FACTORS AFFECTING ENROLMENT AND PERFORMANCE OF FEMALE STUDENTS IN PHYSICS: A CASE OF SECONDARY SCHOOLS IN KAITI SUB COUNTY, MAKUENI COUNTY-KENYA.

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DECLARATION

This is my original work and has not been presented for award of a degree or any other award in any University

…… ……

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L40/16323/2018

The work reported in this project was carried out by the student with my approval as university supervisor.

…… …….

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DEDICATION

This research project is dedicated to the Almighty God for giving me life, strength and wisdom to work on this project report. Special dedication goes to my beloved family, especially my son Wendo, for all the love when I came home tired and exhausted. You were there for me each low and high moment of the entire period of the study, thank you very much. To my mum and dad, who always reminded and prayed for me to be strong and keep going when everything seemed to come to a standstill. I can never thank you enough for educating me to this level; God bless you. To all my siblings, thank you for the constant encouragement and assistance especially after we lost our brother Stano and grandma and all will to live was lost. You taught me how to let go.

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ABBREVIATIONS AND ACRONYMS

APU Assessment of Performance Unit

EFA Education for All

HOD Head of Department

KCPE Kenya Certificate of Primary Education

KCSE Kenya Certificate of Secondary Education

KICD Kenya Institute of Curriculum Development

KNEC Kenya National Examinations Council

MOE Ministry of Education

SMASSE Strengthening of Mathematics and Science in Secondary Education

SPSS Statistical Package for Social Sciences

TSC Teachers Service Commission

UNESCO United Nation Educational, Scientific and Cultural Organisation

ABSTRACT

The study intended to probate the factors that influence enrollment and performance of girls in Physics in selected schools within Kaiti Sub County, Makueni County. Physics is a branch of Science taught as an optional subject in secondary schools in Kenya. Subject selection and choices for Science tend to have more girls choosing Chemistry and Biology, and few of them settle for Physics. A descriptive survey design was carried out in eighteen schools in the sub-county, selected through stratified sampling. Various data were collected from 210 students, 36 Physics teachers, 18 heads of department, and 18 principals. Under quantitative data analysis, descriptive statistics were used. The data analysis showed that the school teaching/learning environment had a significant impact on girls' enrollment and performance in Physics. It indicates that the girls were average on Mathematical concepts, and an extra effort was required to improve this rate. Some girls stated that their parents had a first-hand influence on their future occupation and career choices made. The study recommends that both parents and teachers be involved in guidance, motivations, subject selection, and career choices. As parents provide the advice and material motivation, teachers give advice from a professional view and instill noble counsel subject selection and career choices. The girls also indicated that even though they chose to select Physics, there was a notion that Sciences, Mathematics subjects, and the associated careers were a better fit for the men. The study recommended that the school management provide gender-sensitive facilities conducive for both female and male students for the learning of Physics. It also suggests that girls need guidance from both parents and teachers to develop a positive attitude towards Physics and erase the negative dogmas. Lastly, it endorses a link between Physics and Mathematics departments to teach the Mathematical concepts found in Physics.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

According to UNESCO (2003), several international education reports such as the Education for All (EFA) Global Monitoring Report indicate that Kenya has currently attained virtual gender equivalence. It means that at the national education level, boys' and girls' enrollment is virtually equal both at the primary and at the secondary levels of education. However, a close study also reveals that several factors exist regarding the enrolment of girls and boys in several regions of the country. Some of these gender disparities that seem to favor boys than girls are access to education, class performance, and transition from a level to another or from education to employment. Thus, as we climb up the educational ladder, the gap becomes more expansive, and the difference is easily noted.

A report given by the Ministry of Education (MOE, 2012) shows that this gender disparity has been evidenced in the access of the Science, Technology, Engineering, and Mathematics (STEM) subjects. The difference in the performance of these subjects is also noted between the different genders. It is very usual to have daily interaction with both energy and matter. From the definition of Physics as a Science, we know that Physics is the study of the nature and properties of matter and energy around the world (Green & Basher, 2014). Thus, in Physics, this interrelationship between energy and matter is fundamental. Physics and Science as a whole is a subject that mainly deals with facts other than fiction. The world's Science deals with Physics as a body then will primarily look at the knowledge of the physical environment happenings. For learners to study Physics appropriately, they have to employ a scientific methodology of study so that their reasoning is improved. Learners need to be positive towards

Sciences, especially in Physics' performance, as it is quite defective compared to that of the other two Sciences- Chemistry and Biology.

Education is one of the several factors that are considered key to the development of a country. The provision of quality education in comparison to the national population contributes significantly to growth, productivity, employability, earnings, reduction of inequalities, and poverty. Health care, democracy, and effective leadership also tend to emerge from access to quality education and good performance. The Kenyan government has continuously emphasized education provision to its citizens ever since Kenya attained independence in 1963. The constitution of Kenya and the Session Paper on African Socialism and its Application to Planning in Kenya (1965) discouraged gender-based discrimination. Their emphasis was on social justice with the availability of equal opportunities to all. Besides, it is evident that providing education to women mostly tends to be beneficial not only to the individual but also to both the nation and the entire community.

Summers (1994) considered the many benefits that arise from providing education to women and concluded that: *Investment in girls' education may well be the highest Return on investment available in the developing world.* Then the Kenyan government stretched out access by building a lot of secondary schools to increase the number of students transiting from primary school to secondary school. However, this overall increase in enrollment is higher than the enrolment of girls in Physics even compared to Chemistry and Biology and with that of boys on the same subject. Mostly, girls will tend to score the lowest grades of D and E in Physics in KCSE in many consecutive years while boys score higher grades. Releasing 2016 KCSE results, the then Minister of Education commended on the poor performance noted in Sciences compared to other subjects.

1.2 Statement of the Problem

This study intended to explore the possible aspects connected to girls' enrolment and their performance in high school Physics. The study sought to compare the low enrolment and their poor performance with those of Chemistry and Biology. Both of these other two Science subjects have recorded high enrolments in the past and recorded better grades and mean scores for girls nationwide than those registered in Physics. Thus, this trend tends to put Physics at a disadvantage as many girls choose a subject based on past reports. Physics is a fascinating subject but only appeals to a few girls as the rest of them may be afraid of failure and being in poor performance records. The ministry of education, education officers and stakeholders, teachers, parents, and the students find the low enrolment and poor performance quite a challenge.

According to Kariuki (2007), there is a gap between the enrolment and performance of Biology, Chemistry, and Physics, and it needs to be narrowed. He considered their determinants in Physics and concluded that there is no study to scrutinize the main factors that influence both the enrollment and the low grades noticed in Physics. Therefore, under this consideration, then the study intends to explore factors that affect girls not to enrolment in Physics or enroll and achieve low grades in Kaiti Sub County.

1.3 Purpose of the Study

This study was determined to profoundly scrutinize the factors liable for low numbers noticed in girls' enrolment in Physics, and subsequently, the poor performance logged in Kaiti Sub County.

1.4 Objectives

The following were the study objectives:

i. To investigate the role of schools' learning environment on girls' enrolment and performance in Physics.
ii. To investigate the effect of Mathematical skills in Physics on girls' choices, enrolment, and performance in Physics.
iii. To determine the influence of the parents' education level/ career occupation on the girls' enrollment and performance in Physics.
iv. To determine if girls' career choices and influence from other students/peers affect their enrollment and performance in Physics.

1.5 Research Questions

The study envisioned to answer these questions:

i). How is the school learning environment influential to the girls' enrolment/performance in Physics?
ii). Do the girls' Mathematical/computation skills affect their enrolment/performance in Physics?
iii). What is the role of parents in the enrolment/performance of girls in Physics?
iv). How does girls' attitude impact on the girls' enrolment/performance in Physics?

1.6 Significance of the Study

This study's findings will be of importance to curriculum developers, the examination bodies, teacher trainers, quality assurance officers, and the Physics teachers. The study results will help the Kenya Institute of Curriculum Development (KICD) in the institution of curriculum

changes to improve on the higher enrollment number and better performance in Physics. Furthermore, the findings can be used by publishers of learning resources to be sensitive to the curriculum's gender-responsive issues. The Kenya National Examination Council (KNEC), an examination body, will use these findings to produce well-adjusted assessments and evaluations. The teacher employer TSC will also be able to use the report of this study to employ and place teachers in schools putting in mind the students' needs. Girls will be able to attain better grades in their KCSE Physics. Thus, the formulated policies will improve on the enrolment of girls' in Physics.

The teacher trainers in various education colleges and universities will employ these findings in teaching the teacher trainees. In turn, the teacher trainees will use these skills in instilling information and knowledge to the students when posted to their respective schools. The quality assurance officers, both nationally or in the county can use these findings to advise Physics teachers about the girl's low enrolment and poor Physics performance. Such recommendations will be of fair use to monitor the national girls' enrollment and performance in Sciences. The Physics teachers will be able to use the study findings in adopting improved teaching methodology. They will know the suitable strategies that will increase the number of girls taking Physics. Consequently, the girls' academic performances will grow and hence attract more girls to choose the Physics subject.

1.7 Delimitations of the Study

The research was undertaken in secondary schools within Kaiti Sub County. It involved female students only, even though there was a comparison of data for boys and girls. Both girls-only schools and co-educational schools were involved, and the main focus was on the factors that influence low enrolment and poor performance of girls in Physics. For the co-educational

schools, girls were the only focus. Some of the data collected included past reports of the KCSE Physics results. The area of study was familiar, and hence the research process was simplified.

1.8 Limitations of the Study

There were several challenges faced amid the study. Difficult access was a big challenge, owing to the distances and poor transport infrastructure for some schools. Some of the data collected were from the students' reports, and it may lack honesty. Additionally, some principals and Science/Physics teachers participated unwillingly because of their fear of exposing the schools' poor girls' performance. Also, others did not value the study's importance as poor performance seems like a norm to them, and many persuasions had to be done. Convincing some of the school administrations was such a challenge that I consumed a much more extended period than anticipated.

Liaising with the locals who own bodaboda helped in accessing some of the schools whose location was challenging. A large sample of the students' reports had to be considered to make comparisons before making conclusions. Emphasis on student honesty was put to ensure honesty in the feedback, and this required help from the teachers. Moreover, the principals and other teachers had to be given substantive reasons for the need for the study and be enlightened about its importance and impact on the girls' future performances. Planning time and a reasonable budget helped a lot in the data collection.

1.9 Assumptions of the Study

The following were the assumptions made during the study:

i. There is complete honesty from the respondents, hence providing reliable data.

ii. At form three, the students have stable attitudes formed for Sciences and Physics in particular

iii. The students have equal access and performance prospects, whether in single girls' schools or co-educational schools.

1.10 Definitions of Significant Terms

Academic performance – This is the act of academic achievement in a given field or area as expected.

Performance: These are the results obtained after carrying out an examination of Physics.

Quality education – This is education that focuses on the whole child—the social, emotional, mental, physical, and cognitive development of each student regardless of gender, race, ethnicity, socio-economic status, or geographic location.

Co- educational schools -These are schools composed of both sexes.

Enrolment - The number of students who opt to pursue Physics to KCSE level.

Gender - This refers to the socially determined power relations, roles, responsibilities, and entitlements for men and women, girls, and boys.

Physics - This is the study of matter in relation to energy and laws that determines the universe's structure.

Elective Subjects - Subjects that a student chooses from a given number of choices. They are not compulsory.

Bodaboda - A type of bicycle taxi originated in East Africa, transporting passengers and luggage from border to border. It was later adapted to transport people from one area to another and efficiently navigates the places with undefined roads.

1.11 Summary

In summary, the first chapter of this proposal briefly introduces students' performance in the KCSE, especially their performance in Sciences. We then narrowed down to explore the statement of the problem and the study purpose, mentioning the study's basis. The study objectives were also well stated, along with was the research intends to achieve. This study's success also renders significant to several education stakeholders and that results and suggestions could help enhance the education sector and performances of girls. Delimitations and limitations of this study were also mentioned, and all factors held constant, this study could be a success. Several assumptions have been considered to carrying out the research. New terms and abbreviations have been defined at the end of the study to guide anyone who gets to read this research report.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter covers the literature used to provide insight into the study's theoretical framework. They are the possible influences that lead to girls' low enrolments and poor performances in secondary school Physics. Thus the review of this chapter focused on some selected factors that influence enrolment and performance. The issue of gender parity and the factors the influence enrolment and performance was focused on in the past by other researchers and educationalists. According to Summers (1994), *educationalists and researchers believe that gender balance involves paying extra attention to the girls by offering increased participatory opportunities and having their views heard*. A lot was also written on the factors in question, aiming to improve the state of affairs (Mwangi, 1986).

We learned from the women and gender studies that our school classrooms could sometimes turn hostile for the learners rather than positively impact them (Kariuki, 2007). The study aimed to discover the issues that relate to low enrolment and poor performance in Physics. The chapter reviews the vital literature established from past studies that intended to provide insight for the factors likely to impact girls' enrollment and performance in Physics.

2.2 Body

2.2.1 Low Sciences Enrolment

The launching of the 8-4-4 system of education in 1985 was meant to provide a relevant curriculum offering practical skills for career opportunities and equitable education distribution. By that time, Physics was learned as a compulsory subject for all the learners. However, in 1992 it became a non-compulsory subject, with the learners being allowed to choose any two Science subjects – either pure Sciences, Physical Sciences, or biological Sciences (Kenya, 1984).

