

**DETERMINANTS OF STUDENTS ENROLMENT IN PHYSICS IN KENYA
CERTIFICATE OF SECONDARY EDUCATION IN PUBLIC SECONDARY
SCHOOLS IN KENYA: A CASE OF WAJIR COUNTY**

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DECLARATION

I declare that this is my original work and has not been presented to any other university/institution for consideration of any certification

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DEDICATION

I dedicate this work to my dear wife Amina Abdi and my lovely children; Abdullahi, Summaya and Abdirahman who patiently gave me support as I went through this course. I wish to also dedicate the work to my parents Abdi Omar and Abdi Ali for their support and prayers to continue with my education.

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LIST OF ABBREVIATIONS AND ACRONYMS

B.O.M	Board of Management
BED	Bachelor of Education
BSC	Bachelor of Science
CEO	County Education Officer
CRDD	Curriculum Research and Development Division
CESQAC	County Education Standards and Quality Assurance Council
JHS	Junior High School
KCSE	Kenya Certificate of Secondary Education
KNEC	Kenya National Examination Council
M.ED	Master of Education
MOEST	Ministry of Education Science and Technology
PER	Physics Education Research
PGDE	Post Graduate Diploma in Education
PHY	Physics
SHS	Senior High school
SMASE	Strengthening of mathematics and Science in Secondary Schools
SPSS	Statistical Package for Social Physics
STEM	Science, Technology, Engineering and Mathematics
UNESCO	United Nations Education, Scientific and Cultural Organization

ABSTRACT

The fact that a small percentage of students opt to enroll for physics in Form Three despite all the three science subjects being treated as equal in terms of time allocation and mode of assessment, poses a great challenge to the overall qualification of the general work force. This study investigated the determinants of student's enrolment in Physics subject in secondary schools in Wajir County, Kenya. The study was guided by the following objectives: to establish the extent to which teaching methods influence students' enrolment in Physics in Wajir County; to examine the availability, utilization and adequacy of teaching and learning resources on students' enrolment in Physics in Wajir County; to examine the extent to which teachers' attitude towards Physics influences students enrolment in Physics and to establish the extent to which learner characteristics influence their enrollment into physic at KCSE. The study used descriptive survey research design. The target population of this study consisted of all 16 public secondary schools in Wajir County. Stratified random Sampling was used to select learners from all sixteen secondary schools in Wajir County. Purposive sampling procedure was applied to select 100% of the teachers of all 32 teachers teaching physics, 16 secondary school principals and 6 QASO officers representing six sub-counties in Wajir. The research instruments for this study were questionnaires, FDG, interview schedule and observation guide. Quantitative data drawn from questionnaires and observation schedules was analyzed by the use of descriptive statistics using Statistical Package for Social Sciences (SPSS) version 21.0 and was presented through percentages, means, pie charts, bar graphs and frequency tables. The study found out that schools in Wajir County mainly used discussion, project method/research, educational field trips, lecture method and question and answer methods. Schools were found to have several teaching and learning resources. The teachers made use of several of them. The readily available materials were KICD Syllabus, KICD teachers' handbook for physics, classrooms/desks, calculator, physics charts, reference books for physics. The study also found out that physics was not very difficult understand, physics was not for bright students, physics is useful for student future career, there was discipline among students, teachers could teach physics without teaching aids and practical and physics was not boring subject to teach. The study findings indicate that class attendance and participation, peer pressure and personal goals and challenges influenced enrollment of physics in KCSE. The study thus concludes that enrollment in physics is mainly determined by pedagogical approaches, students characteristics, availability of resources and teachers attitude. The study recommends that Teachers should use effective modern teaching methods to improve absorption and retention of learnt materials by the learner. The study also recommends that school administrations should establish laboratories which are well equipped with learning materials to facilitate experimental approach by each student during practical lessons to improve performance. The study finally recommends that teachers should encourage and give students the opportunity to develop positive attitude towards Physics as a subject.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Physics is an important subject for economic, scientific and technological development (American Physics Society, 2008; Zhaoyao, 2002). Empirical studies from the field of Physics Education Research (PER) have emphasized that Physics knowledge and skills are acquired through the scientific processes should enable the learner to test the validity of the hypothesis through experiments or projects and make conclusions based on the results obtained. Modern knowledge-based economies are so heavily dependent on technology, Thus having a better understanding of Physics and technology, and better technical problem-solving skills will enable people to meet the challenges and demands of the work place (Effandi & Zanaton, 2006; Porter, Ketels & Delgado, 2007).

