional needs confirm the earlier work of Shuck et al. (2011) that revealed that teachers' job commitment and productivity varied according to the school leadership styles and administrative support. The results as well contravene the views of Thibodeaux et al. (2015) which stated that the principals' leadership styles play crucial roles in the retention of teachers for Biology instructional consistence which is essential for improved learning outcome. When teachers believe that their school managers are unwilling to listen and respond to their needs, their morale in teaching is diminished, their efforts reduced, and this affects the learners' scores. The finding also contradicts the views of Muasya (2018) which opined that instructional leadership practices from the school heads are strongly and directly associated with student learning achievement.

Moreover, the findings are inconsistent with the suggestions of other studies, as reviewed in the literature; Leithwood et al. (2016) and Day et al. (2016) which purported that the principal's leadership style is the second influencer on student learning achievement besides classroom instructional strategies. The two studies revealed that principal's supervisory role of reviewing teachers' lesson notes, offering support and guidance, and assessing them in class positively and significantly relates to enhanced student learning achievement.

Equally, the study results share the same sentiments as opinions of Leithwood et al. (2016) and Day et al. (2016) that explained that school heads ought to concentrate their efforts and energies in promoting enhanced student learning achievements in

their institutions through transformational leadership that strives to establish institutional culture and vision aimed at enhancing teaching and learning quality. Additionally, the findings do not support the views of Bass & Avolio (2014) which stressed that transformative school heads stimulate and inspire teachers to achieve the highest academic performance through leadership and provision of suitable learning environment ideal for teaching and learning of Biology. The study results however, disconfirm the findings of Chowdhury (2015) that revealed negative insignificant association between school leadership styles and students' learning achievement.

When asked to establish whether teacher collaboration and peer teaching existed in their schools, the results indicate that majority of the teachers of Biology 33(67.3%) disagreed. However, 10(20.4%) agreed while a paltry 6(12.2 %) were not sure. This item was rated at M=2.26 and SD= 1.17 scores. The low mean and standard deviation imply that the majority of public secondary schools in Garissa County did not give priority to teacher collaboration and peer teaching in Biology possibly explaining why the learners did not perform well in the subject due to effects of consistent teacher monotony. Studies (Thibodeaux et al., 2015 and Fransson and Frelin, 2016) have shown that teacher collaboration provides fellow educators' ample opportunities to meet, share insights, create cohesive plans and work together effectively to achieve institutional preset goals. On the other hand, peer teaching allows learners a chance to teach and learn from one another, sharing knowledge, skills and experiences which add value to learning process and strengthen content retention.

Additionally, when asked whether their schools had mentorship programs, 33(67.3%) of teachers disagreed while 8(16.3%) agreed and 8(16.3%) were undecided. The mean rating and standard deviation for this item was M=2.35, SD=1.03 implying that the

majority of teachers of Biology agreed that their schools did not have robust mentorship programs significant in helping new teacher recruits acclimatize to their new careers and assist them navigate smoothly in teaching profession. Mentorship program is also known to reduce the propensity of teacher turnover and enhance instructional process in Biology leading to improved student learning outcome.

The study findings are in agreement with the opinions of Bey (2011); Thibodeaux et al. (2015) and Fransson and Frelin (2016) who found a significance inverse relationship between teacher collaboration, mentorship and turnover. The results are also in consonance with Mathur et al. (2012) whose study established that 40 of the 42 new mentored teachers never exited the teaching profession due to the experience of more support and ability to adjust to various school working conditions. In the same vein the study findings are consistent with Fransson and Frelin (2016) who argued that teachers who experienced mentorship were more prone to stay in the profession compared to those who did not. The longer such teachers stay in teaching, according to this study, the more they concentrate on Biology classroom teaching which sharpens their preparedness skills resulting in better classroom management and content delivery to learners.

Finally, the study findings as well conform to the literature reviewed in this study by Stanulis and Floden (2009) which showed that teacher mentoring provides instructional support and promotes unity between the newly employed teachers and the rest of the staff. The study further opined that mentorship program is ideal in promoting teacher efficacy, alleviating stress associated with being in a new profession and encouraging teacher commitment, performance and productivity.

Moreover, the teachers of Biology were asked to comment whether their principals allowed them independency in the choice of Biology instructional strategies and resources. The results obtained demonstrated that 34(69.7%), representing the majority disagreed (M= 2.08, SD= 1.08). Teacher autonomy is crucial in fostering a dynamic and effective learning environment (Alshumaimeri & Borg, 2019). For this reason, school principals denying professionally trained teachers instructional mandate as indicated above kills their morale and reduces their efficiency in teaching of the subject. This is reflected in low student learning achievement (Kabiri et al., 2018).

The final item under the second objective of the study sought to find out whether the school principals in study site incorporated the ideas of teachers of Biology in school decision making process regarding school policies and student discipline. The statistics from Table 4.8 indicate that majority of the teachers 34(69.7%) disagreed. Only a small fraction of the teachers 10(20.4 %) agreed while 5(10.2%) was non-committal. This is proven by statistical data representation of mean and standard deviation (M= 2.22, SD= 1.25). School heads creating opportunities for teachers to make decisions concerning school policies promotes the practice of doing the right thing and the feeling of responsibility. On the other hand, non-participation of teachers in issues pertaining school regulations and students' welfare as implied in this item denies them a sense of ownership in their school issues. Such teachers are likely to be hands off and develop "teach and go home" attitude, bound to negatively affect instructional process in schools culminating in low learning achievement.

These results confirm the findings of May (2012), Pearson and Mooma (2015) and Crookes (2017) who postulated that education programs which limit teacher autonomy can create feelings of powerlessness, anxiety, and resentment and result in

development of turnover intentions. Equally, the findings conform to the study by Mayer et al. (2013), which asserted that teacher autonomy enhances student learning outcome, particularly through teacher's independency in the choice of instructional strategies, students' evaluation and discipline. The study findings are also inconsistent with the reviewed studies in the literature that were indicative of the relationship between teacher autonomy and student learning outcome. The study finding contrasts the views of Ata et al. (2015), Kabiri et al. (2018) and Alshumaimeri and Borg (2019) who asserted that autonomous teachers use evaluation criteria in gauging themselves and demonstrating high levels of instructional skills essential for improved student academic achievement. These studies further elucidated that teachers practicing autonomy reflect it in their teaching by setting realistic goals, having high levels of self-esteem, are analytical and aware of their strengths and weaknesses, are self-driven, initiative and pursue instructional tasks unsupervised from their seniors.

The average mean for the teachers' school working conditions of turnover on their instructional process in the subject is 2.11 with a standard deviation of 1.14. The implication of this statement is that teachers' school working conditions in the study area affected their efficiency and morale in the Biology teaching process.

4.6.1: $H_0 2$: There is no statistically significant relationship between the school working conditions of teachers' turnover and learning achievement in Biology

Secondly, the inferential statistics of the variable; the school working conditions of teachers' turnover and the learning achievement in Biology were worked out by testing the stated hypothesis. The hypothesis was tested using Pearson Product Moment Correlation at an alpha level of 0.05 and degrees of freedom of 47 (49-2).

The *p* value and *r* value were used to establish the relationship between the study variables. It was purposely done to determine the strength and direction of the relationship between the independent and the dependent variables. The study intended to establish whether there was any significant relationship between the school working conditions of teachers' turnover; Mean = 2.11, S.D = 1.140 and the learning achievement in Biology; Mean = 1.95, S.D = 0.879. The computation output is shown in Table 4.9 below.

Table 4.9: Pearson's Correlation Analysis between Teachers' School Working Conditions and Learning Achievement in Biology

Correlations				
			School Working Conditions	Learning Achievement
School Working Conditions		Pearson Correlation	1	.73**
		Sig. (2-tailed)		.000
		N	49	49
Learning Achievement		Pearson Correlation	.73**	1
		Sig. (2-tailed)	.000	
		N	49	49

From the Table 4.9 above, the observed results were r = 0.73 and p = 0.000. An r-value of 0.73 indicates a moderate positive relationship between the school working conditions and the learning achievement in Biology (Cohen et al., 2017). The results imply that learning achievement in Biology in Garissa County is influenced by the state of the school working conditions. The p-value (0.000) is less than the alpha value of 0.05, evidence is thus provided against the stated null hypothesis, which is consequently rejected in favor of the alternative hypothesis.

The study thus concludes that the school working conditions of teachers' turnover in the study area are significantly related to learning achievement. The interpretation of this statement implies that an improvement in public secondary schools' working

conditions in Garissa County would result in enhanced student learning achievement in Biology and vice versa. These findings are in congruence with the prepositions of Human Capital Theory of Occupational Choice whose tenets strongly guided the study.

4.7 Influence of Job Satisfaction of Teachers' Turnover on Learning Achievement in Biology

Using the third study objective, the researcher sought to evaluate the influence of job satisfaction of teachers' turnover on learning achievement in Biology. Questionnaire items 19-24 were combined to collect data on the independent variable. Both descriptive and inferential statistics were used to analyze the quantitative data obtained. The study needed to find out whether there was any relationship between job satisfaction of teachers' turnover and students' learning achievement in Biology in the study area. Table 4.10 shows summarized findings on how the teachers of Biology from study area responded to the questions, displayed alongside Figure 4.3 for additional comprehension.