In the present, the ministry of education gave a directive for the students' Science choices to be at least two pure Sciences. Past poor performance records in Physics then lowered the chances of it being chosen by most students. It translated to an extremely low enrolment for the girls in Physics compared to boys in the same subject (Jones & Wheatley, April 01, 1988).

An examination report from KNEC (2010-2018) indicates the candidate's low Physics KCSE enrolment in comparison with Biology and Chemistry. Despite all the stakeholders' intervention, there is a slight improvement over the years for selecting Physics. The numbers are still low.

Table 2.0.1 National Science Girls' Enrolments (2010-2018)

Sub / **Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Physics	15312	16094	16966	19288	21376	23767	25411	29233	29964
Biology	87141	91108	97641	113605	108065	118395	131681	143359	148729
Chemistry	87725	92615	99558	116826	111969	122532	143241	149755	155725

(Source: Annual Examination Report 2010-2018)

2.2.2 Physics Performance

Table 1.2 shows that both National and internal examinations performance is a very crucial factor for the students' subject choices. A good performance in Physics appeals to the students, boosting their morale to settle on Physics-related professions. Nevertheless, the girls' poor performance in Physics is not impressive. This poor performance in Physics exams is a contributive factor to girls' low enrolment as the results dishearten them to take the subject even when they had a prior interest. Summers (1994) discussed the worldwide plea of some learners

who view Physics as a complicated subject and should be dropped from the education syllabus. Science basics work hand in hand with a child's advanced Mathematical skills. Additionally, Physics requires most of these Mathematical skills in its lab-related calculations. Basic arithmetic and advanced mathematics are essential for all students since they undertake at least two of the three Sciences. Their performance in the university is also based on these skills.

Physics is the only Science with an extreme dominance of male students. In the 2001–2002 academic years, Snyder (2006) reported women ratios in the US bachelor's degrees as follows: Biology-62%, Chemistry-42%, Mathematics-47%, and Physics-22%. Primarily Science was developed by males, which tends to spill over to how it is practiced, hence involving male-focused practices (McCullough, L., & Institute of Physics (Gran Bretaña), 2016). Table 1.2 indicates Physics performance for both boys and girls has been low from 2008 to 2013, and a slight improvement between 2014 to 2018 National examinations.

Table 2.0.2 National Science Performances (2012-2017)

	Year	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Subject	Total enrolment	198356	207730	222676	260665	243453	276239
Physics	Girls mean score	26.61	29.09	31.41	32.85	39.07	39.04
	Boys mean score	30.89	32.28	35.25	35.99	40.82	42.23
Chemistry	Girls mean score	22.05	24.04	25.76	24.54	22.56	22.65
	Boys mean score	22.62	29.30	30.43	29.44	27.01	27.68

Biology	Girls mean score	24.58	27.23	32.91	27.24	25.00	38.99
	Boys mean score	28.24	31.35	37.64	32.01	29.84	44.70

(Source: Annual Examination Report 2012-2017)

2.2.3 School Learning and Teaching Environment.

The impact of the school environment is different for males and females. Critical gender issues exist in the school's physical scope, social scope, and academic scope. A research report by Mudulia, Mabel, Ayiro, Laban, & Kipsoi (2017) indicated that a poorly equipped school environment has a more significant effect on the girls. Most school communities are unable to provide adequate and gender-sensitive infrastructure for the students. Even though one of the causes is a scarcity of resources to cater to these needs, there is the fact that some of these communities are just insensitive to girls' needs. Urgent attention should be taken soon as the quality of education is affected by the situation. Moreover, the school worker's morale goes low with an environment that is not conducive to working. Consequently, their efficiency is impacted and results in the learners' low performance (MOE, 2012).

The out-of-school factors influence within-school aspects. So there is the need for the education stakeholders, including the government, the politicians, communities, educationalists, parents, and teachers, to offer their support to the schools (Coumbe, 1994). Support from the outside is essential for any school, but this does not necessarily guarantee that the students perform well. School literature suggests the presence of factors emerging from within the school, such as a favorable environment and effective teaching system for a good performance. The school head and management are determinants of an empowering learning milieu (Gipps, Murphy & ProQuest (Firm), 2003).

A good school head with high notch administrative and management skills is most likely to have the girls achieve better grades in Physics. With such skills, the leaders have the objectives of the learners as a primary priority. Thus, it is a school's responsibility to provide a favorable environment for the girls to be better placed with fair competition in learning Sciences in and out of the classroom. High achievement in a subject pushes the students to be favorable to the subject. Therefore, there is a strong motivation towards the subjects that bear academic yields. Unlike developed countries, developing countries consider school a powerful change agent (Heyneman, 1975). Heyneman observed that developing countries have a more significant influence on school quality and academic performance.

Thus, high school Physics teachers can be given some substantial ideas for trial to prepare students transitioning from secondary Physics to university Physics. Researchers can also use these suggestions in answering questions and implement pedagogy in the education sector (Gipps, Murphy & ProQuest (Firm), 2003). The recommendations lacked information on the importance of the pedagogies to attitude and interest, which is a basis for further study within the particular domain. More time ought to be spent on the understanding of Physics other than too much irrelevant content, e.g., spend more time on mechanics and optics other than the history of Physics. Time spend on Physics-related videos is also increased while making reforms on student-designed projects, pre-practical discussions, and post-demonstration discussions to take lesser time. Furthermore, ensure they can ensure that tests and quizzes include problems that require calculations.

There are recommendations for the same Physics teachers to use components that help students understand concepts powerfully for the balance of gender differences. Memorization is acceptable in Physics' learning, but then the rote-learning strategies such as cramming should be

minimized. An effective strategy is to use real-world examples in the teaching to correlate them to the taught theories. Limit replication of problems and assessments to learn to focus on understanding the concepts other than cramming. Additionally, the study's results suggested that male and female students use different pedagogies to learn the subject effectively. It could be the reason for the success of single-sex education to improve female performance using the reformed curricula. Teachers were also trained to develop the self-concept of the students.

The focus of these reforms is solely on the pedagogy that is effective for female students. This study's results were tested using single-gender classrooms, and further testing can be through the use of actual classrooms. One critical perspective is that fitting female into the "correct" mold displays bias on one gender since females still do well in a single-gender class setting. Another view is that female percentages in Physics have increased with time and thus keeping them interested in the subject in all stages will help improve their performance and increase their numbers. Eventually, females will be able to make changes in the field from within as their numbers have multiplied. "Border crossing" of the females from the outside to the inside is what this study facilitates, as the females will invade the Physics world with an upper hand, and that is a good performance (McCullough, L., & Institute of Physics (Gran Bretaña), 2016). Last is ascertaining the high school Physics and determining the factors influencing females to have an interest in Physics and pursue Physics-related courses in the university.

2.2.4 Mathematical skills in Physics

There is a vital link that exists between Mathematics and Physics subjects (Hutchings, 1993). In the teaching of both of these subjects, it is easily noticed that some of the topics in the syllabus are shared, e.g., Mathematics-Trigonometric graphs are similar to Physics-Waves. Previous studies show that several factors influence the learning of secondary Science and

amongst them is the Mathematical ability of the students. This ability is significant in Physics performance. Mwangi (1986) concluded that the amount of time devoted to Mathematics by the students determined the subject's performance and improved Physics performance. Britain's Assessment of Performance Unit (APU) findings supported this conclusion. Tests for mathematical abilities such as graphs, charts, gradients, and averages showed a bit of boys' superiority in mathematical items.

The male students tend to overpower female students in other situations where manipulation of objects is required. Moreover, as opposed to female students who tend to despair fast when presented with a challenge, male students are always more likely to persist until they get solutions (Twoli, 1986). Previous research by Yalçınkaya (2015) concluded that a grave mistake which Science students make is to take Mathematical variables as symmetrical entities other than asymmetrical i.e., distinguishing between the independent and the dependent. This study aims to find out the impact of Mathematical and spatial aspects in Physics on the girls' performance and hence increase enrollment in Physics.

2.2.5 The Role of Parents

According to Dale (2017), parents tend to discourage their female children into studying Sciences, advising them to undertake humanities. Parents stereotype Science as being more masculine and humanities as feminine. This belief worsens the situations in terms of enrolment and performance in the Sciences. The perceptions held by parents regarding subject importance determine the encouragements that they offer to the children. The child's kind of opportunities, such as toys, reading materials, playing activities, is from the parents' list of essential learning grounds. Therefore as the child grows up, their perception of importance is based on the beliefs related to particular subjects being crucial for future careers.

For instance, the gender-based roles practiced at homes prevent girls from activating their cognitive structures early. It hinders the girls from facing the complex cognitive situations found in Science (Corrigan, Gunstone, & Jones, 2013). Thus responsibilities instilled in girls from their childhood days disadvantage them from gaining much-established skills. Keister (1990) suggested that the idea adopted by most parents to buy play cars for boys, whereas girls are given dolls, should be discouraged. Parents should provide equal opportunities for the girls to experience scientific activities, boosting their societal Science orientation. To save the female children, parents need greater confidence in facing society and its beliefs to accomplish more and give them an opportunity to what the future entails. As observed in America's junior high school, a Mathematics/Physics tutor needs to understand the grade school courses for her to do well in her job (McCullough, L., & Institute of Physics (Gran Bretaña), 2016).

A family's socio-economic status is determined by the parents' education level and their occupation/income, which are believed to influence their children's school participation and achievement. A report indicates that children whose fathers were educated performed better than those whose fathers never went through schooling. School and teacher differences have lower influences than those by parents (Abeti, 1983). This point's affirmation can only mean that the academic performances vary from child to child and from school to another due to the different socio-economic statuses. The diverse conditions in different home environments have a hand in shaping the children's academic abilities. A home and the community need to provide an environment conducive to a girl's mental development, provide her with social needs, and create a strong basis for her school learning. The educated parents provide the right study environment, learning materials, and offer assistance on assignments.

Family size, especially in developing countries, is a primary contributor to the performance of girls. Most large families are poor and with low or no income to support their children's education. The financial constraints see them prefer supporting boys other than girls, making their schooling unsteady and resulting in poor performances. The family sizes have greatly affected girls' education, and the parental attitudes that work in favor of boys and disadvantage the girls results in low academic achievements from the girls.

2.2.6 Girls' attitude towards Physics

A study by Coleman (1966) indicates that girls' interest in Science is much lower than that of boys. Educators have tried to address questions behind the more significant numbers of girls choosing Biology instead of Physics. Some Kenyan studies (Pande, January 01, 2018) argue that unresponsiveness from both the female students and teachers combine to discourage females from participating in Science and other related careers. Such negative attitudes are the root cause of the low performances in high school examinations. The participation of girls in Science-related activities at an early stage contributes to their enrolment in Science-based careers.

Generally, there are better performance records from boys than girls in Mathematics, Physics, Chemistry, and Biology. For the girls, they tend to be more adept in languages than boys, as debunked in the year 2008 to 2013 KCSE performances with the superiority of boys in Sciences compared to girls being easily noted. The parents, teachers, and female students are to blame for the negative attitudes created towards Science and particularly in Physics.

Another contributory attitude for the girls is the classroom's teaching-learning transactions. According to Harrison (2002), the current learning theories suggest that learning is a constructive goal-oriented process, and the cognitive and emotive body parts complement each

other in participation. Formal school lessons indicated that most teachers use the lecture method to convey knowledge to the students rather than guiding them in a process that actively involves them. The students only play a passive role in the learning process (Somerset & World Bank, 1987). Daily achievements boost the students' confidence and enable them to successfully carry out practical in the laboratory (SMASSE, 2009). The study aims to determine factors that could influence the girls' negative attitudes affecting physics enrollment and performance.

In summary, the research aims to determine the effect of girls' attitudes, school learning environment, parents' decisions, girls' attitudes, and their Mathematical skills on enrollment and performance in secondary school Physics in Kaiti Sub County. It is based on the fact that most girls mentioned the above factors as determinants of the overall performance.

2.3 Theoretical framework

This research is guided by Victor Vroom's expectancy theory of motivation and Jean Piaget's constructivist theory of learning. The expectancy theory states that:
"employee's motivation is an outcome of how much an individual wants a reward (valence), the assessment that the likelihood that the effort will lead to expected performance (expectancy) and the belief that the performance will lead to reward (Instrumentality)" (Vroom, 1995). According to Vroom, "the theory rested the assumptions that motivation was a conscious process in which decisions lawfully related to psychological events that occur contemporaneously with behavior, and those forces in the individual and environment combine to determine behavior." Valence refers to the power held by the preference of a person to attain a specific outcome. For example, when a teacher needs a promotion, then she/he is said to have a high valence. The same applies to a girl who strongly wants to excel in her KCSE performance. Thus, if the girls attain an outcome, it is termed to be positive, while it is negative if it is not achieved.