The desire to pursue Physics at higher levels is influenced by the success rate and foundation a student receives in Physics at the high school. Murphy (2006) reported that in the United Kingdom prior achievement and perception of the difficulty of Physics are determinants of students' decisions about whether enroll at secondary level or not. A study by Buabeng and Ntow (2010) revealed a wide range of reasons accounted for students' negative response to Physics in USA, a majority of students cited factors such as teacher's influence, poor performance, perceived difficulty nature of Physics and unknown career opportunities in the subject. These reduced interest in physics at the Senior High School (SHS) level. Interestingly, Physics teachers who participated in the

study admitted that poor pedagogy accounts for the low interest in physics (Buabeng & Ntow, 2010).

Adeyemo, (2010) points out that genuine and helpful interaction should exist between a teacher and students, for better understanding of physics concepts. He noted that learning efficiency and effectiveness should be seen in explanation, experimentation and discussion; followed by application by learners (Adeyemo, 2010). In Ghana, Physics is one science subjects pursued at Senior High school, build upon the foundations laid in the Junior High School (JHS) in integrated science (Curriculum Research and Development Division (CRDD, 2008). If this is accompanied by relevant knowledge, skills and attitudes needed for, apprenticeship, and a wide range of activities such as projects, experiment, demonstrations and scientific enquiry skill, they tend to enroll in the subject.

Safeer & Keenan, (2005) observed that many of the problems confronting society currently, such as global warming, terrorism, genetic modification, global market competition, energy and population crises, ethical issues involving biotechnology among other critical issues, require Physics knowledge, if they are to be dealt with rationally. It is believed that a teachers 'experience and knowledge enhances productivity or achievement of students in their academic work; this in itself may encourage students to enroll in physics (UNESCO, 2010). The way physics teachers sequence content with appropriate pedagogies develops student's potential, abilities in the subject to respond to situations drawn from physics (Safeer & Keenan, 2005).

Croll,(2009) study on “Teacher Self-Perception of Effectiveness “findings revealed that there was no significant relationship of their perception about effectiveness and their age, teaching experience or gender and physics subject. In Kenya enrolment in Physics over the years in secondary schools wanting taking into account the role of Physics subject in science, innovation and Technology as envisaged in Vision 2030. The Table 1.1 shows an assorted enrolment trend of learners in Physics at KCSE for several years.

Table 1.1: Secondary Schools National Enrolment

Subject	YEAR								
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mathematics	243,4	276,2	305,0	337,40	357,48	411,13	436,34	446,69	483,63
	53	39	15	4	8	4	9	6	0
Biology	217,9	245,9	271,7	299,30	317,13	363,81	389,52	397,31	432,97
	28	11	35	2	5	7	3	9	7
Physics	72,49	83,27	92,64	104,18	109,81	120,07	119,65	119,81	131,41
	9	3	8	8	1	4	4	9	0
Chemistry	236,9	266,7	296,3	328,92	347,36	403,07	427,38	439,84	476,58
	01	61	60	2	4	0	6	7	2
TOTAL	770,7	872,1	965,7	1,069,	1,131,	1,298,	1,372,	1,403,	1,524,
	81	84	58	816	798	095	912	681	599

Source: KNEC Annual Examination Reports (2014)

Table 1.1 shows a low enrolment trend in Physics as compared to other STEM subjects nationally from 2006 to 2014. Physics is an optional subject like Chemistry and Biology, the low enrolment in physics nationally is relatively lower than the two optional subjects (KNEC, 2009). Amadalo, (1998) and Kariuki (2007) observed that continuous low enrollment in Physics will affect the contribution of science in National development and the achievement of vision 2030 and Sustainable development goals (SDGs). Enrolment trends in physics in Wajir County between 2006 to 2014 have been unsteady ranging between 210,205,197, 264,176,211,156 and 290 at most, (County Director Education Office-Wajir,2016) these is worrying in comparison to national enrolment as indicated in Table 1.1 (KNEC Annual Examination Report,) because the entire County has never registered above 0.2% of the national enrolment ratio. In spite of an overall gross increase in the enrolment of students into secondary schools due to the subsidized secondary education, student enrolment in Physics is remains low compared to the other two science subjects. It is clear that certain factors are responsible for low enrolment in Physics nationally and Wajir County is not an exceptional. In light with this background that the study established the determinants of students' enrolment in Physics in public secondary schools in Wajir County.