Table 4.10: Influence of Job Satisfaction of Teachers' Turnover Intention on Learning Achievement in Biology

Statements	SD (%)	D (%)	U (%)	A (%)	SA (%)	M	SD
19. I' am satisfied with my present salary TSC offers which encourages me to effectively teach Biology	10(20.4)	27(55.1)	7(14.3)	7(14.3)	0(0.0)	2.15	0.87
20. I' am satisfied with incentives my current school offers in form of paid remedial lessons which motivates me to effectively teach Biology	7(14.3)	31(63.3)	4(8.2)	6(12.2)	1(2.0)	2.23	0.94
21. I' am satisfied with TSC's promotion of teachers which encourages me to effectively teach Biology	14(28.6)	27(55.1)	3(6.1)	5(10.2)	0(0.0)	1.98	0.83
22. I' am satisfied with the teaching career offering me an opportunity for personal growth and fulfilment which motivates me to effectively teach Biology	11(22.5)	26(53.1)	7(14.3)	4(8.2)	1(2.0)	2.13	0.91
23. Teaching career offers me an opportunity to fully utilize my potential. This encourages me to effectively teach Biology	21(42.9)	22(44.9)	2(4.1)	3(6.1)	1(2.0)	1.79	0.95
24. My school has a conducive learning environment which enables me to effectively teach Biology.	14(28.9)	14(28.9)	16(32.9)	4(8.2)	1(2.0)	2.26	1.02
Average Mean & SD						**2.10**	**0.92**

Source: Research Data, 2023

Legend: SD=*Strongly Disagree,* ***D=****Disagree,* ***U****=Undecided,* ***A****=Agree,* ***SA****=Strongly Agree*
*Mean=****M,*** *Standard Deviation=****SD.***

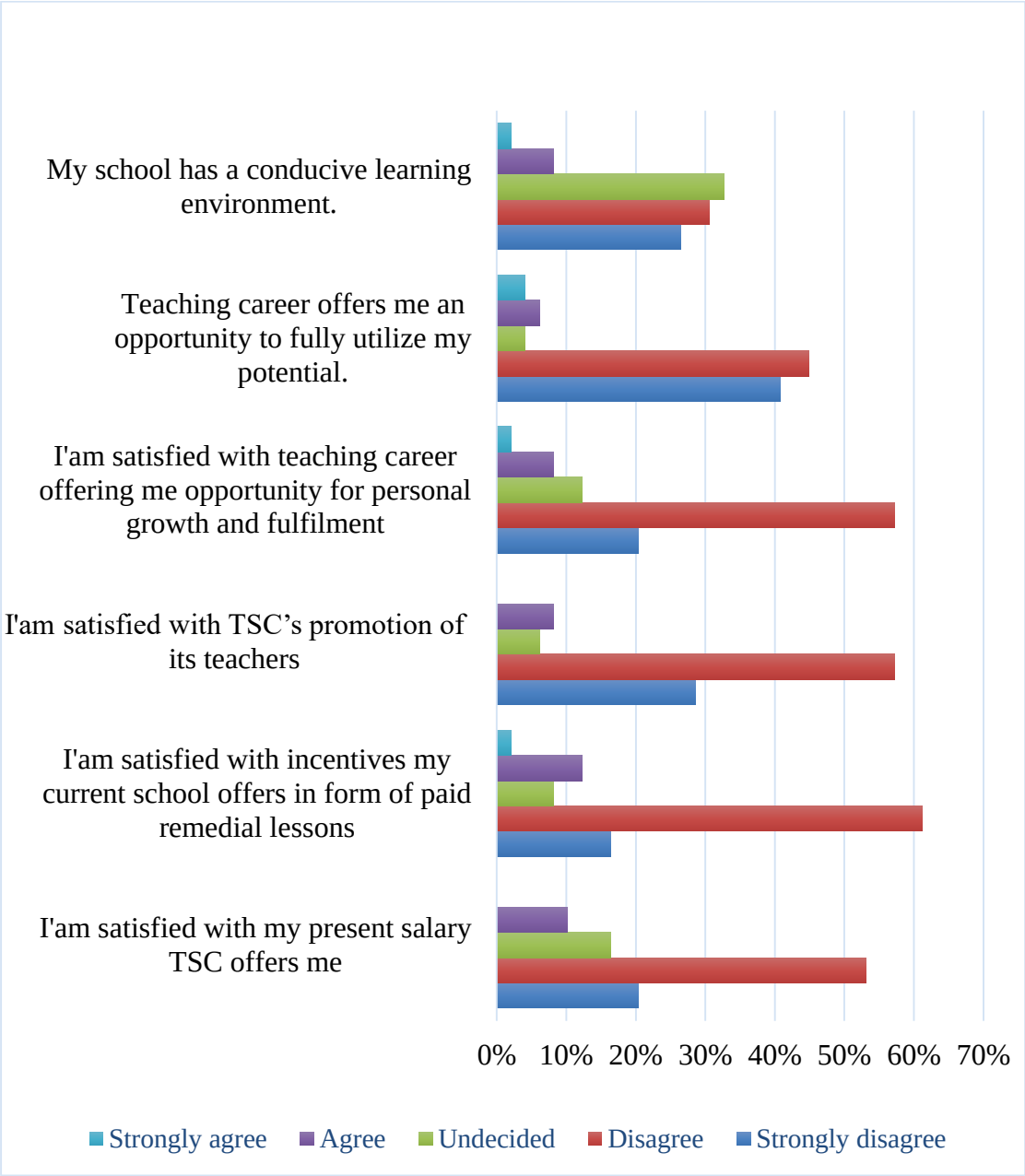

Figure 4.3: Influence of Job Satisfaction of Teachers' Turnover on Learning Achievement in Biology

The items under the third study objective sought to evaluate to which extent job satisfaction of teacher turnover has influenced learning achievement in Biology in public secondary schools in Garissa County.

With reference to Table 4.10, the majority of the teachers of Biology, represented by 37(75.5%) disagreed when asked whether they were satisfied with their present salary

TSC offered them. However, 7(14.3%) agreed with 5(10.2%) remaining undecided. The mean rating for this item was 2.26 and had a standard deviation of 0.87 implying that the teachers of Biology in Garissa County were predominated with those who were dissatisfied with the salary their employer paid them. Research has shown a direct correlation between teachers' pay and learners' academic achievement OECD (2012). Therefore, this feeling of discontentment concerning low salary coming from educators is bound to demotivate them and affect their commitment which results in reduced vigor and effectiveness in teaching of Biology (Mertler, 2016).

In regard to finding out whether they were satisfied with incentives their current schools offered them in form of paid remedial lessons, 38(77.6%) of teachers of Biology disagreed while 7(14.2%) agreed with 4(8.2%) being undecided. The mean and standard deviation for the item was 2.24 and 0.94 respectively implying that majority of the schools the teachers taught never extrinsically motivated them to encourage them effectively teach Biology. Beyond a reasonable salary, studies by Bennell and Akyeampong (2017) and A'yuninnisa & Saptato (2015), have shown that further pay to teachers in form of incentives increases their job satisfaction and retention.

These findings match those got from the document analysis guide. The records from the principals' offices revealed that a large number of teachers had applied for transfers to be moved from their current schools to other schools they perceived better in terms of teacher motivation such as Garissa High School, NEP Girls and County High. Data from the documents as well revealed that majority of the teachers on several occasions had sought for recommendation letters from the heads of their institutions, at times requesting them to be their professional referees whenever they

applied for alternative jobs perceived better than teaching. This implies unsatisfactory remuneration practices lead to increase in turnover among teachers, making salary and incentives a primary concern in teaching profession. This perception conforms to the suggestions of Human Capital Theory of Occupation Choice which elaborates that monetary benefits from the teaching profession can be viewed as returns on investment in education hence affect teachers' job satisfaction, increase work commitment and make them more productive and retained (A'yuninnisa & Saptato, 2015).

These findings show that majority of the teachers of Biology in public secondary school in Garissa County were dissatisfied with teaching profession because of the perceived low salary from TSC and incentives gotten from their schools. The finding is consistent with Miller (2014) who established that majority of teachers rated salary as very important, making it the number one contributor to overall teacher job dissatisfaction. The finding is also in consonance with Mertler (2016) who indicated that a significant number of teachers hinted that if provided with the opportunity again, they would not choose teaching as a career.

This notion of the perceived salary discrepancy of teachers and other government employees is affirmed by Kamau et al. (2020). The study argues on the impact salary has on the power for teaching profession to attract the best and brightest KCSE candidates into the classroom. This finding does not augur well for effective curriculum implementation in Biology because as Komba and Nkumbi (2013) explains, low job satisfaction affects the quality of education provided in any country as it influences teachers' turnover, hence disrupting the learning process in schools.

In the same view, the results are consistent with the findings of Hanushek (2016) who established a link between teacher quality and student academic performance. However, the study further reiterated that employing and retaining high quality teachers with their commensurate salary is a complicated endeavor in many countries. Finally, the study results verify the findings of Saira et al. (2014), Kelly (2014), Hasibuan et al. (2019) and Kirby et al. (2019) who separately noted that teachers' devotion, commitment and willingness to stay longer in schools and in teaching profession largely depended on the salary and incentives they received from their employers and schools they taught. The studies asserted that increases in teacher salary causes a significant decrease in turnover intention leading to significant increase in student academic achievement.

The descriptive results also indicate that 41(83.7%) of the teachers disagreed that they were satisfied with TSC's promotion of teachers while only 5(10.2%) agreed. A less significant figure; 3(6.1%) of the teachers remained undecided. The item had a mean rating of 1.98 and standard deviation of 0.83. This indicates that majority of the public secondary school teachers in Garissa County were dissatisfied with Teachers Service Commission's promotional prospects. Promoting teachers based on their length in service and performance encourages them to stay in profession and continue developing their skills essential for improved students' learning achievement (Kinyili et al., 2015).

This finding is supported by qualitative data collected using the Document Analysis Guide which revealed that a significantly large number of teachers in sampled schools were still in lower job groups despite evidence showing that they had applied and even attended promotional interviews severally. When teachers stagnate in one job

group for a considerable length of time, they get demotivated and this reduces their commitment and productivity making them less effective in teaching (Ekabu, 2018).

Similarly, concerning whether teachers were satisfied with teaching career offering them opportunity for personal growth and fulfilment, the majority of teachers of Biology represented by 37(75.6%) disagreed while 5(10.2%) agreed. However, 7(14.3%) were undecided affirming that Biology teachers' dissatisfaction with their career is a hindrance to effective classroom instructional process in the subject (Mean= 2.13, SD=0.91). Stated differently, the teachers' perception that teaching as a profession does not offer them opportunity for self-actualization demoralizes them to fully engage in effective teaching process, essential for enhanced student learning achievement in the subject.

This finding is in agreement with Ekabu (2018), who stated that teachers' promotions based on performance is an uphill task for the majority of classroom teachers in most sub county day schools lacking adequate infrastructure and learners with high academic achievement. The study further asserted that since the promotions are pegged on the students' achievements in external examinations, teachers in such schools due to dissatisfaction are ever thinking of transferring to schools they perceive are well-endowed with good infrastructure and have bright students to enhance their chances of promotions. The results also share the same sentiments with the opinions of Stah et al. (2013) who demonstrated that teachers will consider leaving their current job when they perceive promotion prospects in other careers are higher compared to teaching. The study findings as well corroborate the views of Nyamubarwa and Zainuddin (2013) who opined that promotion prospects influence teachers' job satisfaction, affecting their commitment, performance and productivity.

Finally, the study result agrees with the views of Kinyili et al. (2015) who opined that a teacher would feel more satisfied to work with an employer who provides him/her with promotional prospects to new challenging positions. The study revealed a positive relationship between teachers' promotional opportunities, their job satisfaction and a corresponding students' academic prowess. According to Steven (2011), whose opinions are also strongly supported by this study, promotional opportunities usually come with increased remuneration, higher status and boosted self-esteem which lead to more authority, responsibility, independence as well as higher job satisfaction among teachers. All these, the study elaborates lead to enhancement of the teachers' interest in teaching, more commitment and productivity; a recipe for improved classroom instructional process that translates to higher students' learning achievement.