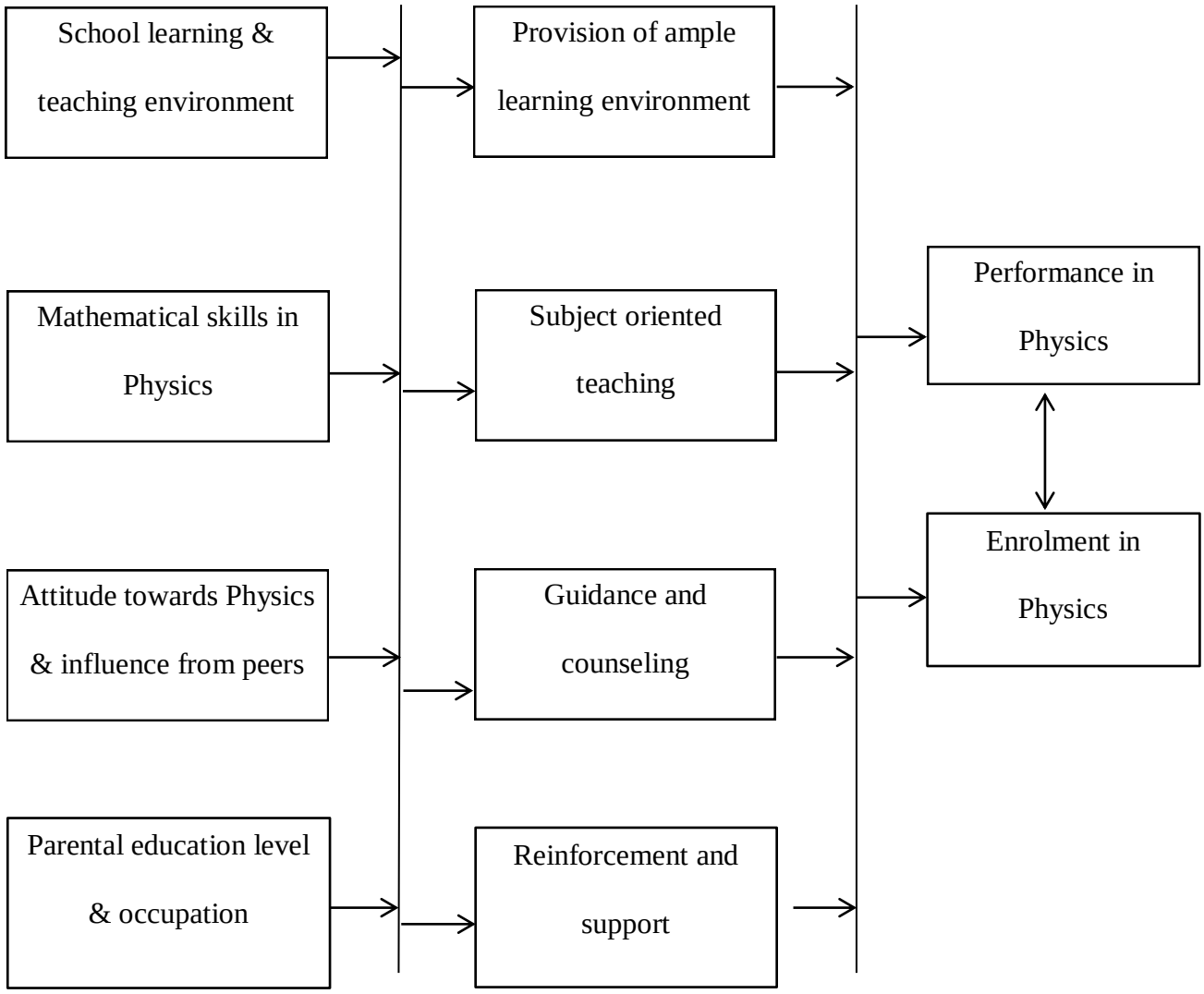
Expectancy is the probability of a particular effort leading to a specific performance. The attained outcomes depend on a person's choices as well as on other events beyond their control. For instance, no matter how well a teacher has taught his/her students, she cannot be confident of their success since this depends on other factors. The instrumentality factor is the probability of performance, resulting in the desired reward. It is based on a belief that upon completion of a task, then there is a reward. Thus, if the KCSE performance is positive, then this motivates the girls, and consequently, students can complete tasks given to them in school. Although the girls' performance in KCSE has several influencing factors, school-based and home-based, there are expected rewards at the end of learning. The expectancy theory of learning can, therefore, be used to explain KCSE performance.

On the other hand, the constructivist theory of learning assumes that "humans construct knowledge other than knowledge being transmitted into the mind." Piaget (1975) mentioned that peers and adults are critical players in a child's learning and development. Thus, both the peers and adults play a huge role in social interactions and learning and acquisition of Science concepts (Sternberg, 2000). The teaching of Physics is based on the understanding of the students' environment. If education and learning are based on prior knowledge, it becomes easy to conceptualize ideas in Science, and the student's performance dramatically improves. For a skillful teacher, each new idea introduced is supported by practical evidence, making sense to the students.

The study aims to determine the factors influencing low enrollment in secondary school Physics and, consequently, girls' poor performance. It uses the constructivist theory to link the girls' perceived experiences from their school environment, teachers, parents, and peers to the enrolment and performance in Physics.

2.4 Conceptual framework

Figure 2.0.1 Conceptual Framework of the Study



CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter discusses the approaches used in the research design, the target population, study sampling size and technique, research instruments, validity and reliability, methods of data collection and data analysis, the definition of terms, and ethical issues. The research process shows the link between the data collection conditions, those of data analysis, and the purpose of this research. It clearly describes the research instrumentation, sampling procedure, and the data collection and data analysis methods of obtained data. In the first section, the research samples and the process of selection are described. The second section describes the sampling procedure, clearly indicating the sample frame, technique, and size. Another area shows the data collection methods deployed to collect reliable data. There is a section describing the validity and reliability of the research instruments used. Data analysis methods used are in another area describing precise details on how the collected data was analyzed. The ethical issues necessary for the success of this research were also discussed in this chapter.

3.2 Research Design

The research design is the link between all the research elements, showing the relationship between the major parts of the study and how they work together, bringing out the purpose of the research. The study's structure or outline is used to respond to the research questions (Orodho, 2004). The research design used here was a descriptive survey. The descriptive survey is one in which information is collected through interviewing and providing questionnaires for the sample respondents to answer (Orodho, 2004). The advantage of utilizing this research design is that it was easy to study a large area, collecting numerous respondents' information. Moreover, the habits and opinions of the respondents were quickly captured. Thus

the teachers' and students' attitudes and school administration were conveniently collected for analysis.

3.3 Target Population

This study's target population was the form of three girl students in selected schools within Kaiti Sub County, Makueni County. They were the appropriate target to study because they have chosen subjects as they had exited Form Two, and they were preparing for KCSE in a year. Thus, having made such subject selections, they were considered mature enough to know what they desire in life and career path intended. They can effortlessly state the challenges in education and in studying Physics. There are 34 secondary schools in Kaiti Sub County, estimated with 15,000 students and approximately 1,260 girls in form three. Of these schools, 6 are girls' only schools, and 22 are co-educational schools. The study targeted 18 selected schools, with the respondents being the principals, heads of Science departments, and Physics teachers, Form Three female Physics students. The research was diverse and represented all groups.

3.4 Sampling procedure

The selection of the study samples involved stratified random sampling, which suited both the girls' only secondary schools and the co-educational secondary schools. It is because the interest of this research was to investigate the Physics' enrolment and performance for girls.

Purposive sampling was used to select the high performing schools, the average, and the low performing schools. The number of high-rank schools within Kaiti Sub County is fewer than the average/low-rank schools. The use of simple random sampling selected the students. The independent variable was well observed to be clear of the dependent variables to enable the research to determine the contributory factors of the study towards the dependent variables.

3.4.1 Sample frame

Below is the study's sampling frame:

- 3 HP girls' only schools
- 3 LP girls' only schools
- 6 HP mixed schools
- 6 LP mixed schools
- 45 students in HP girls' only schools
- 45 students in LP girls' only schools
- 60 students in HP mixed schools
- 60 students in LP mixed schools
- 6 teachers in HP girls' only schools
- 6 teachers in LP girls' only schools
- 12 teachers in HP mixed schools
- 12 teachers in LP mixed schools
- 3 HODs in HP girls' only schools
- 3 HODs in LP girls' only schools
- 6 HODs in HP mixed schools
- 6 HODs in LP mixed schools
- 3 principals in HP girls' only schools
- 3 principals in LP girls' only schools
- 6 principals in HP mixed schools
- 6 principals in LP mixed schools

3.4.2 Sampling Matrix

Table 3.1 below indicates the sampling matrix used to show the population of the schools and the selected samples that were chosen to represent these schools.

Table 3.0.1 Sampling Matrix

Category / nature of secondary school		**Number of sampled schools**	**Number of sampled students**	**Number of sampled Physics teachers**	**Number of sampled HOD Sciences**	**Number of sampled principals**
Girls' only schools	**HP**	3	45	6	3	3
	LP	3	45	6	3	3
Mixed sec schools	**HP**	6	60	12	6	6
	LP	6	60	12	6	6
Total		**18**	**210**	**36**	**18**	**18**

HP: High Performing, LP: Low Performing, HOD: Head of Department

3.4.3 Sampling Technique

A stratified random sampling technique was applied so that all the school categories, as shown in the sampling frame, were represented. Six (6) girls' only schools and twelve (12) mixed schools were picked to represent each category giving a total of eighteen (18). More girls were taking Physics in the girls' only schools than in the mixed schools, with an average of thirty (30) Physics students per class in the girls' schools and twenty (20) students per class in the mixed schools. Moreover, selecting more girls' only schools than for the co-educational schools was

because the purpose of this study was focused on the study of Physics by girls. The total number of students sampled from the selected schools was 210. Two (2) Physics teachers and one (1) HOD were selected through purposive sampling from each participating school. All school principals also responded to the survey.

3.4.4 Sample size

The research sample size was eighteen (18) secondary schools within the sub-county, purposed to meet at least half (50%) of the total number of schools within the study area. A proposed ratio of schools' random sampling was one (1) girls' only school for every two (2) co-educational schools in Kaiti Sub County. Furthermore, for cost, efficiency, and time, simple random sampling was deemed the most reliable in schools' choice. A study was termed as suitable and valid if it can use at least ten percent (10%) of its sample size to determine the sample population.

3.5 Methods of Data Collection

The following were the data collections methods considered to be most reliable for the study:

- Questionnaires
- Achievement tests
- Interviews

3.5.1 Questionnaires for Students and Teachers

The questionnaires were designed to gather relevant information from the students and the teachers, including the school heads.

Peil (1995) outlined the following benefits of using questionnaires:

- A large population can be covered quickly, using little personnel and low is relatively cheap.
- The anonymity allowed for the respondents improves their honesty with answers.
- Avoids biasness as opposed to interviews
- It provides humble time for the respondents; hence hasty answers are mostly avoided.

The school heads were to fill in the questionnaires to provide such information as the academic profile and other important details like the research's school profile. Information regarding the KCSE performances of the selected schools was also availed. Thus it was easy to make comparisons of the performance of the national examinations and internal examinations. The results analysis was easy to interpret and make conclusions based on the purpose of the study.

The Physics teachers were targeted to provide information on students' attitudes, Mathematical skills, and their relation to the performance and enrolment in Physics. These teachers' opinions regarding such matters as the girls' computation know-how and its impact on the enrolment in Physics were necessary.

On the other hand, the students' questionnaires were intended to collect information about the girls, the school, and their parents. They planned to give the girls a free will to participate and provide for the research. It was easy to gain the girl students' truth since they were not being watched as they provided such information, so they felt confident in delivering a response. Here, the students provided such information as:

- The school environment and how favorable it is for the learning of Physics
- Their attitude towards Physics

- Their Mathematical and computation skills and their impact on Physics
- Difficulty levels for the Physics subject
- Peer pressure influence the selection of Sciences and Physics in particular
- Parents' influence on the selection of Physics

3.5.2 Achievement test

This test was purposed for the Form Three students from those selected schools only to collect this information:

- Girls' Mathematical and computation skills and their impact on Physics
- Girls' difficulty levels for the Physics subject

3.5.3 Interviews

Kathuri (1993) defines an interview schedule as *an outline of questions that form a basis for and guide the interviewing process.* The Heads of Departments were the target audience for the oral interviews conducted. The H.O.D.'s are also teachers teaching the students and thus have interactions with them in the girls' academic aspects and discipline. These interviews' primary purpose was to provide supplemental information for the data collected via questionnaires and achievement tests. They were done in the form of discussions, continuously recording the important points noted.

3.6 Validity and Reliability

3.6.1 Validity of Instruments

The use of two different instruments to measure a similar concept is applicable in determining validity. The measurements collected from these instruments were correlated to compute the validity coefficient of the research instrument. One sample is used to provide data

for collection, and this data is simultaneously obtained using the two instruments (Mugenda, O. M., & Mugenda, A. G., 2003). Besides, expertise and professionalism were applied in particular fields through teachers, HOD's and school heads. Predictive validity established the data collection instruments' validity through the prediction of impending subject behaviors by the professionals.

3.6.2 Reliability of Instruments

On the other hand, a random error in research can be influenced by reliability. An increase in this random error will lead to a decrease in instrument reliability. Thus, for the instrument to be most reliable, the random error magnitude should be minute. Some factors that may be overlooked during research cause deviations and lead to random error (Mugenda, O. M., & Mugenda, A. G., 2003). The split-half reliability technique was applied to minimize random error. It meant that the same data collection instrument was divided into random halves and administered to the same target group without altering set conditions. Each of the two halves was scored, and the final scores finally correlated to give the half-test reliability coefficient (r_{hh}).

Using the Spearman-Brown's reliability coefficient formula:

$$\boldsymbol{r_{sb} = \frac{2r_{hh}}{1+r_{hh}}}$$

r_{hh} = Pearson correlation of scores in the two half tests

r_{sb} = Spearman-Brown's reliability coefficient

The procedure steps include: splitting the achievement test into two approximately equal halves, administering each of them to a few of the targeted teachers and students, and then repeated this procedure with all the targeted form three students and all teachers. Final step was

finding correlation of the scores from the two halves. All other conditions were kept constant. SPSS was used to compute reliability of the Spearman-Brown's reliability coefficient. The obtained reliability coefficient was 0.75, and hence the research instrument was considered reliable. According to Carmines & Zeller (2008), an acceptable reliability coefficient obtained should range from 0.7-1.0.