The government adopted a number of interventions targeting teaching of STEM subjects, students, teachers and the overall teaching and learning environment through institutions like SMASSE, CEMASTE, establishing centres of excellence in all counties, building laboratories and providing equipment in schools and paying allowances to science teachers in abet to improve science subjects. This study sought to establish the impact of

these interventions on students in Wajir given that the enrolment of students in Physics is below 10% in comparison to the national enrolment data (KNEC, 2012). Further this study raised serious questions about the implementation of changes made in physics curriculum in secondary especially if the goal is to prepare the young generation for life in a scientific-technological era through encouraging learners to enroll in physics.

1.2 Statement of the Problem

A population without a physics background may fail to understand and make use of every day's phenomena such as understanding the causes of wind, solar system, high dams and geothermal energy. This may lead to a low level of technology and therefore a low standard of living among the people. The fact that a small percentage of students opt to enroll for physics in Form Three despite all the three science subjects being treated as equal in terms of time allocation and mode of assessment, poses a great challenge to the overall qualification of the general work force. Despite the fact that enrolment in physics has been very low, performance has been consistently poor. The fact that selection of a course has a direct relationship with the student's achievement in the subject could be the reason why physics is less appealing to many students especially the weak ones.

Many research have been conducted globally and nationally on causes of low enrolment in physics and the findings have attributed these to: lack of instructional materials, inappropriate pedagogy, ill equipped laboratory, low mastery of the content by teachers and negative attitude of the teachers and students among others (Adera, 2004, Wafula et'al and Heidi et al, 2007). Therefore this study finds it necessary to establish the factors

leading to low student enrolment in physics in Wajir. Facts and findings on what contributes to disparities among boys and girls in enrolment and poor performance in physics have been well documented (SMASSE, 1998), however, Wajir county has no documented literature and statistics on the causes of low enrolment in physics which is a concern for this research to establish determinants to low student enrolment in physics in Wajir County.

1.3 Purpose of the study

The purpose of this study was to investigate the determinants of student's enrolment in Physics subject in secondary schools in Wajir County, Kenya.

1.4 Objectives of the study

The study was guided by the following objectives:

- i) To establish the extent to which teaching methods influence students' enrolment in Physics in Wajir County.
- ii) To examine the availability, utilization and adequacy of teaching and learning resources on students' enrolment in Physics in Wajir County.
- iii) To examine the extent to which teachers' attitude towards Physics influences students enrolment in Physics
- iv) To establish the extent to which learner characteristics influence their enrollment into physic at KCSE

1.5 Research questions

The study was guided by the following research questions:

- i. How does teaching methods influence the enrolment of students in Physics in secondary schools in Wajir County?
- ii. How does the availability, utilization and adequacy of teaching and learning resources influence enrolment in Physics in secondary schools in Wajir County?
- iii. To what extent do teachers' attitudes influence students' enrolment in Physics in secondary schools in Wajir County?
- iv. In what ways do learner characteristics determine enrolment into physics at KCSE?

1.6 Significance of the study

This study may significant to several groups of people including; schools, policy makers, curriculum developers, scholars and international organizations:

The Ministry of Education may provided with primary data on factors responsible for low enrolment in physics in Wajir County, hence design appropriate policies for scaling up enrolments. The Ministry of Education and policy makers may come up with interventions and set aside funds to support awareness programs for parents, community leaders and capacity building for teachers. The findings may go a long way in reclaiming the position of physics as a critical subject that influence the realization of Vision 2030.

The school principals, Board of Management (BoM) and teachers teaching Physics might be provided with new insights on low enrolments in physics in Wajir County that might

enable them come up with remedial mechanisms on the factors influencing low enrolment in Physics in terms of pedagogical approaches. MoE and KICD might make use the findings of the study to bridge the gaps and weakness in the current curriculum through the ongoing curriculum reforms in Basic Education. In addition, aspects of teacher competences in teaching physics may also be addressed by the Teachers Service Commission (TSC). The findings might form a base for other researchers to investigate school related characteristics such as educational innovations, use of digital materials and pedagogy which can help to inform policy review for the benefit of students who enroll in physics at secondary level.