Asked to indicate whether teaching as a career offered them opportunity to fully utilize their potential, the statistical results show that 43(87.8%) of the teachers disagreed while a paltry 4(8.2%) agreed with 2(4.1%) remaining undecided. The study item had a mean of 1.79 and a standard deviation of 0.95 implying that majority of teachers of Biology from public secondary schools in Garissa County disregarded teaching since it did not offer them opportunity to fully utilize their potentials. This perception of the subject specialists affects their job commitment and may affect their vigor and teaching strategies in Biology which is then reflected by low learning achievement in the subject.

Finally, when asked whether their schools had favorable learning environment for Biology instruction, the descriptive results indicate that 27(57.8%) of the teachers of Biology disagreed while only a less significant 5(10.2%) agreed. The item's mean score was 2.26 and had a standard deviation of 1.02 implying that most schools the

teachers taught had unconducive learning environment unsuitable for Biology instructional process. Stated differently, the school workplace atmosphere was hostile as witnessed by the researcher during data collection. The afternoon temperatures were scorching hot with dusty wind blowing all over. *"Mathenge"* (thorny) trees grew all over the school compounds mostly littered by animal wastes. Most schools lacked gated fences thus animals and people could come in and leave at any opening (Abdiaziz, 2019).

This finding is in line with the data collected using the Document Analysis Guide which revealed that a significantly large number of teachers both male and female had fled the County in February 2020 as a result of insecurity and dissatisfaction with the school work conditions. The Biology course books for a few sampled learners depicted content disorganization. The books showed that majority of the teachers of Biology did not organize the learning activities following topical content or used updated and summarized notes as per the requirements of both KICD and KNEC syllabi and schemes of work. The sampled books showed that the Biology content taught was scanty, disorganized and scattered. The learners' course books were unchecked and did not have any lesson quizzes as a proof that effective evaluation of the learning outcome in the subject had been taking place.

The findings are contrary to the recommendations of Gagné's Theory of Five Conditions of Learning (Gagné, 1965). The theory points out that effective learning takes place when teachers carefully plan their lessons and ensure learning progress through sequence of events such as stimulating recall of prior learning, presenting the content appropriately, providing learning guidance, eliciting performance, providing feedback, assessing learning and enhancing retention of content.

The findings are consistent with Masri (2009) who noted that job satisfaction is the most important antecedent variable for directly anticipating teacher turnover. According to the study, satisfied teachers are deemed to be an effective labor force and become an important asset for the learning institution's effectiveness in knowledge transmission to learners. The study further extrapolated that teachers displaying highest job satisfaction equally display highest learners' academic performance since they devote themselves to work, perform orders well, care for learners' academic achievement and are highly committed. The results are also consistent with findings of Rigopoulou et al. (2011) who opined that satisfied teachers are more optimistic, are more committed to their work and their students show enhanced academic prowess.

The findings are in line with a study by Emeka et al. (2012) which established that the greater the job satisfaction rate in teachers, the less likely is the turnover. This confirms the previous literature that teachers with high levels of job satisfaction hold positive attitude toward the jobs and will retain their jobs and produce good results. Finally, the study results concur with those of Tracey and Hinkin (2016), as seen in the literature review that the best predictor of job satisfaction and career fulfilment is when teachers' personal values match those of the employer.

The study findings as well agree with the propositions of Gagné's Theory of Five Conditions of Learning regarding the influence the school environment has on learning achievement in Biology. The theory asserts that a child's knowledge is acquired systematically and thinking processes become more complex and efficient as a consequence of the child's interactions with the environment through teaching. The theory discusses the analysis of learning objectives and how the different classes of objective require specific teaching methods. It emphasizes that effective teaching

should be sequential where a teacher provides learning guidance and feedback to learners through stages and events to enhance content retention. The theory as well insists on the significance of a conducive classroom atmosphere with active learning where instructional processes are activity filled and in which the learner's interests, understanding and retention of knowledge is enhanced (Gagné, 1965).

These findings are also supported by Raziq and Maulabakhsh (2015) who described a satisfying learning environment as the school atmosphere that is fulfilling and adds value to the instructional process. Similarly, the findings conform to a study by Boyd et al. (2014) which argued that a suitable classroom environment is one that is more congenial for learners, support instructional process and motivate students in enhancing their perception towards learning. Finally, the study results agree with Tsui et al. (2012), Park and Shaw (2013), Ayuninnisa and Saptoto (2015), and Dziuba et al. (2020) who demonstrated that when teachers perceive their school learning environments as being supportive, they are more likely to feel positive and motivated in providing quality teaching services.

The average mean for the teachers' job satisfaction of turnover on their effectiveness in classroom instruction in Biology is 2.10 with a standard deviation of 0.92. This implies that efficiency with which the teachers of Biology in public secondary schools in Garissa County engage in classroom teaching process in Biology is influenced by the extent of their job satisfaction. A majority of teachers are dissatisfied with low salary, promotional prospects & learning environment hence ineffectively engage in Biology instruction.

4.7.1 $H_0$3: There is no statistically significant relationship between the job satisfaction of teachers' turnover and learning achievement in Biology

The second part of the generated data on the third objective involved working out the inferential statistics of the variable; the job satisfaction of teacher's turnover and the learning achievement in Biology by testing the hypothesis stated above. The researcher initially tested the hypothesis using Pearson Product Moment Correlation at an alpha level of 0.05 and degrees of freedom of 47 (49-2). The *p* value and *r* value were used to establish the relationship between the two study variables. It was purposely done to determine the strength and the direction of relationship between the independent and the dependent variable. Specifically, the study intended to find out if there existed any relationship between the job satisfaction of teachers' turnover (Mean = 2.10, S.D = 0.920) and learning achievement in Biology (Mean = 1.95, S.D = 0.879). The computation output is shown in the Table 4.11.

Table 4.11: Pearson's Correlation Analysis between Teachers' Job Satisfaction and Learning Achievement in Biology

Correlations			
		Teachers' Job Satisfaction	Learning Achievement
Teachers' Job Satisfaction	Pearson Correlation	1	.67**
	Sig. (2-tailed)		.000
	N	49	49
Learning Achievement	Pearson Correlation	.67**	1
	Sig. (2-tailed)	.000	
	N	49	49

From the Table 4.11 above, the observed r-value is 0.67 while the p-value is 0.000. An r-value of 0.67 indicates a moderate positive relationship between the teachers' job satisfaction and the learning achievement in Biology. The implication of the study result is that learning achievement in Biology in study area is influenced by the state of the teachers' job satisfaction. The p-value of 0.000 is less than the alpha level of

0.05, providing evidence against the stated null hypothesis which is consequently rejected in favor of the alternate hypothesis; stated as there is significant relationship between job satisfaction of teachers' turnover and learning achievement in Biology in public secondary schools.

4.8 Students' Learning Achievement in Biology

Finally, the questionnaire items 25-31 were combined to collect data on the dependent variable; the students' learning achievement in Biology. Both descriptive (means, percentages and standard deviations) and inferential statistics (Pearson product moment correlation and multiple linear regressions) were used to analyze the quantitative data obtained. The study was keen in establishing the extent to which the independent variables; the attributes of teachers' turnover, the school working conditions of teachers' turnover and the job satisfaction of teachers' turnover influenced the students' learning achievement in Biology in public secondary schools in Garissa County.

This was addressed through the descriptive statistical analysis using a five-point Likert scale where: Strongly Disagree=1, Disagree=2, Undecided=3, Agree=4 and Strongly Agree=5. The Table 4.12 shows summarized findings on how the teachers of Biology from the study area responded to the questions. The findings, including the items means as well as standard deviations were supplemented by the qualitative data from the document analysis guide for the purpose of data triangulation.

Table 4.12: Statistics for Learning Achievement in Biology; 2016 - 2020

Statements	Mean	Std. Deviation
25. My school's average admission marks in Form 1 is above 250 Marks	2.1556	.90342
26. My school's average KCSE mean score for the years 2016, 2017, 018, 2019, and 2020 is good	1.9556	.85162
28. My school's KCSE Biology performance is good	1.8444	.79646
29. My school's KCSE Biology average mean score for years 2016, 2017, 2018, 2019, and 2020 is good	1.8889	.98216
31. My school's management always looks for better strategies to improve KCSE Biology performance	1.9111	.82082
Average Mean and Standard Deviation	**1.9511**	**0.8777**