3.7 Methods of Data Analysis

By definition, data analysis is the process that relies on methods and techniques of taking raw data, then cleaning, modeling, and transforming it to discover useful information for decision-making. Both qualitative and quantitative data analysis methods came in handy in this study to answer the research questions. Under quantitative data analysis, descriptive statistics inclusive of frequency distributions, graphs, percentages, and mean were obtained. Mean was used to analyze the achievement test handed to the girl students.

The questionnaires for the teachers and the students were analyzed based on the frequency of their responses. In addition to these, a close analysis of the interview information obtained with the critical points' isolation was also made. The percentages were significant in selecting the number of schools between the girls' only and the co-educational schools to participate. Their ratios had to be chosen decisively due to the difference in girls and the research purpose. Additionally, the same applied in the number of form three girl students to participate in the research. Graphics were also used to indicate the percentages and frequency distributions in figure form for fast visual information.

Narrative analysis and discourse analysis were the qualitative data analysis methods used since the data collection techniques are several; interviews, questionnaires, and achievement

tests. In ascertaining the data collected, qualitative data analysis involved familiarization with the data, re-reading, and transcribing through it to note the basic pattern. The question on the school learning environment, Mathematical skills, parents' role, and girls' attitude impact on the girls' enrolment/performance in Physics were answered through this. Common responses and patterns that could answer the research questions were noted.

The Statistical Package for Social Science (SPSS) techniques were used to sort the data analysis. The SPSS statistical technique was convenient for data analysis as it was possible to make data conversions making it easy to manage efficiently. Regression analysis under SPSS is vital as the dependent and independent variables could be stored in the same file, making them easy to relate. Changes in either of them were noted and explained.

3.8 Operational Definition of Variables

The school learning & teaching environment was measurable from the responses given through the teachers' & students' questionnaires and the HOD's interview on how friendly the school is for the learners. The respondents' perception of the school would convey how virtuous the school was for the students learning.

Mathematical skills were measured by the students' knowledge in the achievement test and the data they provided in questionnaires. The respondents' perception of their ability and liking of math-related challenges would also tell more about them.

The parental influence on their children was concluded from the students' responses to their levels of education and occupation and how they are influenced in selecting subjects. Peer influence was also noted from the students' responses and the interview responses.

Their attitude for Physics was learned from the response of the students on the same. The students' attitude towards Physics was also picked from the teachers' questionnaire and HOD's interview. Moreover, their attitude could also be obtained from how well and cooperatively they respond to the questionnaires and achievement tests.

3.9 Ethical Issues

This research was an academic kind of study. The relevant authorities involved were contacted to permit the research and ease of data collection from the target population. The county education officer authorized the visit to schools for data collection to reach the school heads finally. The school heads then made local arrangements with the HOD's, teachers, and students on how/when the questionnaires, interviews, and achievement tests could be done. Thus on finalizing the study, all collected data and information obtained would be kept confidential and could only be used strictly for academic improvement.

3.10 Summary

In summary, the chapter covered the issues on the methodology of the research. The estimated sample size and target population were also noted. The research elements were noted with brief explanations of the most suitable research techniques and instruments for this study's success. The appropriate validity and reliability tests were also mentioned here, giving the formula for use to determine the reliability coefficient. The methods for use included questionnaires, interviews, and achievement tests given to the respective selected respondents for data collection. Appropriate data analysis methods for quantitative and qualitative data analysis include percentages, frequency distributions, graphs, means, narrative analysis, and discourse analysis. The statistical technique considered appropriate was the SPSS program.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTEPRETATION

4.1 Introduction

This chapter focuses on analyzing and interpreting the research findings to establish its objective and answer the research questions. As earlier mentioned, the research variables are in the following categories; the school learning environment, the girls' Mathematical skills, the parents' education level/occupation, and girls' attitudes towards Physics & peer influence. I used Different analysis methods to analyze the data collected through questionnaires, interviews, and achievement tests. The questionnaires covered the students, teachers, and the principals while the H.O.D.'s got an interview. There was also an achievement test given to the students, aimed at testing their skills in Physics. I used quantitative and qualitative data analysis here as per the requirements of the data collection methods.

4.2 Rate of Response by Gender

There were 210 questionnaires distributed to the Form Three Physics girl students, and out of these, 200 were filled and returned while the rest halfway filled and returned. This result gave a 100% response rate. The 18 school principals and the 36 Physics teachers also received their questionnaires and filled them, giving a 100% response. The girl students filled the achievement test papers given to them, giving a 100% response rate. The 18 H.O.D.'s positively took the interviews conducted, and each turned up, hence a 100% response rate.

I ensured to capture all opinions and attributes of the H.O.D.'s through the interview schedules. These responses ensured the reliability of the collected data. Mugenda &Mugenda (2003) argued that a 60% response rate is reasonable and for social research, either 70% or higher is excellent. The 100% response attained was excellent for the research report. After the

collection of data presenting the demographic characteristics, then the presentation of findings followed. We considered the study objectives when presenting these findings.

Table 4.0.1 Data Collection Instrument's Response Rate by Gender

Research Instrument	Gender	Distributed	Returned	Percentage (%)
Students' Questionnaires	F	210	210	100
Principals' Questionnaires	F	10	10	100
	M	8	8	100
Teachers' Questionnaires	F	16	16	100
	M	20	20	100
H.O.D.'s Interview	F	7	7	100
	M	11	11	100
Students' Achievement Test	F	210	210	100

F-Female, M-Male

From the table above, it is evident that the research instruments' response rate was effective as of the instruments issued to the respondents and those collected back. Weekdays were the perfect days to conduct the survey, and it was easy to find the target respondents at the schools or even arrange with those not available on the planned visitation days. We scheduled all of H.O.D.'s interviews before the visitation days to attain a 100% response. As for the students' achievement test, a sensitization was arranged through their teachers to encourage them to

respond effectively. Therefore, all the 210 students targeted participated, 18 principals, 18 heads of departments, and 36 Physics teachers totaling 272 target respondents (100% response rate).

4.3 Teachers' Education Level by Gender

The Physics teachers responding to the questions provided information on their education levels, stating their gender. Of the participating 36 teachers, 16 were female, and 20 were male. Thus the females represented 44.4% while the male teachers made the other 55.6%. Out of the 16 female teachers, 10 held at least a graduate degree making 62.5%, while the remaining 6 held a diploma in education, forming 37.5%. On the contrary, the male teachers had 15 of them holding a graduate degree or higher, forming 75%, and the other 5 (25%) had diplomas. None had a master's degree, a certificate in education, or was untrained. This data indicates that the number of female Physics teachers is lower than that of their male counterparts.

Table 4.0.2 Teachers' Education Level by Gender

Education Level	**Female**	**Male**	**Total**
Graduate	10	15	25
Diploma	6	5	11
Total	16	20	36

The graph below indicates the ratio of the female and the male teachers by the education level.

Figure 4.0.1 Teachers' Education Level by Gender

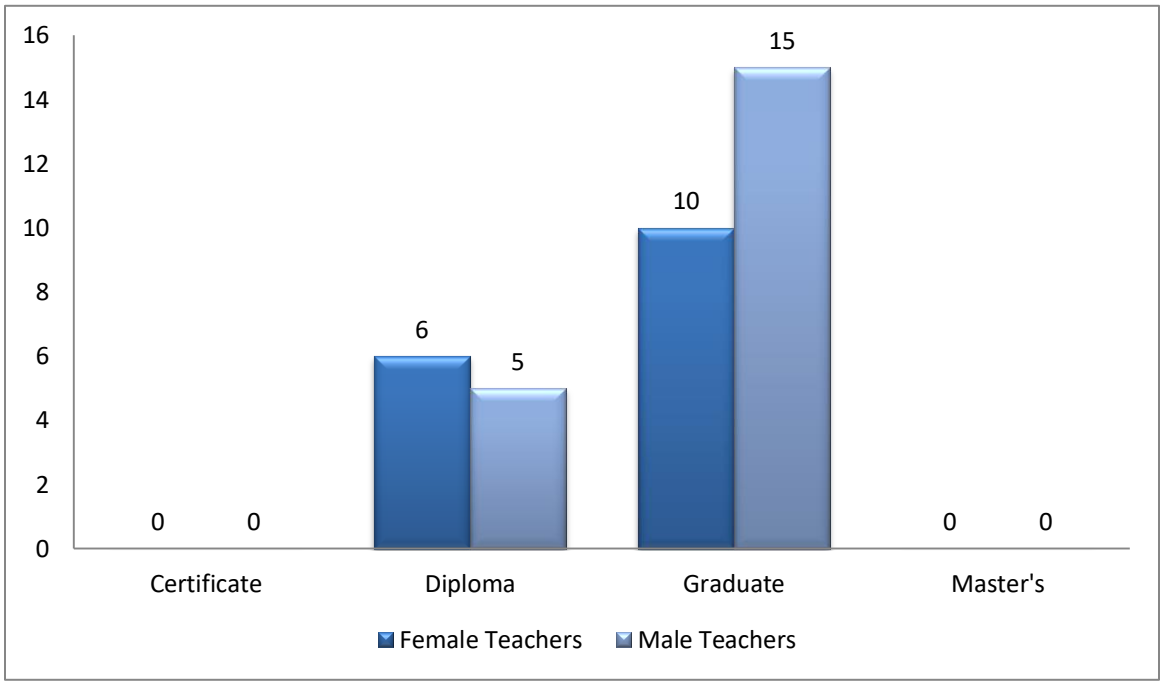


Table 4.2 and figure 4.1 show that the level of education is higher for male teachers than for female teachers. More male teachers are graduate degree holders while their female counterparts have more diplomas in education, raising the concern of why the females end up settling for less. The male dominating the Science field could reflect the imbalance of subject choices at secondary school level. A few female-teacher role models tend to dishearten the girl students into choosing Physics as a subject in their selections. On the contrary, the fact that we have more graduate degree teachers than diploma teachers indicates qualified personnel in the schools hence providing the girls with quality content. It is a direct contributing distinctive to the general factor of the school teaching & learning environment.

4.4 Influence of Girls' Attitude towards Physics on Enrolment and Performance

The study used students' questionnaires to collect information on the girls' feelings for Physics and their overall attitude towards the subject. I used a stratified sampling method on the

Form Three students. Data collected from them all with bias was from a high performing category school or a low performing category school. In the students' questionnaire, questions numbered 20, 22, 25, and 30 (appendix 4) tested for the students' attitude. There were 210 respondent girl students. Out of these, 142 (67.6%) gave responses to indicate that they disliked Physics, Mathematics, and the Sciences in general due to their in-depth content and difficulties. The stereotype that some of these girls believe that these subjects should be male dominant lowers their passion, and hence they end up not enrolling or performing poorly. They even fear taking Physics because they could end up with low grades as they said it is a challenging subject.

Most schools have used teacher initiatives to instill creativity for the girl students through encouragement for practical activities in the laboratories and steadfast assistance whenever necessary. 165 (78.6%) students strongly agreed with the encouragement received from their teachers as a push for them to study and excel in Physics. On the contrary, 20 (9.5%) students mentioned that they always initiate and push themselves to study and excel in the subject while another 15 (7.1%) get the most influence from their parents/guardians. Ten students (4.8%) chose not to respond to the matter.

Table 4.0.3 Support of Girls' by Teachers, Parents and Themselves to Study Physics

Support Origin	**Frequency**	**Percentage (%)**
Physics' Teachers	165	78.6
Students themselves	20	9.5
Parents/Guardians	15	7.1

Neither themselves/teachers/parents	10	4.8
Totals	**210**	**100**

Table 4.3 shows that students get more support from their teachers as compared to other people. Thus the teachers play a very crucial role in the enrolment, learning, and performance of the girls in Physics. When compared to girls' performance in other subjects, especially the languages, girls perform poorly in Physics and much excel in languages. It is, therefore, essential to note that in as much as teachers play their role in pushing them to study Physics, the girls need to create a positive attitude for them to be able to get better results. This conclusion corresponds to the gender policy from the ministry of education (M.O.E., 2012) that students' attitude contributes to their performance. According to Kariuki (2007), a positive attitude towards a particular subject is very likely to bring about good performance in the subject, while the contrary is true.

4.5 Teacher Difficulties in Teaching Physics

The teachers' questionnaire collected information on the teachers' difficulties in the teaching of Physics, including any of the challenging topics. There were 36 respondent Physics teachers, having chosen two from each of the selected schools and 18 H.O.D.'s, some of whom also share the two positions. Of them all, 67% responded that it was easy to handle most of the topics in the Physics syllabus. They however, indicated that some topics such as electromagnetic induction, electronics, and waves seemed to challenge most students' understanding. The difficulty level of the subject was also responded to by the teacher and the H.O.D.'s.

Table 4.0.4 Teacher Difficulties and Students' Performance

Topics	Students' Performance in Class	Percentage (%)
All topics are easily handled	Above average	67
Topics are hard to handle	Average	23
No response on the matter	Below average	10

From the above table, it is evident that most teachers find that most topics are easy to handle despite having some students with negative attitudes. We can say that this could be due to highly trained and competent teachers with professional qualifications to teach Physics. The topics identified to be difficult for comprehension were handled by the teachers with more experience in the schools, as learned from the H.O.D.'s interviews. A few teachers agreed that some topics are challenging to deliver to the students, especially Mathematical skills.