1.7 Delimitations of the study

This study was delimited to public secondary schools in Wajir County. The independent variable were determinants such as pedagogical approaches in teaching physics, availability of learning resources for teaching physics, teacher attitudes towards teaching of physics and learner characteristics towards the subject physics while the dependent variable was students' enrolment in Physics. The respondents included principals and QASO officers who were interviewed, teachers and students answered questionnaires and focused groups discussions for students. The researcher also used observation checklist to establish the availability of teaching and learning resources.

1.8 Limitations of the study

The researcher had a number of limitations such as; the data collection was restricted to Public secondary schools in Wajir County; the consent of respondents were sought hence dispel suspicion and create a good rapport.

The random sampling method that was adopted for this study might not allow generalization of the findings in the following ways: purposive random sampling was used to select QASO officers and principals because of the specific characteristics required for this study.

1.9 Assumptions of the Study

This study assumed the following: all selected schools offer Physics up to KCSE, teachers teaching physics are qualified and teaching-learning resources are in place; that the respondents were ready to respond and to give honest responses to the study instruments and questionnaire return rate was above 90%.

1.10 Definition of Significant Terms

Achievement: this is performance of a student measured by the school through test and national examinations.

Assessment: the process of determining students' achievement through tests, projects and examinations.

Attitude refers to sum total of one's feelings, bias and pre-conceived convictions.

Pedagogy These are instructional strategies and techniques of carrying out instruction in the delivery of curriculum content.

Pedagogical approach: addresses learning skills, perspectives, and values that guide and motivate students to participate class

Peer group pressure: the power to influence another person's beliefs, character or actions of a person of the same age.

Physics: is one of the physics subject taught at secondary education

Resources: These refer to any inputs that are used in the learning environment to effectively achieve the desired outcomes.

Science: a vast body of connected knowledge of theories, concepts and facts developed by scientists through scientific methods.

Student Enrolment: This term will be used in the study to refer to the number of students selecting Physics subject up to the K.C.S.E level

Teaching and learning resources refer to laboratories, classrooms, and practical apparatus to be used in teaching and learning process.

Teachers' professional training refers to getting the require skills and knowledge on a specialized area (subject).

1.11 Organization of the study

The study is organized into five chapters, three chapters for the proposal and two more chapters to make up the research thesis. Chapter one presented the introduction, background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, delimitations of the study, basic assumptions, definition of significant terms and organization of the study. Chapter two consisted of literature review an introduction, review of related literature, theoretical framework and conceptual framework and research gaps. Chapter three described the research methodology describing research design, target population, sample and sampling procedures, research instrumentation, validity and reliability of instruments, data collection and data analysis technique. Chapter four covers, data presentation, interpretation and discussion of findings and chapter five presents summary of the study, conclusions, recommendations and Suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature anchored on the study title and objectives. The chapter will have seven sub sections as follows: pedagogical; availability of teaching and learning resource and student enrolment; teacher attitude towards physics and student enrolment; influence of learner characteristics and enrolment in physics; summary literature review; theoretical framework and conceptual framework.

2.2 Pedagogical approaches and student enrolment in physics

Heidi et al (2007) notes that students' learning of science directly depends on teachers having adequate knowledge of the subject matter. Teachers with more content knowledge are more likely to teach in ways that help students construct knowledge (Alonzo 2002). Such teachers interact with the learners intensively through question-answering and investigation-explanation approach; hence influence their desire to pursue the subject. Anderson,(2002) contends that teachers with long teaching experience in physics have strong instructional skills and are capable of encouraging students to like the subject, because they are quick in restoring order and developing a tempo of teaching which fosters more time on the tasks on the part of the students (Anderson, 2002). This may attract students to enrolling in physics.

Brookfield (2006) and Richet (2000) on the other hand argues that what may attract students to learning sciences like physics is not prolonged practice of professional

teaching. It all depends on what an individual what one had acquired earlier and how one approaches the new learning situations. The baseline studies Ong'ele (2007) and Agwanda (2002) established that most young teachers seemed to have problems in passing the content objectives to the students while experienced teachers were complacent, could not go to physics laboratories unprepared and most likely repeat previous mistakes. It is clear enrollment in physics is dependent on the teacher delivery of content and practical presentation. South African government came up with a number of initiatives to improve strategy for teaching science, mathematics and technology by the setting up of DINALEDI schools (Western Cape Department of Education, 2005). This enhanced learners' interest in STEM subjects.