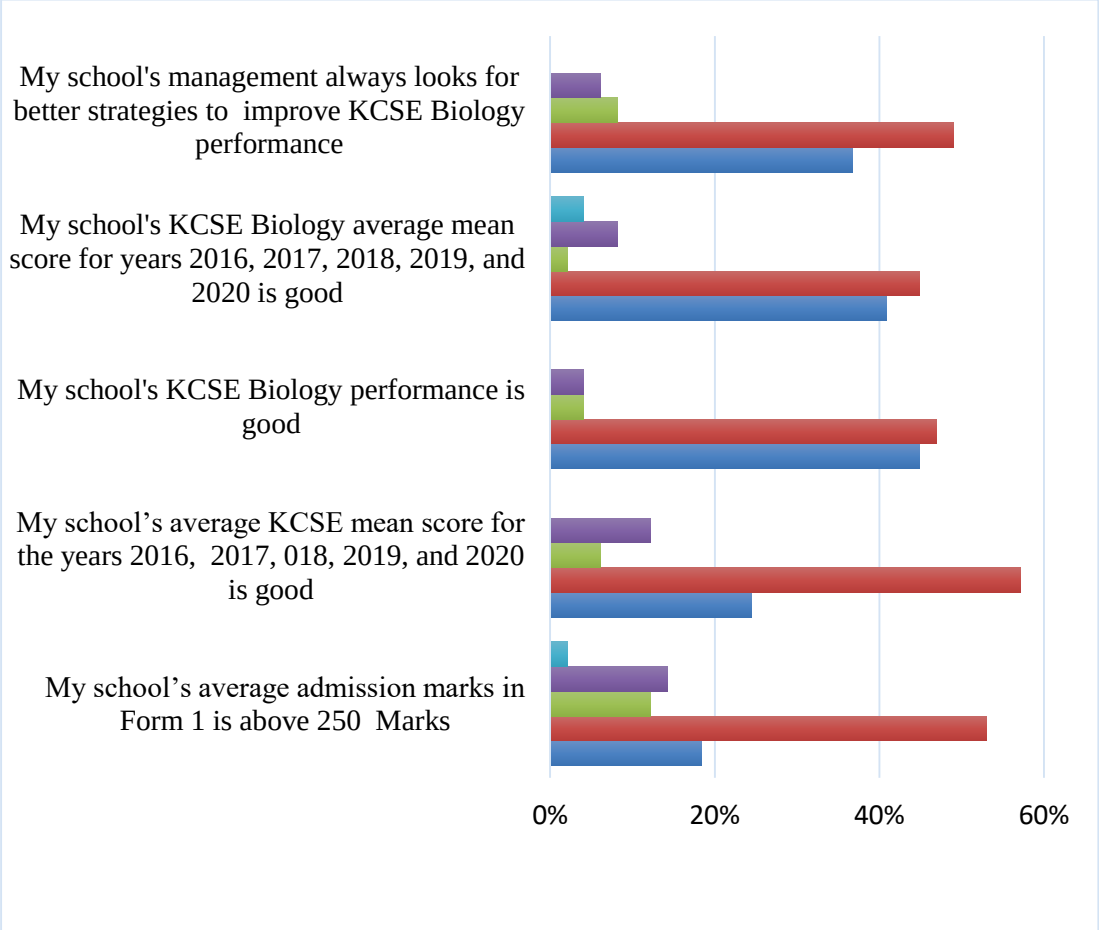

Figure 4.4: Statistics for Learning Achievement in Biology; 2016 - 2020

In regard to item 25 which sought to find out whether the schools' average admission marks in Form 1 were above 250, the majority of the teachers disagreed (M=2.1556, SD= .90342). This implies that most of public secondary schools in Garissa County admitted learners in form one with KCPE marks below 250.

As to whether the schools' average KCSE mean scores for the years 2016, 2017, 2018, 2019, and 2020 was good; the majority of teachers of Biology in public secondary schools in Garissa County disagreed (M=1.956, SD= 0.852). This suggests that most of public secondary schools in Garissa County posed low KCSE mean scores as a result of low learning achievement in various KNEC examined subjects, Biology included.

Concerning item 28 that sought to establish whether KCSE Biology performance was good in schools the Biology teachers taught, the majority of educators were in disagreement (M=1.844, SD=0.796). This statement insinuates that the yearly summative evaluation KNEC carried out on learners in form of KCSE examinations produced low scores in the subject indicating low learning achievement in study area. This is so as a result of the influence of various types of teacher turnover factors on learning achievement in Biology when intervening variables were kept constant.

Further, with reference to item 29, which sought to establish whether the schools' KCSE Biology average mean scores for the years 2016, 2017, 2018, 2019 and 2020 was good, the majority of teachers of Biology from the public secondary schools in Garissa County disagreed (M=1.889, SD=0.982), indicating that for a long period, most learning institutions in the study area had been attaining low KCSE mean scores in Biology. Significantly, Biology concepts are applied in many fields of studies and job opportunities. The subject is crucial and affects all aspects of human life.

Therefore, the inability of learners to adequately understand, master and apply the Biology course materials in all spheres of life, including problem solving and innovations due to low learning achievements narrows their scope in competitive job market and good living.

The majority of teachers, when asked whether their school managements always looked for better strategies to improve KCSE Biology performance, majority disagreed (M=1.911, SD=0.820). This assertion alludes that most of the administrators in public secondary schools in the study site did not strive to come up with the most effective instructional strategies aimed at improving KCSE Biology performance. For effective Biology instruction to take place that results in enhanced learning achievement in the subject, various stakeholder involvement is vital. There is need to provide conducive learning environments and teacher support systems such as early and adequate syllabus coverage, frequent evaluations, timely revision and exposure to numerous Biology practical lessons for improved learning outcome to be achieved (Njagi, 2014).

The summary of learning achievement in Biology from a few sampled form three students in various schools in Garissa County is revealed in the Table 4.13. The results obtained from the various schools' Directors of studies' offices indicate learners' achievement from the five Biology Cats they sat in the year 2023.

Table 4.13: Summary of Form Three Students' Biology CAT Mean Scores

S. No	School Sample Size	CAT 1	Grade	CAT 2	Grade	CAT 3	Grade	CAT 4	Grade	CAT 5	Grade
1	12	2.472	D	2.100	D-	2.510	D	1.902	D-	2.681	D
2	12	3.114	D+	3.023	D	3.222	D	3.511	D+	3.402	D
3	12	2.550	D	2.410	D-	2.612	D	2.104	D-	2.521	D
4	12	3.641	D+	3.400	D	3.841	D+	4.145	D+	3.743	D+
5	12	2.113	D-	2.697	D	2.465	D	2.544	D	2.564	D
6	12	2.357	D-	2.976	D	3.753	D+	3.147	D	3.397	D
7	12	3.654	D	3.754	D+	3.797	D+	3.275	D	3.643	D+
8	12	3.098	D	2.764	D	2.953	D	2.872	D	2.409	D
9	12	2.216	D-	2.432	D-	2.975	D	2.780	D	2.587	D
10	12	1.487	D+	2.091	D-	1.672	D-	1.925	D-	1.803	D-
11	12	2.873	D	3.094	D	3.491	D+	4.374	D+	3.421	D
12	12	3.784	D+	3.852	D+	3.530	D+	3.905	D+	3.568	D+
13	12	2.703	D	3.810	D+	3.105	D	3.047	D	3.606	D+
14	12	3.703	D+	4.097	D+	3.843	D	3.790	D+	3.896	D+
15	12	3.098	D	2.954	D	2.906	D	3.195	D	3.543	D+
16	12	2.769	D	3.067	D	2.590	D	2.796	D	3.290	D
17	12	2.108	D-	2.342	D-	2.834	D	2.643	D	2.385	D-
18	12	1.908	D-	2.328	D-	2.765	D	2.587	D	3.254	D+
19	12	2.968	D	3.376	D	3.185	D	3.429	D	4.586	C-
20	12	1.954	D-	2.321	D-	2.975	D	2.654	D	2.643	D
21	12	1.794	D-	2.598	D	3.109	D	2.863	D	2.393	D-
22	12	3.097	D	3.865	D+	4.853	C-	3.217	D	3.429	D
23	12	2.950	D	3.345	D	3.438	D	3.086	D	3.538	D+
24	12	3.832	D+	3.654	D+	3.764	D+	3.074	D	3.487	D+
25	16	2.251	D-	3.973	D+	3.064	D	3.753	D+	3.327	D
26	16	2.976	D+	2.673	D	2.986	D	2.295	D-	2.690	D
27	16	1.747	D-	1.864	D-	2.854	D	2.459	D	3.045	D

Source: Field Data, 2023.

To examine the significant differences between the test scores in Cats administered, a repeated measures ANOVA was conducted (Celik, 2019). This was done with assumption that the Cats scores being multiple measurements originating from the same learners grouped by schools, a repeated measures ANOVA suitably compared the means of the scores while accounting for the fact that they are not independent.

Table 4.14: Descriptive Statistics Showing Cats Means and Std. Deviations

Cats	Mean	Std. Deviation	N
Cat 1	2.71174	0.675181	27
Cat 2	2.99481	0.652567	27
Cat 3	3.15156	0.606591	27
Cat 4	3.01378	0.637033	27
Cat 5	3.14263	0.608529	27

Table 4.15: ANOVA of Form Three Students' Biology CAT Mean Scores

Tests of Within-Subjects Effects

Measure*:* *Measure*_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Cat	Sphericity Assumed	.050	4	.013	.095	.984	.004
	Greenhouse-Geisser	.050	3.766	.013	.095	.980	.004
	Huynh-Feldt	.050	4.000	.013	.095	.984	.004
	Lower-bound	.050	1.000	.050	.095	.760	.004
Cat*School Sample Size	Sphericity Assumed	.147	4	.037	.277	.892	.011
	Greenhouse-Geisser	.147	3.766	.039	.277	.883	.011
	Huynh-Feldt	.147	4.000	.037	.277	.892	.011
	Lower-bound	.147	1.000	.147	.277	.604	.011
Error (Cat)	Sphericity Assumed	13.242	100	.132			
	Greenhouse-Geisser	13.242	94.146	.141			
	Huynh-Feldt	13.242	100.000	.132			
	Lower-bound	13.242	25.000	.530			

The analysis shows a *p*-value of 0.9 which is higher than the 0.05 alpha level. This according to Cohen et al. (2017) implies that there is no significant difference between the means of different Cats scores. Similarly, the above Cat results shows a conspicuous resemblance in terms of learning achievement to the respective sample schools' KCSE and KCSE Biology results for the years 2016 – 2019.

Table 4.16: Summary of Sampled Schools' KCSE Mean Scores; 2016 - 2019

Year	2016	2017	2018	2019
No. of Schools	25	26	26	27
KCSE Mean	2.5507	2.7386	2.9467	3.1786
Std. Deviation	0.3216	0.3485	0.6169	0.7062

Source: Field Data, 2023

Table 4.17: Summary of Sampled Schools' KCSE Biology Mean Scores; 2016-2019

Year	2016	2017	2018	2019
No. of Schools	25	26	26	27
KCSE Biology Mean Scores	2.3721	2.1957	2.6436	2.3238
Std. Deviation	0.67043	0.46271	0.54218	0.53125

Source: Field Data, 2023

The above study results (Table 4.16 and Table 4.17) at a glance shows a comparison of both KCSE overall mean scores and KCSE Biology mean scores the sampled schools in Garissa County obtained for the years 2016-2019. The results indicate a deteriorating trend of learners' scores in Biology. The study finding shows that the schools' KCSE mean-scores were slightly greater than the Biology mean score the same schools attained. This revelation presents a serious case of concern that requires urgent address if the overall learning achievement in the subject in public secondary schools in Garissa County is to improve.

Table 4.18: The Means and Standard Deviations of Research Variables

Variable	Mean	Std. Deviation
Teacher Attributes	3.19	1.292
School Working Conditions	2.11	1.140
Job Satisfaction	2.10	0.920
Learning Achievement	1.95	0.879

Source: The Researcher, 2023

4.9 Multiple Regression

Under the second part of the inferential statistics, the researcher used multiple linear regression, a statistical tool used to model the relationship between two or more predictor variables and a response variable (Kumari & Yadav, 2018). It was done particularly to analyze the extend of relationship between the single dependent variable (student learning achievement in Biology) and several independent variables (teacher attributes, school working conditions and job satisfaction of teachers' turnover).

In the opinion of Osborne & Waters (2019), when conducting multiple linear regression, several assumptions need to be met for the results to be valid. The following are the main assumptions that were considered in this study: Normality, Linearity, Homoscedasticity, and Multicollinearity.