On the other hand, the students indicated that Mathematics was a challenge to them, which was why they ended up disliking Physics. Their poor performance in Mathematics could also translate to poor performance in Physics. According to this study, 55 (26.2%) students have a particular interest in the Physics subject, and they work hard to excel (Torongey, 1986). 113 (53.8%) of the students have to put more effort into the subject because they were just average in Mathematics concepts. 42 (20%) were reluctant about performance and just put little or not so much effort. The students' questionnaire items 22, 25, 30, and 34 were easy to get this evidence.

Further, the above percentages intended to surface from the fact that after excelling in Physics, one was able to qualify for some marketable courses like engineering, medical doctors, etc. (Mwangi, 1983). With the use of a proper teaching methodology to approach the so-called

complex topics, then the performance in Physics will get better. A collective responsibility from all the parties here, i.e., the learners, the parents, the teachers, and other educational stakeholders, is of great importance when settling on the best manner to handle difficult Physics topics. As stated by Waititu (2004), emphasis on evaluation policies and learner motivations should encourage students to work hard and smart in the subject.

4.6 Students' Commitment to Physics

The students' questionnaire established that the commitment the students have to Physics has a direct effect on performance. As earlier mentioned, 55 (26.2%) of the students have a staunch commitment to study Physics without being pushed by either teachers or parents. A committed student will show interest in the subject, such as joining the Physics club, be a member of a study group, and always consult the Physics teachers when in need of assistance.

Table 4.0.5 Students Commitment to Physics

Students' commitment in Physics	**Frequency**	**Percentage (%)**	**Last Physics Performance**
Students who study on own initiative	55	26.2	B and above
Students guided by teachers	142	67.6	C
Students who don't study on their own	7	3.3	D
Students who don't ask for	6	2.9	E

guidance			
Total	210	100	

Table 4.5 indicates that a higher percentage of the girl students were at least average in Physics in their previous exam. This outcome shows that they have developed strategies effective to beat low performance. These strategies could be study groups to discuss and revise content learned in class. Furthermore, the teachers' consultation also contributes to creating a positive impact on the girls as they guide on the subject value and its effect on life. Those students who solely rely on the teachers' guidance have an average performance. If these students made an effort to study independently, then there are chances that their grades will improve. The other percentage of students who don't bother to put any effort at all, and it is upon the teacher to push them to have low grades. Thus, for any good performance, learning should actively involve both the teachers and the students with the subject.

Figure 4.0.2 Students' Commitment to Physics

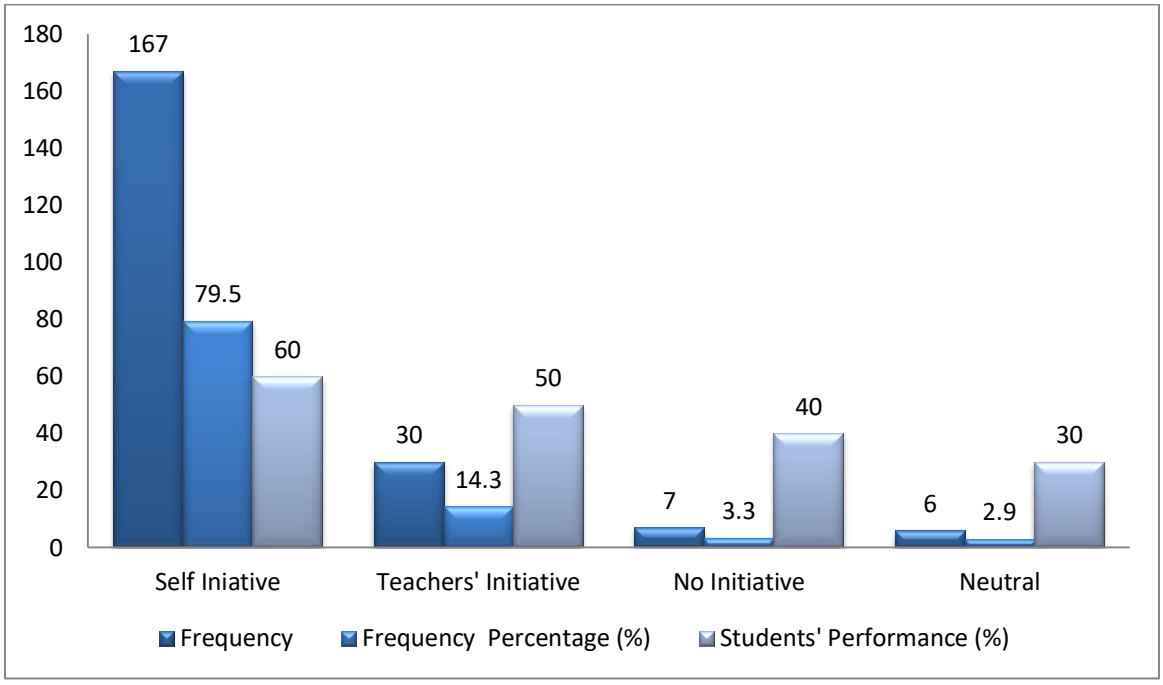


Figure 4.2 above indicates the same results. During the scheduled interviews with the H.O.D.'s, most of them mentioned that the students ought to be aware of Physics' career opportunities. The schools have been continuously creating such awareness to encourage more girls to enroll in Physics.

4.7 Students' Primary School Science versus Secondary School Physics Performances

In the students' questionnaire, items 2 and 6 sought to compare the girls' performance in primary school Science and after the transition to secondary school. The scheduled interview sessions also got the H.O.D.'s commenting on how the students fair in secondary school compared to the primary school results. The 210 respondent students gave the impression of non-weak students in primary school Science. 60 (28.6%) girl students mentioned that the scored A in their KCPE Science, 85 (40.5%) scored grade B, 45 (21.4%) scored C, and the remainder 20 (9.5%) scored grade D in KCPE. However, these numbers seem to take a turn as they did not

seem to apply for the previous internal exam they sat for before the research. Only 25 (11.9%) scored grade A in the exam, 30 (14.3%) scored B, 142 (67.6%) had grade C, 7 (3.3%) had grade D and 6 (2.9%) had an E. The previous trend seemed to have changed for the worst.

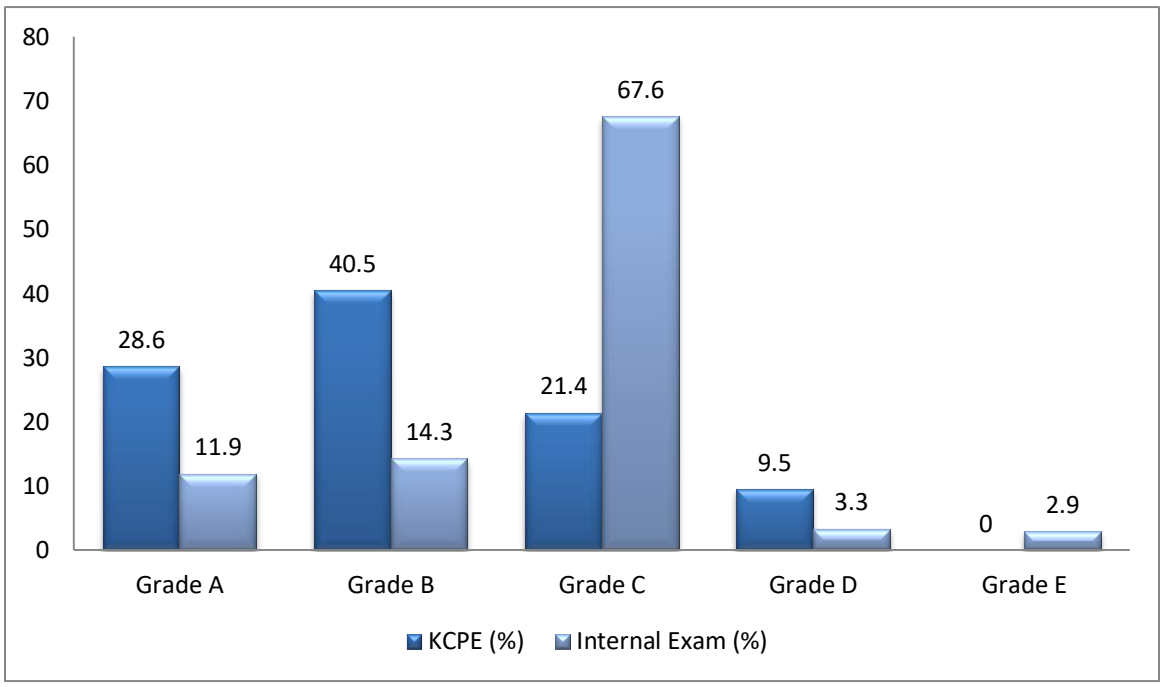
Table 4.0.6 Students' Primary School Science and Secondary School Physics Performances

Grade attained	**KCSE Performance**	**Previous Internal Exam Performance**
A	60 (28.6%)	25 (11.9%)
B	85 (40.5%)	30 (14.3%)
C	45 (21.4%)	142 (67.6%)
D	20 (9.5%)	7 (3.3%)
E	0 (0%)	6 (2.9%)
Total	210 (100%)	210 (100%)

From table 4.6 and figure 4.4 indicates that there are several deviations between the two examinations. Most girls performed better in KCPE than in their internal examinations. Primary school Science is taught as a single subject while the high school gets Science to split into three; Physics, Chemistry, and Biology. There seems to be negative energy developed by the students due to this transition. Furthermore, the students mentioned that the primary school Science was less bulky with some concepts that could be crammed and let them excel. In high school, Science gets deep, and there are more than just the classwork theories taught and the cramming of concepts.

The students have to get to practical sessions in laboratories, which may lead to single-minded students' failure. The absence of laboratories in primary schools deters students from thinking diversely and obtaining more scientific skills. Moreover, we note that some of those who scored above average in KCPE did not necessarily get good grades in the internal exams. This negative transition is worrying since it could mean that the students became less focused in high school Physics. This outcome could be that the girls have created some stereotype imaginations that Physics is a complex subject for the female gender (Amadalo, 1998).

Figure 4.3 Students' Primary School Science versus Secondary School Physics Performances



4.8 The Role of Parents in the Girls' Physics Enrolment and Performance

The study sought to establish the relationship between parents and the enrolment of the children in Physics. From the collected data, most girls indicated having their parents play a vital role in the subject choices. 158 (75.2%) of the respondent girls stated that their parents guided the pros and cons of enrolling in Physics and supported them with study materials on the subject.

Table 4.0.7 Parents' Influence on Learning of Physics

Parents' Influence	Satisfaction Level (%)	Implication on Learning of Physics
Provision of Necessary Study Material	75.2	Increased skills, knowledge, and competency in Physics
Guidance/Encouragement in Subject Selection	75.2	Self-confidence in taking up the subject
Other Needs	70	Readiness to learn the subject

From the table above, parents play an essential role in the enrolment and performance of girls. Parents wish to see their daughters succeed in life. From the data, most of these parents have attained at least a diploma level of education. It shows that they understand the importance of education. Such parents wish that their daughters excelled at higher levels than they did. They provide study materials such as revision books and practical equipment for the bit where Physics and Science, in general, require practical know-how. With sufficient study material, the students will better understand the subject and have efficient, practical skills, living up to their professional career choices. They also support their daughters and encourage them to do better by providing revision books and support for things such as Physics symposiums and Science clubs. These give the girl students morale to work hard and perform better in Physics.

4.9 Family Influence on Career Choice

In establishing the influence of family on performance in Physics and career choices, the study sought to obtain data related to this through appendix 4, items 8, 9, 23, and 28. Out of the

210 girls, 142 (67.6%) stated that their parents had a first-hand influence on their future occupation and career choices. 55 (26.2%) had their teachers guide them in career choices while the other 13 (6.2%) either did not seek any assistance from teachers/parents, or they just chose not to follow their guidance.

Table 4.0.8 Family Influence on Career Choice

Student's response	**Frequency**	**Frequency percentage (%)**	**Performance in Physics**
Career choice by parents	142	67.6	Average performance
Career choice by teachers	55	26.2	Above-average performance
Career choice done individually	13	6.2	Below-average performance

From table 4.8 above, most parents greatly influence their daughters' career choices and tend to push them to take subjects related to such careers. A student whose career choice was a doctor stated her reasons for that future occupation was to appease her mother because the mother always wanted to be a doctor but ended up in law. It means that she would be living up to her mother's dreams and not hers. Parents' influence on career choice consequently influences the ultimate enrolment and performance of the girls in Physics.

Career choices did not only emerge from the parents but also the teachers and the individual students. We note that the portion whose career choices have been guided by parents seem to lag in performance compared to students guided by the teachers. The push from teachers (experts in this case) seems to bear better fruit in performance, with students getting above-average grades. The other lot of students, who made career choices without guidance from the teachers or parents, gets low grades. A parental push and an expert opinion are critical in career choices as they may understand a student's capabilities better than se\he does for herself.

The education stakeholders provide better insights on career choice that individual students may never discover. Interviews with the H.O.D.'s revealed organized career guidance sessions for the Sciences, languages, and humanities to help model the students choose appropriate job opportunities. Students should choose careers based on several guidelines and not just the perceived importance that parents tend to base on (Kempa, 1996).