In Kenya SMASSE (2003) designed meaningful and focused activities for improving teaching of sciences and mathematics in order to raise the students' interest, curiosity and help them relate the concepts learnt to the occurrence in day-to-day life. Ndirangu, Kathuri and Mungai,(2003) point out that, Improvised laboratory experimentation (ILE), for example, has been used as a remedy to the situation where there are inadequate teaching resources. According to F E M S A. (2001) it was noted that majority of the teachers tends to use the lecture method in which the learners are passive listeners. However, Inquiry-Based Teaching (IBT) approach is used to describe teaching strategies that are driven by scientific inquiry (Kahn & O'Rourke, 2005). It is student-centered rather than teacher-centered and offers students opportunities to be actively involved in experimenting, questioning and investigating in Physics.

Secondary school students in Nigeria exhibited low interest in science due to poor performance and these was considered as the major cause for low enrolment in sciences including Physics (Esiobu, 2005). Science educators and in particular Physics teachers in secondary schools need to change their teaching approaches to make them more effective and relevant to a much larger proportion of the student population (International Bureau of Education, 2000; Wieman and Perkins, 2005).

2.3 Teaching and learning resources and student enrolment in physics

Onyango (2001) observes that the limited number of Physics teachers in Kenya has led to heavy work load such that the teachers would not emphasize the need for practical lessons, therefore physics is left to the few who are confident in it and whom the teachers can manage well. Maicibi (2003) observes that when the right quality of human resource work together, they can manipulate other resources towards realizing institutional goals and objectives such as steady enrolment in all subjects. Raw (2003) added that educational resources enable the learners conceptualize concrete objects in their environment and help the teacher to cater for individual differences in the classroom and learners with special needs hence attract learners to learn the subject.

Teaching of Physics without adequate and functional instructional materials especially laboratory apparatus may certainly result in poor academic achievement and this discourages learners in the subsequent years (Frazer et al. 1992). Taale and Antwi (2012) also discovered that inadequate exposure to science laboratory work at the secondary school level has been a major cause of students' inability to comprehend, apply scientific

knowledge and enroll in the respective subject. Angora (2003) and Munyalo (2006) observed that if any meaning of implementation of a curriculum should take place, there should be ready and continuous supply of teaching learning resources to sustain the student interest in sciences. This study seeks to understand the relationship between the availability, adequacy, condition and utilization of teaching and learning resources on student enrolments in physics in Wajir County, Kenya.

2.4 Teachers' Attitude towards Physics and Students Enrolment in Physics.

Kahere (2011) revealed that science teachers who had gone for the SMASSE training had positive attitude towards experiments, confidence and were able to improvise in cases where resources are not available, than teachers who were not exposed to the training. Ongele (2007) noted that attitude and interest can be and are learned, teachers should assist pupils to have positive attitudes towards the subject. According to Adera (2004), Efumbi (2004), Kamau (2004) Mwangi (2002) negative attitude of the teachers towards the science subjects was the major factor influencing low enrollment in physics in secondary education. According to Raw (2003) teachers attitude leads to appropriate utilization of resources in schools thus reduces dropout rates, maintains learners discipline and makes learners remain motivated for longer periods.

Kiptum (2016) study revealed that teachers find most of the topics in physics easy to handle, however, some topics like electromagnetic induction, Electronics and Waves tend to be challenging which implies that learners' were left to struggle on their own with topics that proved difficulty to teachers. Jayantee (2011) noted that teachers had positive

opinions about girls' ability to do science but stated that lack of infrastructure facilities did not allow them to involve the pupils in practical work as much as they would wish, few students are encouraged to take subjects like physics. This study will closely investigate the teachers' attitude towards practical, improvising resources and interaction with the learners to enroll in physics.

2.5 Learner characteristics and student enrolment in physics

Waititu (2004) established that the attitude students develop towards a subject is dependent on their experiences in school. Furthermore he noted that there was a strong relationship between attitude and the choice of a subject of study. Bassey, (2003) argues differently that, key property of physics is that there are many mathematical concepts and processes which make physics a preserve of very few learners. This is similar to findings of (Amunga et al, 2013) that most secondary schools physics is optional and a preserve of a few who are confident enough to take a third science subject and sustain the perceived difficulty concepts by a majority of the students. This notion affects student enrolment.