According to Schmidt and Finan (2018), the focal point of testing the normality assumption in multiple regression is scrutinizing the scattering of the residuals, which are the differences between the observed values and the values predicted by the regression model. According to Osborne and Waters (2019), if the residuals are not

normally distributed, the results of hypothesis tests may not be valid. The figure that follows shows the study's results of the normality test.

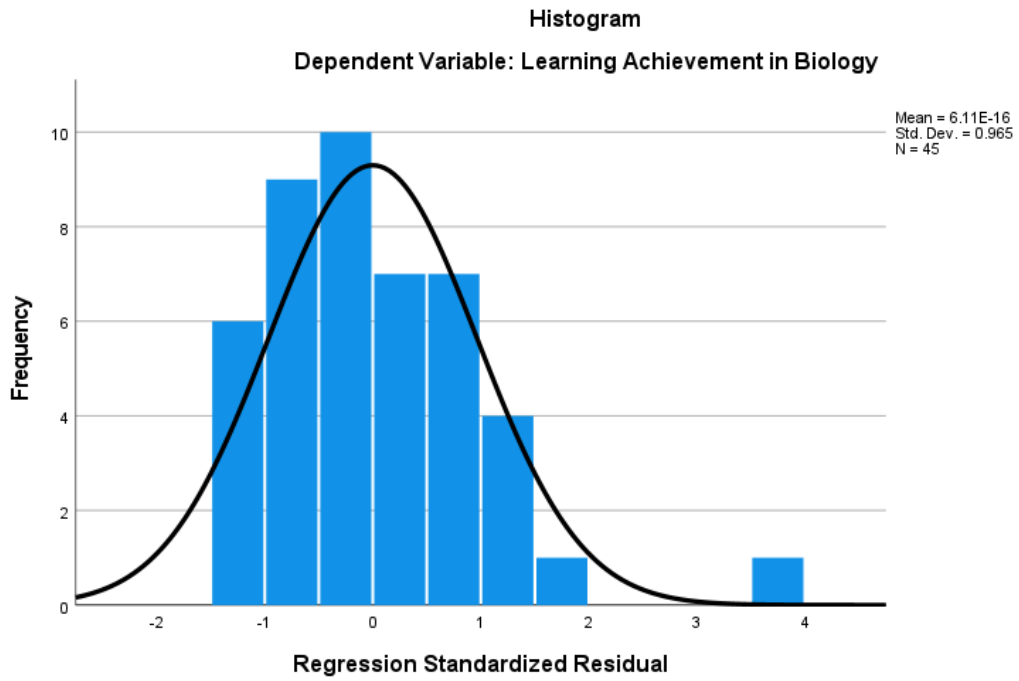

Figure 4.5: Results of the Normality Test

According to Osborne and Waters (2019), linearity assumption tests the relationship between the independent variables and the dependent variable. It refers to the presence of a straight-line relationship between the independent and the dependent variables (Mutende et al., 2017) and can be checked by plotting the residuals (the difference between observed and predicted values) against the fitted values. Therefore, the following figure shows the graph of fitted values (observed values) against the residuals.

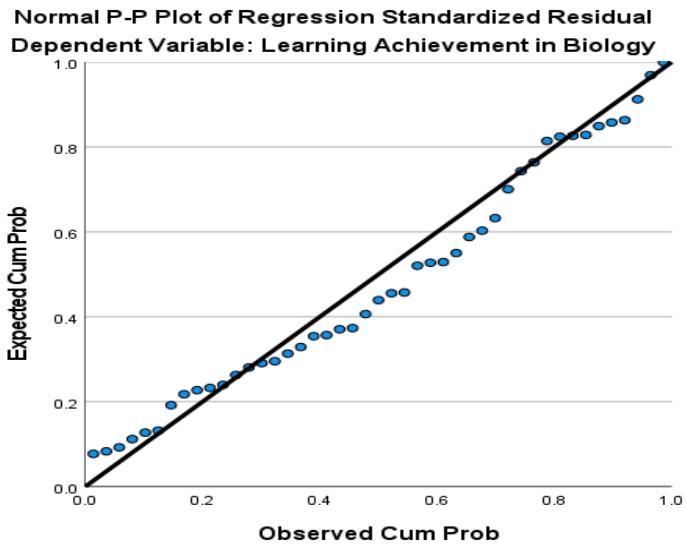

Figure 4.6: Fitted Values (Observed Values) against the Residuals

According to Çelik (2019), homoscedasticity alludes to a state in which the variance of the residual, or error term, in a regression model is constant. In other words, it refers to the state that the error term does not change a lot even when the value of the independent variable changes. The following figure represents scatterplot for homoscedasticity test.

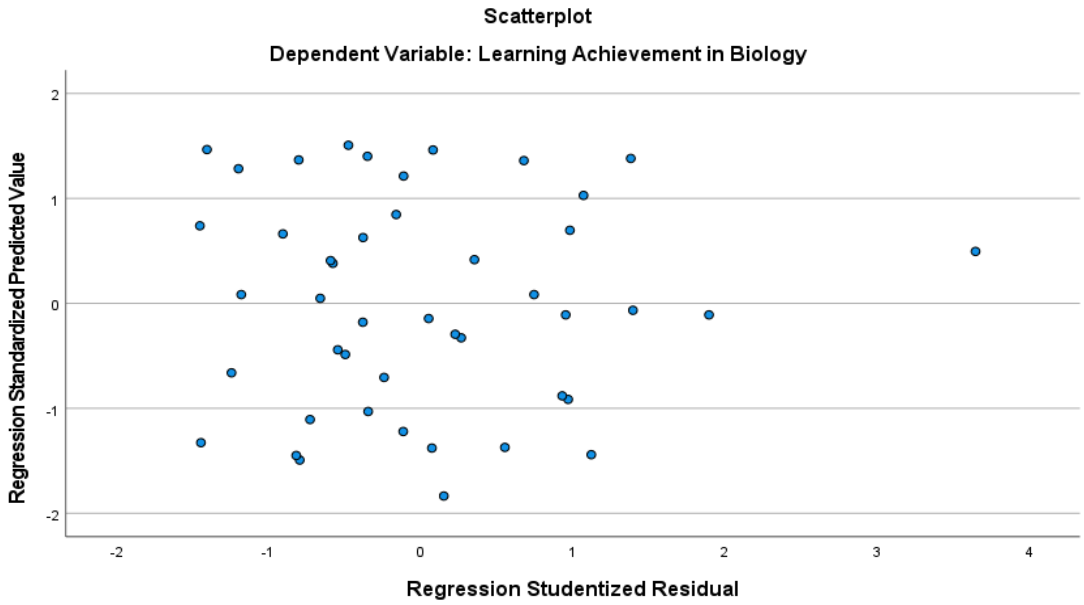

Figure 4.7: Scatterplot for Homoscedasticity Test

Daoud (2017), opines that multicollinearity in research is a violation of one of the basic assumptions for successful regression model assumptions. It appears when two or more independent variables in the regression model are correlated. Multicollinearity, or near-linear dependence, is a statistical phenomenon in which two or more predictor variables in a multiple regression model are highly correlated. Multicollinearity, according to Daoud (2017) is checked by either using the correlation coefficients or the Variance Inflation Factor (VIF).

In this study, VIF values were used. When the VIF value is equal to 1, there is no multicollinearity, greater than 1 and less than 5 indicates moderate collinearity. However, if VIF is greater than 5, it needs to be addressed by removing one or more highly correlated independent variables. Results from Table 4.19 below indicate VIF values that are less than 5. According to Shrestha (2020), a VIF value of 10 and above indicates a strong correlation while VIF value less than 10 indicates a weaker correlation. However, VIF value less than 5 is the best outcome for testing multicollinearity as it indicates little to no correlation (Johnston, Jones, & Manley, 2018).

Table 4.19: Multicollinearity Test Table

Variables	VIF
Teachers' Attributes	2.567
School Working Conditions	3.628
Teachers' Job Satisfaction	4.191

4.9.1 Regression of Factors of Teacher Turnover on Learning Achievement in Biology

A multiple linear regression was performed on the data taking learning achievement in Biology as the dependent variable and teacher attributes, school working conditions and teacher job satisfaction of turnover as individualized independent variables. The results are given in the following analysis.

Table 4.20: Model Summary of Independent Variables on Learning Achievement in Biology

				Std.	Change Statistics				
			Adjusted	Error of	R				
		R	R	the	Square	F			Sig. F
Model	R	Square	Square	Estimate	Change	Change	df1	df2	Change
1	.764[a]	.584	.554	.26893	.584	19.194	3	41	.000

The Model Summary obtained indicates that 58.4 % of the variability in learner's achievement in Biology can be explained by the three study independent variables; the teacher attributes, school working conditions and job satisfaction of turnover. In the test for Analysis of Variance (ANOVA), the findings [F (3, 41) = (19.194), p = .000] indicate that there is statistically significant relationship between the factors of teachers' turnover and students' learning achievement in Biology from the study area.

Table 4.21: ANOVA of Factors of Teachers' Turnover on Learning Achievement in Biology

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	4.165	3	1.388	19.194	.000[b]
	Residual	2.965	41	.072		
	Total	7.130	44			

In order to establish the contribution of each predictor variable (specific factor of teacher turnover) to the variation in the response variable (student learning achievement in Biology), regression analysis was carried out and the results presented in Table 4.22.

Table 4.22: Regression Coefficients

Model	Variable	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	1.032	.215		4.797	.000
	Teachers' Attributes	.211	.105	.520	2.015	.031
	Teachers' School Working Conditions	.194	.195	.518	.997	.021
	Teachers' Job Satisfaction	-.131	.190	-.278	-.685	.012

The general model equation from the results in Table 4.20 that predicts the factors of teachers' turnover based on teachers' attributes, teachers' school working conditions and teachers' job satisfaction is given as:

$$Y = 1.032 + .211X_1 + .194X_2 - .131X_3$$

The study hypotheses were:

H_01: There is no significant relationship between the attributes of teachers' turnover and learning achievement in Biology in public secondary schools.

(t (47) = 2.02, p = .031 < .05) is significant, the null hypothesis 1 is thus rejected. The interpretation of this is that one unit change in attributes of teachers' turnover would cause a change of .211 or 21 % in students' learning achievement in Biology.

H_02: There is no significant relationship between the school working conditions of teachers' turnover and learning achievement in Biology in public secondary schools.

(t (47) = 1.00, p =.021< .05) is significant, hence, the null hypothesis 2 is equally rejected. The interpretation of this finding is that one unit change in teachers' school working conditions of turnover would cause a change of .194 or 19.4 % in students' learning achievement in Biology.