4.10 Peer Influence on Enrolment and Performance of Physics

In establishing whether the form three girl students were influenced by their friends to enroll in Physics, the study gave items 21, 22, and 26 in appendix 4. The students' questionnaire intended to get the girls to state whether their peers influenced their subject choice. While 88 (41.9%) of the girls said they chose Physics independently, 73 (34.8%) responded that they might have selected Physics due to a bit of pressure from the friends. The other 49 (23.3%) said that the more significant push to take Physics was neither individual nor was it from their peers.

Table 4.0.9 Peer Influence on Enrolment and Performance of Physics

Students' response	**Frequency**	**Frequency**	**Physics Performance**

		Percentage (%)	
Subject choice influence by peers	73	34.8	Average or below-average performance
Subject choice by an individual	88	41.9	Above-average performance
Subject choice influence not by peers nor individual	49	23.3	Above-average performance

The study established that the students who were not influenced by their peers to choose Physics performed better than those who selected Physics under peer pressure. The choice of subject and performance further translates to the girls' performance in KCSE. Students with self-initiative for the subject choice perform better because they have the urge to study the subject. A good performance in the subject relates to the career choices of Science related courses.

4.11 Relationship between Physics Theory Work and Life Experiences

It was an interest in the study to establish content taught in classwork and their daily life encounters. Knowing that the learners could recall classwork content and use it to solve their day-to-day challenges was a way of knowing their abilities, interests, and career choice (Torongey, 1986). 156 (74.3%) of the girls mentioned that they encountered challenges in life that required them to apply their Physics knowledge to solve them. The other 54 (25.7%) said they could not remember any real-life challenges that needed Physics to solve. Force, pressure,

and reflection of light were the most identified topics that the girls have used to solve real-life problems.

Table 4.10 below shows the most mentioned topics that students could relate to real experiences. I established that a high number of girls could connect the classwork content and real-life situations. Thus, when choosing a career, they are able to relate theory, practical, and life experience and can easily pick a career that interests them and that which they can easily connect with (Sternberg, 2000).

Table 4.0.10 Relationship between Physics Theory Work and Life Experiences

Physics Topic	**Where applied in real life**	**Frequency**	**Frequency Percentage (%)**
Pressure	Use of fluids and liquids	120	57.1
Force	Use of simple machines to make work easier	139	66.2
Reflection of light	Mirrors used in beauty shops and for vehicle side mirrors	156	74.3

4.12 Students' Mathematical Skills and Physics Performance

Mathematical skills and spatial aspects were among the main factors of Physics enrolment and performance that the study sought to discover. The students' achievement test examined for this through the Mathematical questions administered through it in items 2, 4, 5, 9,

and 10(b) of appendix 6. These five questions had a cumulative of 25 marks, 50% of the total marks. The 210 students who sat for this test had only 15 (7.1%) scoring all these 25 marks for the five Mathematical questions. 98 (46.7%) passed the Mathematical calculations questions with 18-24 marks, which was at least 72% for computation skills. 66 (31.4%) girls had between 50%-72% for Mathematical items, 24 (11.4%) had 30%-50% and 8 (3.8%) scored below 30%.

Out of the total number of participating students, 76(36.2%) passed the whole achievement test with a mean score of 70% and above. 80 (38.1%) had a mean score ranging from 50%-70%, 32 (15.2%) had a score of 40%-50%, 14 (6.7 %) scored 30%-40% and 8 (3.8%) scored below 30%. Those who scored above 70% indicated an outstanding ability to be excellent students with an extra push. The average students also could do best if they improve on the Mathematical skills since most of these had scored below 18 marks in the Mathematical questions.

Table 4.0.11 Students' Mathematical Skills

Number of Students (Frequency)	**Frequency Percentage (%)**	**Mathematical Ability (%)**
15	7.1	100
98	46.7	72%-96%
66	31.4	50%-72%
24	11.4	30%-50%

8	3.8	Below 30%

Table 4.0.12 Students' Mathematical and Physics Performance

Number of Students (Frequency)	**Frequency Percentage (%)**	**General Performance**
76	36.2	70%-100%
56	26.7	60%-70%
24	11.4	50%-60%
32	15.2	40%-50%
14	6.7	30%-40%
8	3.8	Below 30%

From the above tables, the total number of students whose mean score was above 50% was 156, representing 74.3% of the respondent students. This score displays that an extra effort can make the students with Mathematical abilities above average and who can do very well. The students have high Mathematical skills useful for solving Physics problems. Thus, the students with such skills have a reasonable basis for undertaking Physics, as it is evident that most Physics examinations have a combination of items that require computation abilities (Mwangi, 1986).

4.13 The H.O.D.'s Opinions on the Girls' Mathematical Abilities

The interview scheduled with the 18 H.O.D.'s also sorts to establish any specific school considerations for the Physics students. TheH.O.D.'s based the students' mathematical ability in Physics on their knowledge and performance in Mathematics. It was almost a natural selection that those who enrolled in Physics had proved to perform well in the Mathematics subject, from the reports they received from their colleagues. They all indicated that the mathematics department's highly ranked students tended to rank high with Mathematical/computation questions in Physics.

The students were encouraged to join Science and Mathematics clubs and attend symposiums and Science congress, where they would closely interact with each other, upgrading their computation skills. The Physics teachers encourage them to tackle all problems encountered that would require calculations other than ignoring the conclusion that they knew the formula for use. The Mathematics department plays a vital role in molding the students to understand the Mathematical basics used in Physics. Most importantly, 75% of all the teachers had their subject combination of Physics and Mathematics, making it easier for them to bring the concepts overboard.

4.13 Learning Environment and its impact on Enrolment and Performance of Physics

The study intended to establish whether the school learning environment had any effects on the girls' performance in Physics. The school facilities and learning materials are among the things that comprise a school environment. The school facilities' adequacy was tested via the students' questionnaire and the teacher questionnaire to determine what views they had on such. Moreover, the students' achievement test was used to test their know-how of tackling Physics

challenges. The heads of departments were also interrogated on the satisfaction that the environment provides for the students. In appendix 4, items 18 and 19, 180 (85.7%) of the students indicated that the school environment had a significant role in determining their enrolment and performance in Physics. It provided facilities, teaching/study materials, and influenced the learning of Physics. Items 19 and 27 of appendix 2 were used to provide data through the teachers' responses on the school environment. 30 (83.3%) teachers gave responses that indicated an important role that the school environment plays on the students' teaching and learning.

"Availability of learning materials is a contributory factor that pushes the students into subject selection," said the H.O.D.'s. Appendix 5, items 11, 12, and 23 had these interview questions answered. All the above concur with the government policy on the provision of basic education. The education of a girl-child requires schools to provide adequate and appropriate materials and an unbiased infrastructure for both female and male students. According to M.O.E. (2012), most schools fail to adhere to gender-sensitive infrastructure and don't prioritize girls' needs. Additionally, the necessary resources are scarce and tend not to be available to all schools.

Table 4.13 Learning Environment and its Impact on Enrolment/Performance of Physics

School learning environment	**State of the environment**	**Rating of the environment**	**Effect on performance**
Academic and technical staff	Adequate	80%	Quality work

Classrooms	Adequate	75%	High performance
Laboratories	Not adequate	40%	No practicals/experiements
Libraries	Not adequate	59%	Low performance
Textbooks	Adequate	83%	Average performance

From the table above, it is easy to establish the relationship between available teaching/learning facilities and girls' performance in Physics. The adequate qualified staff is the well trained and skilled teachers who provide quality Physics concepts to the students, boosting their performance. Teachers were rated to have provided professional and moral support to the students, offered guidance, and consequently improved enrollment and performance. In this era, most schools have classrooms that provide comfort to the students as they are being taught. It was rated as adequate, and the performance of students is excellent with the accessibility of such.

The fewer practical lessons recorded indicate the inadequacy of laboratories where the students can carry out such experiments. This outcome means that the theory work learned in classrooms is rarely put in practice, and the students do not get to relate the theories and real situations satisfactorily. The availability of textbooks is rated high and, consequently, implies that girls' performance gets better due to the study materials. On the contrary, the libraries seem to be a bit low rated. It is owed that most schools did not have enough textbooks and revision books, as mentioned by the H.O.D.'s. It was not until recently that the government committed to the total provision of textbooks to the schools. Furthermore, the current 100% transition from

primary school to secondary school has also impacted the count of books for the students who seem to surpass the number initially targeted by the government.

The interviews with the 18 H.O.D.'s indicated that the school environment was a catalyst in the girls' enrollment, performance, and growth in Physics. Most of them mentioned that a nurtured and enriched interpersonal affiliation with the teachers and the students would significantly impact students' morale and confidence. The girls tend to believe more in themselves, and eventually, this boosts the subject's performance and standards. Furthermore, increased securities display a good poise for the students whose concentration in classrooms improves. The department heads also mentioned that the teachers' motivation is an essential factor in their content delivery and students' performance. They also mentioned the school administrations need to recognize much of the hard work that Physics teachers do to boost their morale.

4.14 Physics Teachers' Workload on Performance

The study intended to establish the impact of teacher workload on the girls' Physics performance. In appendices 3 and 5, the teachers and the H.O.D.'s commended the influence magnitude that an overload in Physics would have on the students' performance. 32 (88.9%) of the teachers mentioned that they had a vast workload throughout the academic year, and all the department heads seconded this. One H.O.D. said that "the Physics syllabus should either be revised or T.S.C. and the ministry of education to deploy more Physics teachers to unburden the current teachers. The delayed employment of teachers and the understaffing by T.S.C. is affecting teachers and student performance." All teachers admitted that their lesson plan and schemes of work were rarely up-to-date as they had had to choose to teach the girls over the

preparation of the two documents. The overload and burden seem to limit the teacher-student interaction since the teacher is almost too busy to spare extra time. The dissatisfaction of most H.O.D.'s on syllabus coverage was attributed to the large workload and burden that Physics teachers have.

4.15 School Category and Performance in Physics

The data provided showed that 9 (50%) of the schools were sub-county schools, 4 (22.2%) were county schools, 4 (22.2%) were extra county schools, and only 1 (5.6%) school was a national level school within Kaiti Sub County. Most parents seemed to prefer enrolling their daughters in schools near home to reduce costs and save funds. The report by the principals on the girls' performance in KCSE ranged from these school categories. Three principals from the sub-county seemed satisfied with results while the rest were dissatisfied. All county school principals were okay with their school results but mentioned that they have room to do better. Two principals from the extra-county principals were okay with the results, and the other two mentioned that they aimed for better. The national school principal was satisfied with the results, adding that the students were happy with the school environments and recommended organized benchmarking with other top-rank schools for better results.

CHAPTER FIVE: SUMMARY, DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

The study aimed to establish the specific factors that influence Physics enrolment and performance for female students in Kaiti Sub County. This chapter presents a summary and discussion of the research findings, as presented in chapter 4. With some of the recommendations and suggestions, the study concluded further research in line with study objectives. Compared to that of their male counterparts, girls' academic performance is what prompted this research.

5.2 Summary and Discussion of the Study Findings

The study discovered that some factors are responsible for girls' enrollment in Physics and consequently for their performance. However, little or no management had been made towards those factors to increase enrollment and achieve better grades. The girls' attitude towards Physics, believing that Physics and Mathematics were difficult subjects, is evident. From the data, the girls displayed that Physics and computation concepts scared them off even through how they tackled the achievement test given.

With such negative attitudes, 142 (67.6%) of the girls indicated that even though they chose to select Physics, there was a notion that challenging subjects (Mathematics and Sciences) were a better fit for the men. Furthermore, the career opportunities associated with Physics and Mathematics seem to highly rate to be more masculine and less recommended for females. The change of reasoning for most students was due to intensive talks and encouragement from parents and teachers. Teachers always organize talent days and career choice lectures to emphasize the available national and global job markets and show prosperous case women

whose careers seemed "masculine." The attitude is approached through two perceptions of Physics, that of the students and the teachers.

In the focus of the Physics teacher perception, some of the teachers indicated that they had difficulty teaching some of the Physics topics. The fact that such teachers end up having the more experienced teachers' topics is an indication that they have some negative attitude developed. It is effortless to spill such negativity to the girl students since they look up to their teachers as role models. This negativity affects the enrolment and performance of girls in Physics.

On the other hand, most of the girls seem to have performed relatively better in their KCPE examinations than the previous internal exam taken before this study. While 145 (69%) of the girls scored at least grade B in KCPE, their internal exam results indicated that 142 (67.6%) scored grade C, and only 55 (25.2%) scored grade B and or above. This alarming transition could result from the cramming of content experienced in primary school whole high school requires the girls to understand content as the syllabus is more comprehensive. Furthermore, primary schools lack adequate laboratories and Physics specialized teachers. In Science, Physics is an independent unit.

Restoration of the girls' confidence required both teachers and parents to provide guidance and counselling on study habits, subject selections, and career choices. Moreover, resource mobilization is also necessary to build more classrooms and study centres for students. The learners also displayed that they could relate classroom content with real-life situations to tackle life problems by applying classroom knowledge. The researchers noted that the environment played a significant role in the girls' performance in the selected schools. Adequate

laboratories and libraries with current editions of study materials were vital for increased enrolments and high performances of the girls in Physics.

5.2.1 Influence of Teaching & Learning on Girls' Physics Performance

The study also aimed to establish the impact that the school teaching and learning environment had on girls' enrollment and performance in Physics. The study findings indicated there was an influence on girls' enrollment and performance by the school environment through data from the students' questionnaire and teachers' questionnaire. The H.O.D.'s interview further confirmed this, emphasizing that the impact was not only on internal exam performances but also on the national examinations' performance. 180 (85.7%) of the respondent girls said that the school environment had a role to play in their subject choices and performance. They indicated that an unfavourable learning environment would discourage most of them from learning, reducing the enrolment rate in Physics and other subject and worse of affecting their performance.