In contrast, Murithi (2013) states that physics is taught to selected students who have knowledge of its mathematical concepts and symbols. These factors lower the morale in pursuing physics. The same findings revealed that students have a positive attitude towards physics, perceive the physics' teachers as competent and they perceive the physics laboratories as well equipped. A study conducted in USA by New Education Department in 2013/2014 revealed that across the country, 2.8 million K-12 students received one or more out-of-school suspensions, a nearly 20 percent drop from the

number reported two years ago, however such students could not follow basic concepts in school in English language and similarly there gaps were seen for physics, chemistry and Algebra II, therefore, inconsistency in school due to indiscipline affects the interest in pursuing science subject like physics.

Al –Methen and Wilkinson (2014) reported that failure in students is due to lack of confidence in the knowledge they possess in turn could affect their level of activity in the classroom. They also argued that student’ academic problems arise from personal inadequacies such as low ability; negative self- concept, anxiety, maladjustment, environmental influences such as poor classroom conditions, curricular inadequacies, peer groups and the lack of home support. Regular school attendance is an important factor in school success as cited by Rothman (2001),in his study it was established that poor attendance had severe negative results on student achievement in mathematics and sciences, because learners has fewer hours for instructions and experiments. Furthermore, a positive attitude toward science “leads to a positive commitment to science that influences lifelong interest and learning in science”. This is one reason why major science education reform efforts have emphasized the improvement of students’ attitudes.

Sintayehu (2014) argued that student’ academic problems and lack of interest in pursuing physics arise from personal inadequacies such as low ability; negative self- concept, anxiety, maladjustment, environmental influences such as poor classroom conditions, curricular inadequacies, peer groups and the lack of home support. In addition to this, Birhanu (2009) basically identified in four major areas that physics students has

been facing the problems, namely: lack of interest, poor problem solving skills, poor understanding of the concept of physics, and lack of skill in practical work respectively.

On the other hand, Akweya et al (2015) attributed attitudes of students, learners' ability and teacher characteristics to low enrolment and poor performance of girls in physics. This concurs with, Uchenna. & Patrick (2015) views that students' notion that physics was difficult to understand; their subject combinations and envisaged career choices which exclude physics; inadequate exposure and motivation; student's negative affective attitude towards mathematics and physics. Based on this fore goings, the researcher will closely investigate learner characteristics and how they influence their enrollment in physics.

2.6 Theoretical Framework

The study will be guided by Expectancy Value Model of Achievement theory, proposed by Eccles et al (1983) and Wigfield (2002) related to choices in investigating students' choices of STEM. Expectancy Value Perspectives Achievement theory on choice of science and technology Education was founded in social psychology and it incorporates psychological and cultural aspects that affect young people's choices. The theory has two perspectives expectations of success and subjective value. Expectations of success value include: how well the students will perform in a school subject they choose, they chose what they can master based self-concept of ability and impression of difficulty of the subject. Tyler et.al (2008) observed that Physics and Mathematics are regarded as difficult and demanding; and also the way students weigh the potential cost related to

failure and lost opportunities, in the long run any reputation of difficulty makes students to shy away. Students also identity development affects expectations of success attached to different educational options.

In addition, Simkinset'al (2006) links between mathematics and sciences choices and expectations of success, therefore students participate activities which predict expectations and value, in turn predicted enrolment in mathematics and sciences. Subjective value includes: interest enjoyment value- student's interest in a subject in question and the enjoyment they expect to experience when they engage in the subject; Attainment value-how well the subject fits into identity development and the importance attached to attaining the goal. If physics is perceived to be for the brainy and unpopular geeks, physics will have low attainment value for someone who rejects identity; Utility value-how helpful a certain option in reaching external goals; and Relative cost relates to students educational choices compared to other options physics because physics may be considered as difficult and higher workload.

This theory is relevant to this study in the following ways: Learner 'characteristics influence choices to enroll in physics mainly because of their low or high confidence, attached value, personal goals, interest ,support from home, how friends and family members talk about science subjects. The subject value is dependent on interaction between teachers and students in class, methods of teaching that may lead to mastery of concepts and availability and utilization of learning resources. Pedagogical approaches, availability of teaching and learning resources, teachers' attitude and learner

characteristics may be critical determinants enrolment in physics. Researcher acknowledges students' decision to enroll in physics is as result of various factors some of which are mentioned Expectancy Value Model of Achievement theory, which will be investigated in Wajir County, Kenya.