H_03: There is no significant relationship between the job satisfaction of teachers' turnover and learning achievement in Biology in public secondary schools

(t (47) = -.69, p = .012 < .05) is significant, therefore the null hypothesis 3 is also rejected. The indication of this result is that an increase of one unit in job dissatisfaction of teachers' turnover causes a change of -.131 or -13.1 % in students' learning achievement in Biology.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the research findings, conclusions linked to the research objectives, recommendations and makes suggestions for further research. The study sought to ascertain the influence of teacher turnover factors on learning achievement in Biology. This was done in relation to the teachers' attributes, the teachers' school working conditions and the teachers' job satisfaction in the context of turnover on learning achievement in Biology in the selected public secondary schools in Garissa County.

The current study findings provide a valuable perspective that aligns with the broader research landscape on the influence teacher turnover factors have on students' learning achievement. The following null hypotheses guided the study: There is no statistically significant relationship between the teachers' attributes of turnover and learning achievement in Biology in public secondary schools. There is no statistically significant relationship between the school working conditions of teachers' turnover and learning achievement in Biology in public secondary schools. There is no statistically significant relationship between the job satisfaction of teachers' turnover and learning achievement in Biology in public secondary schools.

5.2 Summary of the Study Findings

The findings of the current study were discussed under the sub-sections as follows;

5.2.1 Teachers' Attributes of Turnover on Learning Achievement in Biology

The first study objective sought to examine to what extent the attributes of teachers' turnover influence learning achievement in Biology in public secondary schools in

Garissa County. The study found out that a majority of the teachers of Biology represented by 55.1 % agreed that their gender did influence the effectiveness of their instructional process in Biology class. This meant that learning achievement in Biology in the study site was influenced by the individual teacher's gender. Similarly, the study results found out that majority of the teachers represented by 53.1% affirmed that their age indeed had a significant influence on their instructional process in Biology and consequently the students' learning achievement in the subject.

With regards to marital status, the study established that 40.8% of the teachers of Biology representing the majority agreed that marital status influenced their effectiveness in Biology classroom instructional process. Additionally, concerning the teacher's academic qualification and the students' learning achievement in Biology, the study ascertained that those teachers with higher credentials such as Master's degree in education should pose better results in the subject compared to their colleagues with lower academic qualifications. This finding on the item was supported by 55.1% of the teachers of Biology.

The study as well established that 61.1% of the teachers agreed that their effectiveness in teaching Biology was highly influenced by their teaching experience. It was further established that teachers who had been in the teaching career for a considerable length of time had better content mastery in the subject were good at teaching methodologies and their learners posed higher scores in the subject compared to the newly employed teachers.

The study results also showed that a majority of the teachers, represented by 57.1% disagreed that teachers' current designation in schools they taught had an influence on their instructional process in Biology. This meant that whether a teacher of Biology

was an assistant teacher or deputy principal in schools they taught did not affect their effectiveness in teaching the Biology subject. To recap, the study revealed that averagely, the teacher's attributes of turnover had a moderate influence on students' learning achievement in Biology (M = 3.19, SD = 1.292).

The results on teachers' attributes of turnover on learning achievement in Biology were also confirmed by qualitative results from the document analysis guide showing teachers' late duty reporting / early departure from schools, chronic absenteeism from schools, massive transfer requests, duty desertions, resignations and interdictions were majorly influenced by their individual teacher attributes. The results further showed that these factors of teacher turnover led to constant disruption of Biology instructional process in affected schools.

Moreover, the information the researcher obtained from the value-added progress records, CAT marks in Biology and analyzed KCSE results records as well provided adequate information on the attributes of teachers of Biology which concur with the quantitative data collected using the questionnaire. The two sets of triangulated data provided satisfactory evidence on the influence the teachers' attributes of turnover had on the learning achievement in Biology in public secondary schools in Garissa County.

The inferential statistics, both Pearson Product Moment Correlation and Multiple Linear Regression established that the teachers' attributes of turnover were significantly related to learning achievement in Biology in Garissa County ($r = 0.76$, $p>0.05$). This therefore, implies that the departure of these teachers as a result of their attributes of turnover affects the effectiveness of instructional process in Biology leading to low learning achievement in the subject.

5.2.2 School Working Conditions of Teachers' Turnover on Learning Achievement in Biology

The second study objective analyzed how the school working conditions of teachers' turnover influence learning achievement in Biology in public secondary schools in Garissa County. The research demonstrated that schools in the study area had inadequate playgrounds for learners' recreational activities. The study also established that majority of the schools did not have adequate learners' and teachers' washrooms. Learners' classrooms were also inadequate. In addition, it was revealed that some schools did not have adequate Biology course and reference books for the subject's instructional process. Similarly, most schools were found to have inadequate Biology charts, models, laboratories, laboratory equipment and reagents making the classroom instruction in the subject ineffective, hence contributing to low learning achievement in the subject.

The study as well established that schools in the study site did not have access to clean and reliable water supply and electric connectivity. Additionally, it was discovered that the schools' locations affected the non-local teachers' safety and the majority of schools were surrounded by unfriendly and unsupportive neighbors. It was also found out that the security posts in some of the schools in the study site were inadequate in protecting teachers from external attacks. The study further ascertained that majority of the principals did not support the teachers of Biology with institutional needs such as availing the Biology instructional materials. Similarly, the study findings showed that majority of the principals in secondary schools in Garissa County did not promote enhanced student learning achievement in Biology through extrinsic motivation.

The study also found that majority of the schools neither gave priority to teachers' collaboration and peer teaching in Biology nor did they have robust mentorship programs, significant in helping new teacher recruits acclimatize to the teaching career, reduce turnover and enhance instructional process in Biology. The study results obtained also demonstrated that teachers of Biology did not have autonomy as appertain to their freedom in the choice of the subject's classroom instructional process. It was also found that the majority of the principals did not incorporate the ideas of teachers in the school decision making process regarding school policies and student discipline. Finally, the study revealed that the teachers' school working conditions of turnover had a significant influence on students' learning achievement in Biology ($M = 2.11$, $SD = 1.14$). In summary, the findings established that majority of the public secondary schools in the study area did not have conducive learning environment and lacked adequate physical infrastructure and instructional resources essential for the subject instruction. It was also established that majority of the school principals' leadership styles and administrative support hampered effective instructional process in Biology.

The above findings were corroborated with qualitative results from the records on teacher transfer requests in the Document Analysis Guide which showed that majority of the teachers wished to transfer from rural bound schools to urban schools on the basis of un-conduciveness of their school working conditions as well as safety. This was due to the fact that most schools located in rural Garissa County lacked basic social amenities. Besides, school location and non-local teachers' safety is a very crucial issue in this area. Schools in far flung remote areas of Garissa County, particularly those bordering Somalia are considered risky due to constant attacks.

The results from inferential statistics, both Pearson Product Moment Correlation and Multiple Regression test show that there is a moderate positive significant correlation between school working conditions of teachers' turnover and learning achievement in Biology in public secondary schools in Garissa County, ($r = 0.73$, $p>0.05$). This suggests that work conditions are significantly related to learning achievement, implying that unconducive school working conditions are the ones driving teachers to high rate of turnover in public secondary schools in this County. The departure of these teachers leaves classrooms without subject specialists which affect the instructional strategies in Biology as learners are left unattended, thus contributing to low learning outcome in Biology (Ingersoll & Merrill, 2017).

5.2.3 Job Satisfaction of Teachers' Turnover on Learning Achievement in Biology

The third study objective sought to evaluate to which extent job satisfaction of teachers' turnover influence learning achievement in Biology in public secondary schools in Garissa County. The study established that majority of the teachers of Biology were not satisfied with their present salary TSC offered them. Similarly, the findings show that teachers were not satisfied with incentives their current schools offered them in form of paid remedial lessons. The study results further ascertained that the teachers of Biology were not satisfied with Teachers' Service Commission's promotion of teachers and that teaching career did not offer them opportunity for personal growth and fulfilment. In addition, the findings revealed that teaching career did not offer teachers the opportunity to fully utilize their potential. Also, the study established that majority of the schools in the study area did not have conducive learning environment for Biology instructional process.

The findings on this objective indicated that the teachers' job satisfaction of turnover had a significant influence on the effectiveness with which the teachers of Biology in public secondary schools in Garissa County engaged in the teaching process which affected the learning achievement in the subject (M = 2.10, SD = 0.92). This led to low learning achievement in the subject.

These findings are in agreement with the qualitative results from the Document analysis guide which state that teachers of Biology in public secondary schools in Garissa County reported late on duty and left school early and were chronic absentees. They were unsettled in school as a result of constantly seeking for permissions to be out of schools, persistently applied for transfers to move from their current schools to other schools they perceived better and, on several occasions, applying for alternative jobs other than teaching. The records also indicated that majority of the teachers intending to transfer or quit teaching usually had low morale and attended lessons unprepared as evidenced by the scanty Biology content in their lesson note books, disorganized notes and scattered learning activities. The learners' course books were unchecked and lacked lesson quizzes for effective evaluation of the learning progress.

The results from inferential statistics, both Pearson Product Moment Correlation and Multiple Linear Regression show a moderate positive relationship between the teachers' job satisfaction and the learning achievement in Biology in public secondary schools in Garissa County, ($r=0.67$, $p>0.05$). The study results conclude that the Biology teachers' job and the learning environment dissatisfaction were among the major teacher factors influencing their turnover which lead to low learning achievement in the subject. This is due to the fact that lack of job satisfaction leads to lack of commitment, performance and productivity among teachers which

demoralizes them, thereby influencing their instructional methodologies in the subject.

5.3 Conclusions

After a detailed data analysis, the three independent variables considered in this study; the teachers' attributes, teachers' school working conditions and job satisfaction of teacher' turnover had a positive significant correlation with the dependent variable; the learning achievement in Biology. The results of Pearson Product Moment Correlation (r) as well corroborated those of Multiple Linear Regression leading to the rejection of all the three null hypotheses. Moreover, the study results from the Biology Teachers' Questionnaire and Document Analysis Guide corroborated each other affirming the study findings. From the aforementioned findings, the study therefore derives the following conclusions:

The Biology teachers' attributes in public secondary schools in Garissa County moderately influenced both their turnover and the students' learning achievement in the subject (Mean = 3.19, S.D = 1.292). Teacher's gender, age, marital status, academic qualification and teaching experience significantly influenced teacher turnover which led to low learning achievement in Biology.

Secondly, lack of conducive working conditions in the learning institutions which included inadequacy of school physical infrastructure and instructional resources, insecurity and poor leadership styles was a shared issue in most of the sampled secondary schools in the study site (Mean = 2.11, S.D = 1.140) influencing both teachers' turnover and students' low learning achievement in Biology.