The lack of adequate science laboratories, classrooms and libraries are some of the unfavourable conditions experienced in these selected schools. The burden of workload for the Physics teachers due to unavailability of enough teachers in the schools, in turn, affects these students. Empathetic teachers and the right learning environment will boost the students' morale, encouraging higher enrolment in Physics and improving performance. The working conditions for the teachers also need to be friendly enough for them to work best and deliver content with efficiency.

5.2.2 Mathematical Aspects in Physics on Enrolment and Performance

The intention of this study was also to establish the Mathematical skills of the girls through the achievement test given. The achievement test had ten items, 5 of which tested for general knowledge and 5 tested for Mathematical computation skills. Each set had a cumulative of 25 marks, 50% of the total marks. The 210 students that sat for this test had 15 (7.1%) of them scoring all these 25 marks for the five Mathematical questions giving 100% for computation skills. 98 (46.7%) girls passed the Mathematical calculations items with 18-24 marks, meaning they scored at least 72% for computation skills. Thus, this translates to 113 (53.8%) of the girls that scored at least 72% cumulative for the computation skills items.

There was a traditional teaching approach that most teachers used to teach Mathematical concepts to the students. However, currently, teachers have taken it upon themselves that the students need exposure for hands knowhow so that they can explore more to what's taught in class. Furthermore, as mentioned by most H.O.D.'s that most Physics departments now involve Mathematical departments more often in the emphasis of computation skills to students. These allow the students to explore new ideas within Physics, leading to better performances with hands-on and minds-on understanding (SMASSE, 2009). The teachers' competency to the Mathematical concepts in Physics and their additional commitment to teaching and delivery is an essential factor that has led to better performance (Mwangi, 1986).

5.2.3 Girls' Attitude on Physics Enrolment and Performance

The study aimed at establishing the attitude of the girls towards Physics, Mathematics and Sciences in general. Compared to other Science subjects, Physics attracted the least number of students in each of the selected study schools. The collected data indicated that 142 (67.6%) of

the girls had somehow developed a negative attitude towards Physics. Even the girls who had selected Physics as one of their Science subjects had a belief that it was complicated than both Chemistry and Biology. A close analysis from the students and teachers' questionnaires and the H.O.D. interview revealed that the girls always based their reasoning on the ground of Physics is masculine. A change in attitude is important for the girls to be able to achieve better grades and attract more feminine gender to the subject (Sternberg, 2000)

5.2.4 Relationship between Classroom Physics Content and Real Life Situations

The research sought to discover the relation between the Physics concept taught in class, the experiments made in laboratories, and how girls were able to apply such knowledge in life. Out of the 210 respondent girl students, 156 (74.3%) indicated that they would comfortably transfer the classroom knowledge on to their day to day activities. Using these in life scopes is an indication of the students being able to related theory and practical.

Force and pressure are the prevalent Physics topics that the girl students mentioned to apply in daily life that made them appreciate Physics concepts. Use of electronic appliances daily also reminded them that Physics was a daily-scope subject. Reflection of light also as applied in mirrors, beauty cafes, fibre optics, side mirrors was much appreciated by the girls. Such daily experiences with the application of Physics concepts are essential in aggregating the morale and seriousness of the students in the enrolment and performance of Physics.

5.2.5 Role of Parents on Physics Enrolment and Performance

The study intended to establish the influence of parents and peers on their subject selection of the girls as well as on performance. 158 (75.2%) of the respondent girls stated that

their parents guided the pros and cons of enrolling in Physics as well as supporting them with study materials on the subject. Out of the 210 girls, 142 (67.6%) stated that their parents had a first-hand influence on their future occupation and career choices made. 55 (26.2%) had their teachers guide them in career choices while the other 13 (6.2%) either did not seek any assistance from teachers/parents or they just chose not to follow their guidance. 73 (34.8%) gave the response that they may have selected Physics due to a bit of pressure from the friends.

Both parents and peers play a role in influencing subject choices for the girls. Parents, peers and teachers influence the career choice of the girls. Although both parents and peers impact on these, teachers play a more significant role in the provision of professional guidance to the girls before subject selection and career choices. From the collected data, the teachers have a considerable role to play to improve on the students' performance. However, the peers seem to provide morale to the students through organized study with friends so that the girls can excel together. Parents, on the other hand, provide a basis for the daughters and encourage them to enrol and perform better through the provision of study materials and moral support. Contrary to previous reports that the socioeconomic status of a family determined the performance of the girls, the study established that family status did not affect performance. It is, therefore upon the students to use their parents' motivation and work hard in Physics.

5.3 Conclusion of the Study

This study established that enrolment and performance of girls in Physics has many barriers which education stakeholders need to deal with and eradicate. The extensive poor Physics performance amongst the girls in Kaiti Sub County and nationally are a revelation of severe measures to be taken. The barriers noted are:

i. The school teaching & learning environment. This aspect here plays a very vital role in the performance of girls, not only in Physics but even in other subjects. The school environment should be friendly enough to offer comfort for the learning of Physics. The administration should be sensitive in the provision of Science facilities and learning equipment. Study materials and laboratory equipment should be adequate to enable girls to gain added exposure to Physics knowledge. Furthermore, the T.S.C. should provide enough qualified teachers for the schools so they can have sufficient time for their students.

ii. Mathematical and computation skills in Physics. The performance of girls is affected negatively by the average Mathematical skills that the girls possess. Being unable to carry out Mathematical formulations can be a real hassle for them. The girls need constant encouragement and reminder to prioritize Mathematical practice more often than not. Furthermore, the Physics and Mathematics departments should liaise with each other in the delivery of Mathematical concepts found in Physics.

iii. Girls' attitude towards Physics. As noted by the study, the negative attitude that most girls have developed towards Physics has repeatedly led to low enrolment and poor grades in the subject. There is a need for constant sensitization for the girls to drop these absurd beliefs and change for positivity. With sensitization and encouragements, the girls should then voluntarily think positively towards Physics and realize that both females and males can tackle Physics-related challenges.

iv. The parents play an essential role in influencing enrolment and performance of girls. They tend to build up confidence for the girls by offering advice and encouragement. A partnership between schools and parents can plan for implementation of motivational

programs such as Science camps, mentorship, and career guidance. However, this advice pushes the girls to take Physics because of the interest of the parents/peers. It is therefore still recommended that the teachers be involved in offering professional motivation for the girls, especially in subject selection and career choices.

A proper management of their education can address all the mentioned challenges facing enrolment and performance of girls in Physics. School heads and administration can engage and sensitize other education stakeholders to ensure that the content is adequately delivered. The school environment should be favourable to learners, with every plan made with gender sensitivity. The girls can be consulted in such decisions to have environments that not only favour males but females as well. A responsive environment will trigger a voluntary change of attitude towards Physics to the needs of the students and the teachers.

5.4 Recommendations of the Study

i. The school teaching & learning environment. The government should be at the forefront of funding schools to construct fully equipped laboratories and libraries with relevant textbooks and revision books. This gesture will help improve the school environments, providing adequate learning facilities and give the girls a chance to acquaint themselves with Physics experiments. The governments should also collaborate with T.S.C. to employ more Physics teachers, reducing the current workload so that syllabus is covered in time and proficiently. So generally, the school administration needs always to follow up, ensuring that the school environment is pleasant for both students and teachers.

ii. Mathematical and computation skills in Physics. The idea of the Physics department incorporating teachers from the Mathematics department will be of aid in improving the

girls' computation skills. A strong Mathematical foundation is necessary for all Physics students as they can adeptly tackle Mathematical concepts in Physics. Furthermore, in the subject selection, the Physics teachers should consider Mathematical background of students willing to take the subject. Students should be encouraged continuously to do frequent practice and perfect their skills.

iii. Girls' attitude towards Physics. Girls need to get guidance on the pros of taking Physics in high school. Teachers and parents should motivate the girls, sensitizing them on the career choices and well-salaried jobs that one can secure through Physics. The T.S.C. and school administrations can also ensure that all girls' only schools and mixed schools have at least a female Physics teacher. This move will help build up the morale of the girls to enrol and excel in Physics. Also, proper teaching of the subject matter will help demystify negative attitude amongst the students. The schools should frequently hold organized forums to create emphasis on the importance of selecting Physics and where the students can air the subject challenges. Teachers in mixed schools also need to embrace all students and treat them as equal regardless of their gender.

iv. The parents play an important role in influencing enrolment and performance of girls. Parents are key players in the academic lives of their children. The involvement of parents through the help of school managements in the education of the girls will help in moulding them to fit into the scientific world. Parents need to be responsible for their daughters and motivate them to adapt to a reading culture even during school holidays. The provision of basic study materials, and also the creation of enough revision time for them is essential. Parents need to be aware that girls are equally useful in society just like the case for boys. It will bring about excellent and steady grades in Physics for the girls,

encouraging them to compete with boys. Furthermore, they should be sensitive enough to allow the girls to take subjects comfortable with them.

5.5 Suggestions for Further Research

i. Researchers can carry out a similar study in other sub-counties within Makueni County and consequently other Kenyan counties to establish if such factors apply elsewhere. The study report could be of aid to educational stakeholders.

ii. Researchers could also survey to establish the rate of girls studying Physics-related courses in Kenyan universities/colleges and establish reasons for their choices.

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APPENDICES

Appendix 1: Letter of Transmittal

Jacinta M. Musyoki

University of Nairobi

ODeL Campus

10th January, 2020

The Principal

_____ Secondary School

Kaiti Sub County - Makueni

Dear Sir/Madam,

With your permission, I request to be allowed to conduct research study in your institution in line with the requirements of the attainment of PGDE in the University of Nairobi. The purpose of the study is to assess the factors affecting enrolment and performance of girls in Physics in Kaiti Sub County, Makueni County. Your cooperation and honesty during this period will be highly appreciated. All data and information collected will be kept confidential and only used for the intended purpose.

Yours sincerely

Jacinta M. Musyoki

Appendix 2: Principal's Questionnaire

Section A

1. Name of School ……
2. Number of times it has presented candidates for KCSE ……..
3. School rank ……..
4. Type of school (Government/Private) ……..
5. Nature of school (Mixed/Pure girls school) ……..
6. School enrolment by gender (a) Male …… (b) Female ……
7. Form three enrolments by gender (a) Male ……..……. (b) Female ……

Section B

1. Highest level of education ……..……
2. Duration in school ……..
3. Teaching subjects ……
4. How do you rate your girls' performance at KCSE Examinations …….
5. If the answer in Q.4 above is positive, what factors would you say have contributed to that performance ……
6. If the answer is negative, what would be the factors affecting girls performance? ……..…….

…….

…….

7. Are there some specific areas or conditions you find the girls excelling? If so, state the areas / factors ……

.....

……..

Thank you for your cooperation

Appendix 3: Teachers' Questionnaire

Dear Physics teacher,

I am interested in finding out the factors affecting enrolment and performance of Physics among girls in secondary schools within Kaiti Sub County. Please give as honest information as possible. The information you give will be treated with a lot of confidentiality.

General Information

Name of School.....

Gender (male or female).....

Teaching subjects.....

Nature of school (mixed or girls' only) ……

School rank ……..

Number of years in teaching.....

Instructions

1. Please read through the instructions very carefully first before you start answering the questions.
2. For the boxed questions indicate your response by ticks (✓) in the appropriate boxes.
3. The questions with spaces to be filled should be answered in the spaces provided below them.
4. The information you will give will help improve Physics enrolment and performance in the Sub County; if the results are honest, complete and trustworthy.

Section A: Tick (✓) the appropriate box.

1. What is your highest level of education?

a) University ☐

b) Diploma ☐

c) A level ☐

d) O level ☐

2. What is your professional qualification?

    a) Graduate teacher ☐

    b) Diploma teacher ☐

    c) Approved teacher ☐

    d) Untrained teacher ☐

    e) Teacher certificate☐

3. When last did you undergo in-service training in Physics?

a) More than 10 years ago ☐

b) 5-10 years ago ☐

c) 3-5 years ago ☐

d) 1-3 year ago ☐

4. When did quality assurance officers last visit your school?

a) Over 20 years ☐

b) 20-15 years ago ☐

c) 15-10 years ago ☐

d) 5-10 years ago ☐

e) 1-5 years ago ☐

5. Do you prepare schemes of work?

Yes ☐ No ☐

6. If you do not have a scheme of work, please briefly explain how you plan your teaching activities ……

……

7. Do the students select Science subjects on their own?

Yes ☐ No ☐

8. If your answer above is No, kindly explain how you select the Physics students to your class ……..……

…….…….…….

9. Averagely, how many Physics students do you have in form three classes?

a) More than 50

b) 50-40

c) 40-30

d) 30-20

e) 20-10

f) 0-10.

10. How many lessons do you have in a week and do you attend all?

11. Does your workload enable you to attend to individual students?

12. Are the teaching resources effective in teaching of Physics in your school?

13. Do you have difficulties in delivering content to the students?

14. Are there some distinctive topics in Physics that are complex for you to teach?

If yes, please mention them ……

…….....

……

15. Are there some specific topics that seem complex for the students?

If yes, please mention them ……..

……

……...