Thirdly, majority of the teachers of Biology in public secondary schools in Garissa County were dissatisfied with the teaching career as well as the unsuitability of the students' learning environment (Mean = 2.10, S.D = 0.920). This influenced their turnover and resulted in low learning achievement in the subject. The un-streamlined teacher promotions, low salary and incentives as well as limited opportunity for growth were cited as major factors contributing to job dissatisfaction.

Therefore, in conclusion, the teacher's intent to transfer or entirely quit the teaching profession has a profound negative influence on the efficiency with which the very teacher selects the instructional resources and the strategies and also engages in classroom instruction process in Biology. This affects the teacher's job commitment, classroom performance and productivity which significantly impacts on the students' learning achievement.

5.4 Recommendations

Based on the study findings and the conclusions thus drawn, the study recommends the following:

1. Both Teachers' Service Commission and the school administrators should come up with teacher retention strategies that address teachers' attributes. These includes; emphasis on provision of adequate staff houses and putting in place robust mentorship programs for the young and newly employed teachers to assist them navigate smoothly in the teaching profession. The TSC should manage transfer crisis and develop retention strategies that are appealing and consistent with the needs and desires of younger teachers such as reducing the mandatory five years period to three for newly employed teachers in Garissa County before one qualifies for transfer to other schools of choice. Further,

both the teacher employer and the school management should provide attractive support systems and allowances/ incentives that commensurate with one's level of education in order to retain teachers in schools thus improve students' learning achievement in Biology.

2. On school working conditions of teachers' turnover, the school administration should provide suitable school work atmosphere that fosters enhanced learning achievement in the study area. Both the school physical infrastructure and instructional resources should be sourced and adequately provided to enhance teaching and learning of Biology. The government should formulate school policies that allow teachers instructional autonomy, free collaboration and easy access to mentorship programs. Moreover, the school principals should be instructed to demonstrate good leadership and be supportive to enhance classroom instructional process. In addition, the government through TSC and the school management should attach security post to every learning institution, install CCTV cameras and increase the number of security officers manning schools in Garissa County to ensure teachers' safety. They should also come up with a special risk allowance for teachers in Garissa County and re-introduce fare reimbursement to motivate and retain teachers in this County.

3. The TSC and the schools' management in Kenyan public secondary schools should ensure teacher job satisfaction since it has an effect on teachers' turnover. They should re-visit salary schemes for teachers in public secondary schools to ensure teachers are well paid, besides putting in place other attractive human resource practices such as ancillary incentives to retain

teachers in schools. The teacher promotions should be fast tracked, streamlined and made clearer, appealing and automatic depending on the teacher's academic qualification to allow the most educated, most qualified, and most experienced teachers to be retained. The government through TSC should regularly organize in-service training curriculum for Biology teachers to sharpen and enhance their pedagogical knowledge and skills aimed at improving instruction process in Biology. Quality instruction of Biology, frequent practical lessons and timely evaluation should be the core target in improving the learning achievement in the subject.

5.5 Suggestions for Further Studies

1. The researcher recommends future studies to be conducted on the same topic in a different region other than ASAL to ascertain whether similar results would be obtained.

2. Future studies are also suggested to be conducted on the same topic with other independent variables other than those included in this study to explore and ascertain the degree to which the variables will influence teacher turnover and consequently lead to low learning achievement in Biology.

3. The current study being a mixed methods research approach, future qualitative research should be carried out in the same locality to provide an in-depth understanding of predictive factors of teacher turnover and their effect on student learning achievement in Biology.

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APPENDICES

Appendix A: Letter of Introduction

Moi University, School of Education
Department of Curriculum, Instruction and Educational Media,
P.O Box 3900,
ELDORET.

Dear respondent,

My name is Makokha Terry David, a graduate student of Moi University undertaking PhD research entailing **Teacher Turnover Factors on Learning Achievement in Biology in Public Secondary Schools in Garissa County, Kenya**. I' am requesting you to kindly participate in filling of this questionnaire. The findings of this study will have both theoretical and practical implications in the education sector of our country, particularly in the study area. Theoretically the study will contribute to the advancement of knowledge on the influence of teacher turnover on learning achievement in schools. Practically, the study will help address the teacher attrition challenges faced by learners particularly those in public secondary schools in marginalized regions of the country in their pursuit of academic excellence. In addition, the findings will benefit the Ministry of Education and all key stakeholders concerned with efficient and effective learning achievement in schools in the formulation of future education policies.

The information you provide will be treated with strict confidentiality and will be used for academic research purposes only. Your name and that of your school need not to appear anywhere in the questionnaire.

Thank you in advance.

Yours faithfully,

Makokha Terry David

.

Appendix B: Participant's Informed Consent Form

I voluntarily agree to take part in the study entitled: **Teacher Turnover Factors on Learning Achievement in Biology in Public Secondary Schools in Garissa County, Kenya**, as a *Participant.* This decision was arrived at after the researcher thoroughly informed me about the study purpose and the confidentiality of the data involved.

Participant Number: _____ Signature: _____ Date: _____

Appendix C: Biology Teachers' Questionnaire (BTQ)

Teacher Participant,

My name is Makokha Terry David, a graduate student of Moi University, School of Education undertaking a Doctoral study. I am carrying out a study on **Teacher Turnover Factors on Learning Achievement in Biology in Public Secondary Schools in Garissa County, Kenya**. I' am inviting views from the teachers of Biology concerning the above topic. Kindly respond to all questions as honestly and accurately as possible. Your responses will be treated with utmost confidence and will be used for academic purpose only. Your sincere cooperation is essential in assisting resolve the current problem and enhance the academic achievement of learners in Biology in the study area and the entire country. This questionnaire consists of Four Sections, A, B, C and D. Please answer all the questions in all sections in the spaces provided.

Section A: Background Information

This section comprises various statements in regard to your demographic characteristics of turnover intention. For each statement indicate by placing a tick **[√]** against the statement applicable to you.

Teacher Demographics	**Response Options**
i. What is your gender?	a) Male [ ] b) Female [ ]
ii. What is your age bracket?	a) 20-30 years [ ] b) 30-40 years [ ] c) 40-50 years [ ] d) Above 50 years [ ]
iii. What is your marital status?	a) Single [ ] b) Married [ ] c) Separated [ ] d) Divorced [ ] e) Widowed [ ]
iv. What is your highest academic qualification?	a) Diploma in Edu. [ ] b) Bachelor of Edu. [ ] c) PGDE [ ] d) Master's Degree Edu. [ ] e) PhD in Edu. [ ]

v. How long have you been in teaching profession under TSC?	a) Less than 5 years [ ] b) 5-10 years [ ] c) 10-20 years [ ] d) Over 20 years [ ]
vi. What is your current designation?	a) Assistant Teacher [ ] b) Class teacher [ ] c) Head of Subject [ ] d) Head of Department [ ] e) Deputy Principal [ ] f) Principal [ ]

vii. How would you rate your intention to transfer to another school or leave the teaching career?

a) Low (1-10%) [ ]
b) Moderate (11-30%) [ ]
c) High (31-50%) [ ]
d) Very high (51% & Above) [ ]

viii. How many teachers in your school have within the last two years requested for transfer to other schools?

a) Less than 10 [ ]
b) 10-20 [ ]
c) Over 20 [ ]

ix. How many times within the last two terms have you sought for permission to be away from school for personal reasons?

a) 1-2 [ ]
b) 3-4 [ ]
c) Above 5 [ ]

I) List the official reasons

…….....

.....

II) List the personal reasons

…….....

.....

x. Within the span of last two years, how many times have you applied for jobs other
than teaching?

a) 1-2 [ ]
b) 3-4 [ ]
c) Above 5 [ ]

Section B: Biology Teachers' Attributes

This section comprises various statements in regard to influence of your attributes of turnover on learning achievement in Biology. For each statement indicate by placing a tick **[**√**]** against the number to indicate the extent to which you agree or disagree.

Scale: 1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5= Strongly Agree.

Item	Statement	Rating				
		1	2	3	4	5
1	My gender influences my instructional process in Biology affecting students' learning achievement in the subject					
2	My age influences my instructional process in Biology affecting students' learning achievement in the subject					
3	My marital status influences my instructional process in Biology affecting students' learning achievement in the subject					
4	My academic qualification influences my instructional process in Biology affecting students' learning achievement in the subject					
5	My teaching experience influences my instructional process in Biology affecting students' learning achievement in the subject					
6	My current designation at school influences my instructional process in Biology affecting students' learning achievement in the subject					

Section C: Biology Teacher's School Working Conditions

This section comprises various statements in regard to how you perceive influence of your school working conditions of turnover intention on learning achievement in Biology. For each statement place a tick **[√]** against the number to indicate the extent to which you agree or disagree.

Scale: 1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5= Strongly Agree.

Item	Statement	Rating				
		1	2	3	4	5
7	To what extend do you agree with the adequacy of the following facilities for enhanced instructional process in Biology? i. Playground for learners' recreational activities ii. Wash rooms iii. Classrooms					
8	To what extend do you agree with the adequacy of the following Biology instructional materials in your school for enhanced teaching and learning process in the subject? i. Course books and Reference Materials ii. Charts and Models					
9	To what extend do you agree with the adequacy of the following resources in your school for improved teaching and learning process in Biology? i. Laboratory, laboratory reagents and equipment ii. Libraries that are spacious and functional					
10	To what extend do you agree with the availability of the following social amenities in your school for enhanced teaching and learning process in Biology? i. Access to clean and reliable water supply ii. Reliable electric connectivity					
11	My school's location is safe and secure for my stay and for the Biology classroom instructional process					
12	My school is surrounded by friendly and supportive neighbors making instructional process in Biology effective					
13	The security post in my school is adequate to protect me from any attack making me fully engaged in effective teaching of Biology					
14	To what extend do you agree with the following statements in regard to your principal's administrative and leadership styles in promotion of enhanced learning achievement in Biology?					

	i. My principal is supportive; listens and responds to my institutional needs ii. My principal is a transformative leader promoting enhanced student learning achievements in Biology through extrinsic motivation.					
15 16	Teacher collaboration and peer teaching in Biology is a priority in my school. My school has a sound mentorship program to help new teacher recruits acclimatize to their new career. This reduces turnover and enhances instructional process					
17 18	My school principal allows for my independency in the choice of Biology instructional strategies and resources. My school principal incorporates my ideas in school decision making process regarding school policies and student discipline enhancing teaching and learning of Biology					

Section D: Biology Teacher's Job Satisfaction.

This section comprises various statements in regard to how you perceive influence of your teaching job satisfaction of turnover intentions on learning achievement in Biology. For each statement indicate by placing a tick **[√]** against the number to indicate the extent to which you agree or disagree.

Scale: 1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5= Strongly Agree.

Item	Statement	Rating				
		1	2	3	4	5
19 20	I' am satisfied with my present salary that TSC offers which encourages me to effectively teach Biology I' am satisfied with incentives that my current school offers in form of paid remedial lessons which motivates me to effectively teach Biology					
21 22	I' am satisfied with TSC's promotion of teachers which encourages me to effectively teach Biology I' am satisfied with the teaching career offering me opportunity for personal growth and fulfilment which motivates me to effectively teach Biology					

23	The teaching career offers me an opportunity to fully utilize my potential. This encourages me to effectively teach Biology					
24	My school has a conducive learning environment which enables me to effectively teach Biology.					

Section E: Learning Achievement in Biology

This section comprises various statements in relation to students' learning achievement in Biology. For each statement indicate by placing a tick **[√]** against the number to indicate the extent to which you agree or disagree.

Scale: 1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5= Strongly Agree.

Item	Statement	Rating				
		1	2	3	4	5
25	My school's average admission marks in Form 1 is above 250 marks					
26	My school's average KCSE mean score for the years 2016, 2017, 2018 and 2019 is good					

27. Please indicate your school's overall KCSE mean score for the years

2016_____ 2017 _____ 2018 _____ and 2019 _____

Item	Statement	Rating				
		1	2	3	4	5
28	My school's KCSE Biology performance is good					
29	My school's KCSE Biology average mean scores for the years 2016, 2017, 2018 and 2019 is good					

30. Please indicate your school's KCSE Biology means score for years

2016_____ 2017 _____ 2018 _____ and 2019 _____

Item	Statement	Rating				
		1	2	3	4	5
31	My school's management always looks for better strategies to improve KCSE Biology performance					

Thank you for your cooperation

Appendix D: Document Analysis Guide (DAG)

The main purpose of this document is to supplement the data obtained from the Biology Teacher Questionnaire.

S. No	Document Item(s)	The Objective the Item(s) Serves
i.	Note the number of TSC employed Biology teachers in Garissa County by gender, age and job group.	*Teacher's gender, age and job group*
ii.	Note the number of TSC employed teachers of Biology by gender that left Garissa County between 2016 and 2019 through transfer or resignation.	*Gender as attribute of teacher turnover [2016 – 2019]*
iii.	Note the number of teachers by gender who have within the last two years requested for transfer	*Gender as attribute of teacher turnover [2021 – 2023]*
iv.	Note the number of times within the last two terms teachers have sought for permission to be away from school for personal and official reasons.	*Teacher absenteeism and turnover intentions*
v.	Analyze the Daily Teacher Log-in & Log-out Records in the sampled schools	*Teacher lateness, absenteeism*
vi.	Analyze the Daily Teacher Lesson Attendance Records in the sampled schools	*Daily learning achievement*
vii.	Analyze the Staff Management Records in the sampled schools	*Teacher duty desertions and interdictions*
viii.	Examine Past CATs; Mid and End Term Cats Analysis Records in Biology for the year 2023 in the schools	*Formative learning achievement in Biology*
ix.	Examine Past KCSE Exam Analysis Records between 2016-2019 in sampled schools	*Overall learning achievement in schools*
x.	Examine Past KCSE Biology Exam Analysis Records 2016-2019 in sampled schools	*Overall learning achievement in Biology*

Appendix E: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **462737**

Date of Issue: **21/February/2022**

RESEARCH LICENSE

This is to Certify that Mr.. David Terry Makokha of Moi University, has been licensed to conduct research in Garissa on the topic: DETERMINANTS OF TEACHER TURNOVER INTENTIONS ON LEARNING ACHIEVEMENT IN BIOLOGY IN PUBLIC SECONDARY SCHOOLS IN GARISSA COUNTY, KENYA for the period ending : 21/February/2023.

License No: **NACOSTI/P/22/15648**

462737

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Director General
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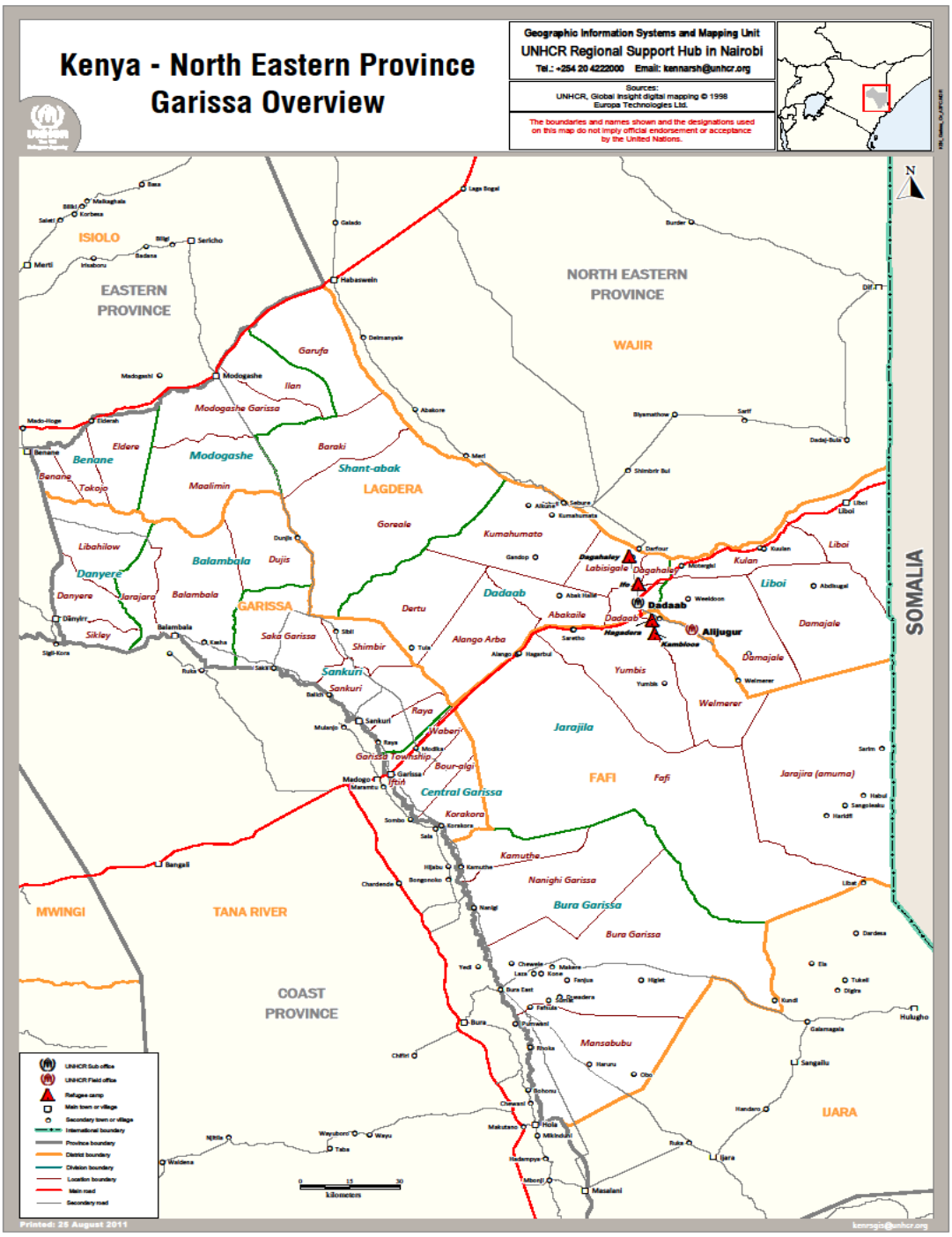
Mobile: 0713 788 787 / 0735 404 245
E-mail: dg@nacosti.go.ke / registry@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix F: MOE Garissa County Registered Public Secondary Schools, 2023

S. NO	NAME OF SCHOOL
1.	GARISSA HIGH SCHOOL
2.	COUNTY HIGH SCHOOL
3.	NEP GIRLS HIGH SCHOOL
4.	IFTIN GIRLS SEC. SCHOOL
5.	BOYSTOWN SEC. SCHOOL
6.	TETU SEC. SCHOOL
7.	UMMUSALMAA GIRLS
8.	SANKURI BOYS SEC. SCHOOL
9.	SANKURI GIRLS SEC. SCHOOL
10.	BANANE SEC. SCHOOL
11.	YUSSUF HAJI GIRLS
12.	SHURIYE SEC. SCHOOL
13.	DADAAB SEC. SCHOOL
14.	BURA SEC. SCHOOL
15.	FAFI GIRLS SEC. SCHOOL
16.	GALMAGALA SEC. SCHOOL
17.	BALAMBALA SEC. SCHOOL
18.	SHANTA ABAQ SEC. SCHOOL
19.	HALUGHO BOYS
20.	HALUGHO GIRLS
21.	DERTU GIRLS SEC. SCHOOL
22.	SAKA GIRLS
23.	KULANI SEC SCHOOL
24.	COUNTY COUNCIL MIXED
25.	YATHRIB SEC. SCHOOL
26.	IJARA SEC. SCHOOL
27.	HAJI IDRIS GIRLS
28.	ALINJUGUR SEC. SCHOOL
29.	TUMAINI BOYS SEC. SCHOOL
30.	RAHOLE GIRLS SEC. SCHOOL
31.	SHILL SEC. SCHOOL
32.	MODOGASHE BOYS SEC. SCHOOL
33.	MODOGASHE GIRLS SEC. SCHOOL
34.	SAMBUL SEC. SCHOOL
35.	BOREHOLE SEC. SCHOOL
36.	DANYERE SEC. SCHOOL
37.	NASIIB SEC. SCHOOL
38.	DAMAJALE SEC. SCHOOL
39.	NANIGHI SEC. SCHOOL
40.	GARISSA SCHOOL FOR THE DEAF

Appendix G: Map of Garissa County



Appendix H: Plagiarism Awareness Certificate

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MAKOKHA TERRY DAVID

DPCS/4341/20

In recognition for passing the University's plagiarism

Awareness test for Thesis **entitled: TEACHER TURNOVER FACTORS ON LEARNING ACHIEVEMENT IN BIOLOGY IN PUBLIC SECONDARY SCHOOLS IN GARISSA COUNTY, KENYA** similarity index of 7% and striving to maintain academic integrity.

Word count:51773

Awarded by

Prof. Anne Syomwene Kisilu
CERM-ESA Project Leader Date: 21/08//2024