16. How do you rate your school's performance in Physics?

a) Excellent

b) Very good

c) Good

d) Fair

e) Poor

17. How do you rate your school's enrolment in Physics?

a. Very satisfactory

b. Satisfactory

c. Not satisfactory

d. Poor

Give reason(s) for your answer

……

……

……

……

……

Section B: Tick (✓) in appropriate box

SA - Strongly Agree

A - Agree

N - Neutral / Not Sure

D - Disagree

SD - Strong Disagree

18. Parents support their daughters to perform well in Physics

SA ☐ A☐ N☐ D☐ SD☐

19. The school provides an environment which is conducive for the girls to perform well in Physics

    SA ☐ A☐ N☐ D☐ SD☐

20. The students admitted in this school are below average

    SA ☐ A☐ N☐ D☐ SD☐

21. Students are encouraged to think creatively during learning sessions

    SA ☐ A☐ N☐ D☐ SD☐

22. Students are helped to make precise/and accurate observations during Physics practical sessions

    SA ☐ A☐ N☐ D☐ SD☐

23. Learners are encouraged to verify their predictions by doing experiments that are based on scientific ideas and relate to environment

    SA ☐ A☐ N☐ D☐ SD☐

24. Our students are lazy and do not like working hard

    SA ☐ A☐ N☐ D☐ SD☐

25. My day's workload cannot allow me to attend to slow learner students

    SA ☐ A☐ N☐ D☐ SD☐

26. The enrolment of Physics by girls in form three is influenced by their parents/guardians

    SA ☐ A☐ N☐ D☐ SD☐

27. The school provides all the required apparatus for practical lessons in Physics

    SA ☐ A☐ N☐ D☐ SD☐

28. . I rejoice when I complete the Physics syllabus

    SA ☐ A☐ N☐ D☐ SD☐

29. Most of the Physics topics are difficult to handle

SA ☐ A☐ N☐ D☐ SD☐

Thank you for your cooperation

Appendix 4: Students' questionnaire

Dear student,

I am interested in finding out the factors affecting enrolment and performance of Physics among girls in secondary schools within Kaiti Sub County. Please give as honest information as possible. The information you give will be treated with a lot of confidentiality.

General information

Name of school ……

Class …….

Gender (male or female) …….

Nature of school (mixed or girls' only) ……..

School rank ……..

Instructions

5. Please read through the instructions very carefully first before you start answering the questions.
6. For the boxed questions indicate your response by ticks (✓) in the appropriate boxes.

7. The questions with spaces to be filled should be answered in the spaces provided below them.
8. The information you will give will help improve Physics enrolment and performance in the Sub County; if the results are honest, complete and trustworthy.

Section A

1. Do you take Physics?

   Yes ☐ No☐

2. How did you perform in Science in K. C. P. E.?

a) Grade A ☐

b) Grade B ☐

c) Grade C ☐

d) Grade D ☐

e) Grade E ☐

3. What is the average number of students in your class (stream)?

   a) 0-10

   b) 11-20

   c) 21-30

   d) 31-40

   e) Above 40

4. Which topics in Physics do you find difficult in the syllabus and why?

……..……

……

……

……

Reasons for each

……

……...……

……

……

……..

5. Do you find the Physics syllabus wide compared to other subjects?

   Yes ☐ No ☐

6. What was your performance in the last Physics exam?

   a) Excellent

   b) Very good

   c) Good

   d) Average

   e) Below average

7. What do you intend to be after school (occupation)?

……..

8. Does your family influence your choice of occupation? Yes ☐ No ☐

   Please explain ……..

   ……..

9. Briefly explain why you like that occupation ……..

……

……

10. How will Physics help in the occupation you intend to take after school?

…….....

.....

11. Do your parents provide learning materials for example textbooks?

12. Do you have any people employed by your parent to assist in domestic works?

Yes ☐ No ☐

i). If yes, what type of worker is employed?

a) House help ☐

b) Gardener ☐

c) Cook ☐

d) Driver ☐

e) Other (specify) ……

ii). If No, how much are you involved in doing domestic work when at home?

a) Too much ☐

b) Much ☐

c) Little ☐

d) Very Little ☐

13. What level of education has your parent reached?

a) Father ……

b) Mother ……

14. What is the occupation of your parents?

    a) Father ……

    b) Mother ……

15. Do you think parents‟ level of education and occupation affects your performance?

    e) Too much ☐

    f) Much ☐

    g) Little ☐

    h) Very Little ☐

16. Does your teacher help you understand the procedures in the Physics practical work?

    Yes ☐ No ☐ Sometimes ☐

17. Is there a relationship between what you learn in Physics class and what happens every day? ……..

18. How do you share Physics textbooks? ……....

…….

19. Does your school have enough Physics laboratory equipment and apparatus? Explain

    ……

    ……

Section B: Tick (✓) in appropriate box

SA - Strongly Agree

A - Agree

N – Neutral / Not Sure

D - Disagree

SD - Strong Disagree

20. Physics is useful in future

    SA ☐ A☐ N☐ D☐ SD☐

21. My friends influenced me to choose physics

    SA ☐ A☐ N☐ D☐ SD☐

22. I often study Physics on my own

    SA ☐ A☐ N☐ D☐ SD☐

23. My parents influenced me to choose physics

    SA ☐ A☐ N☐ D☐ SD☐

24. Girls involvement in domestic chores like cooking and looking after siblings affect their performance

    SA ☐ A☐ N☐ D☐ SD☐

25. Physics is a difficult subject

    SA ☐ A☐ N☐ D☐ SD☐

26. My friends do not like physics

    SA ☐ A☐ N☐ D☐ SD☐

27. The teaching and learning facilities in the school are adequate

    SA ☐ A☐ N☐ D☐ SD☐

28. My Physics teacher influenced me to choose physics

    SA ☐ A☐ N☐ D☐ SD☐

29. We do not do CATs and assignments often

    SA ☐ A☐ N☐ D☐ SD☐

30. I enjoy doing Mathematics and Physics

SA ☐ A☐ N☐ D☐ SD☐

31. Our teacher helps us to solve difficult Physics problems

SA ☐ A☐ N☐ D☐ SD☐

32. I am able to handle Physics problem on my own

SA ☐ A☐ N☐ D☐ SD☐

33. Our teacher helps us handle Physics problems

SA ☐ A☐ N☐ D☐ SD☐

34. I enjoy Physics lessons

SA ☐ A☐ N☐ D☐ SD☐

35. What five factors should be improved in your school to raise the performance of Physics?

……

……

……

……

……

……

Thank you for your cooperation

Appendix 5: Heads of Departments (H.O.D's) Interview Guide

Name of school.....

Position held in school.....

Number of years in teaching.....

Nature of school (mixed or girls' only) ……

School rank ……..

Form three Physics enrolment by gender (a) Male …… (b) Female ……..

1. Do you make students aware of job opportunities that are there when they learn physics?
2. Do you stream students according to ability or is it random streaming?
3. How do students select their Science subjects?
4. How is the attitude of students towards Physics in the school?
5. What is done to change the attitude of the students?
6. Are students encouraged to think logically during Physics learning and how is it done?
7. Are students assisted to view the relevance of the Physics learned in class in relation to what they come across in society and career opportunities?
8. How often do you check students work in relation to syllabus coverage?
9. What is the evaluation policy of your school's Science department?
10. How is the evaluation done?
11. Are revision and reference materials available and enough in your school?
12. How many laboratories do you have in your school for teaching of physics?
13. Do you choose those students you want to do Physics or students choose subjects themselves?
14. How do you ensure that all the students participate in practical activities?
15. Are students encouraged to design investigations aimed at solving problems in physics?
16. Do you have difficulties in delivering content to the students?

17. Are there some distinctive topics in Physics that are complex for you to teach?

If yes, please mention them ……

……

18. Are there some specific topics that seem complex for the students?

If yes, please mention them ……..

……

19. Are parents involved in the subject choice of their children?
20. How often do you talk to the Science students?
21. Are students encouraged to take a keen interest in other Science subjects and Mathematics?
22. Are students taken out for field trips, symposium or contest?
23. How can the performance and enrolment of Physics be improved in your school?

Thank you for your cooperation

Appendix 6: Students' Achievement Test

Dear student,

I am interested in finding out the factors affecting enrolment and performance of Physics among girls in secondary schools within Kaiti Sub County. The test is to give information for the research being carried out. Please give sincere and honest answers to the questions asked to the best of your ability. The information you give will be treated with a lot of confidentiality.

General Information

Name of school.....

Class.....

Name of the student.....

Instructions

1. Please read through the instructions very carefully first before you start answering the questions.

2. Answer ALL the questions in sections A and B.

3. ALL working must be clearly shown.

4. Mathematical tables and electronic calculators may be used.

Take acceleration due to gravity g=10m/s^2

For Examiners Use Only

Section	**Question**	**Maximum score**	**Candidate's score**
A	**1-5**	**16**	
B	**6-10**	**34**	
Total Score		**50**	

Section A (16 marks)

1. Explain why a wire gauze is used when heating water in a laboratory (2marks)

2. The weight of a car is 6000N and the recommended tire pressure is 30N/cm^2 .Find the area of each tire in contact with the ground (3marks)
3. State the ways of reducing surface tension (2 marks)
4. The water level in a burette is 35cm^3. If 20 drops of water are added what is the new level if each drop has a volume of 0.1cm^3. (2marks)
5. 200g of fresh water of density 1g/cm^3 was mixed with 200cm^3 of sea water of density1.2g/cm^3. Determine,

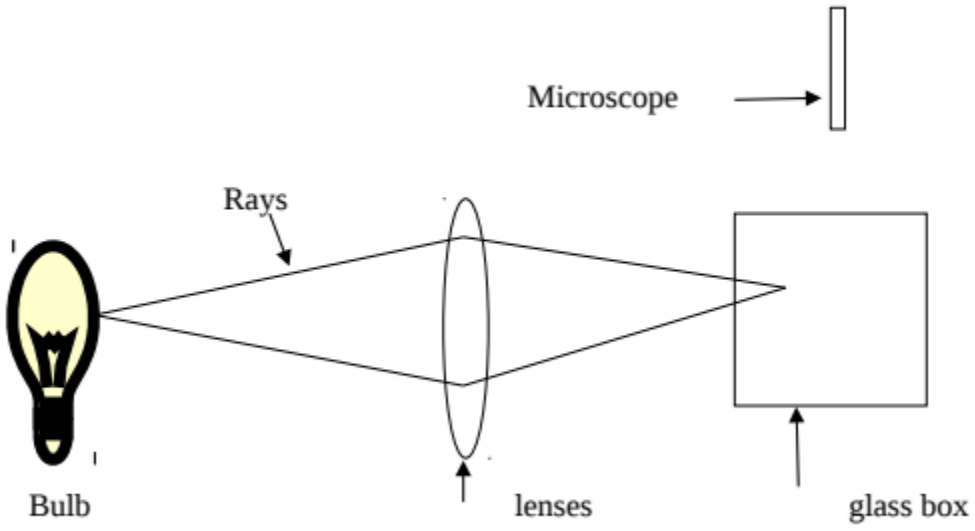
a) Mass of sea water (2 marks)

b) Volume of fresh water (2 marks)

c) Density of the mixture (3 marks)

Section B (34 marks)

6. Brownian motion of smoke particles can be studied by using the apparatus shown in fig. below. To observe the motion, smoke is enclosed in the smoke cell.



a) Explain the role of the following

i). Bulb (1 mark)

ii). Lens (1 mark)

iii). Microscope (1 mark)

b) State and explain the nature of the observed motion of the smoke particles (3marks)

c) State and explain what will be observed about the motion of the smoke particles if the temperature is raised slightly. (3marks)

d) State two ways in which ammonia gas can be made to diffuse faster from one end of a room to the other end. (3marks)

7. Fig below shows a body being acted on by two forces F_1 and F_2

Draw the force F3 that has same effect on the body as the two forces (2marks)

8. State the Pascal's principle of transmission of pressure in fluids (1mark)
9. A pipe of radius 6mm is connected to another pipe of radius 9mm. If water flows in the wider pipe at the speed of 2m/s. What is the speed in the narrow pipe(3marks)
10. a) Distinguish between solid and liquid state of matter in terms of intermolecular forces (1mark)

b) In an experiment to estimate the diameter of an oil molecule, an oil drop of diameter 0.05cm spreads over a circular patch whose diameter is 20cm. Determine:

i). The volume of the oil drop (3marks)

ii). The area of the patch covered by the oil (3marks)

iii). The diameter of the oil molecule in meters (4marks)

c) State:

i). The assumptions made in (b) above (3 marks)

ii). Two possible sources of error in this experiment (2 marks)

Thank you for your cooperation

Appendix 7: Timeframe

Time (weeks) / Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Wee k12
Problem recognition												
Literature review												
Research												

methodology											
Data collection											
Data analysis											
Data interpretation											
Summaries and conclusion											

Appendix 8: Budget

Item	Quantity	Cost / unit (in Kes)	Total cost (in Kes)
Traveling	1	3,000	3,000

Write up materials	1500	1	1500
Printing	1000	2.5	2500
Miscellaneous			1000
Total			**9,000**

Traveling – these are the road transport charges are bodaboda fares that I will incur from Nairobi where I reside to Kaiti constituency, and to the selected schools for data collection and back.

Write up Materials – these are the writing materials used such as a typing/research laptop, purchase of foolscaps, and pens to provide to each of the participants selected.

Printing – these will include all print out related stationery purchased and the costs incurred to print. The binding of the final research project report is also included here.

Miscellaneous – this includes the cost of my meals as I travel for data collection, purchase of internet data to get information on past researches as well as purchase of airtime for communication with the school principals.

Appendix 9: Location of the study – Kaiti Sub County Administrative Boundaries