2.7 Conceptual Framework

The conceptual framework is hypothesized model identifying various variables and the relationship among them (Mutai, 2000). This study will be based on the assumptions that factors students' enrolment in Physics influenced by inputs which include; teaching methods, teacher attitude towards utilization of learning resources and learners' availability, adequacy and utilization of resources and learner characteristics which ultimately affect enrolment in Physics. The variables constitute the conceptual framework which is summarized in figure 2.1.

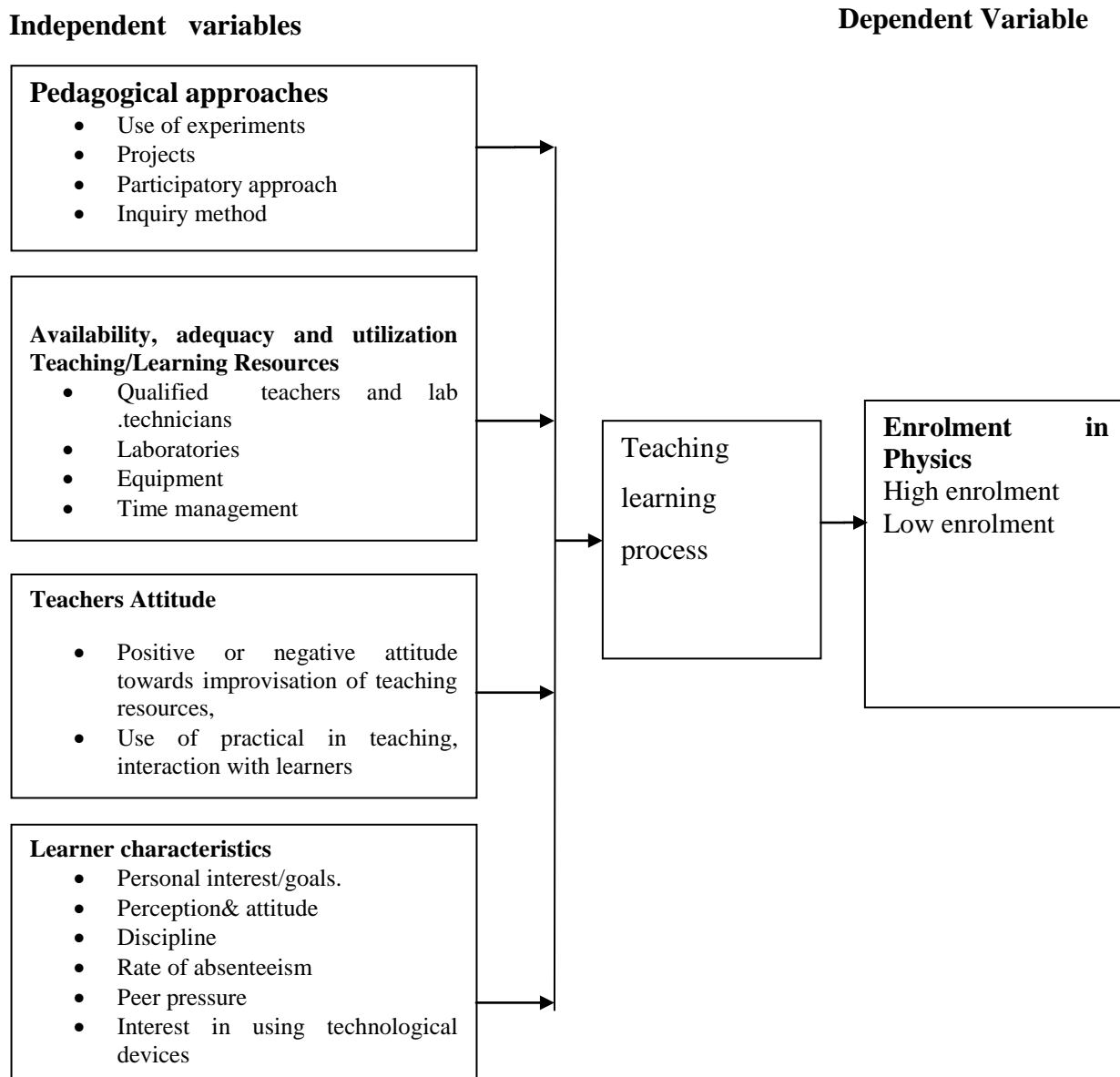


Figure 2.1: Conceptual Framework

The conceptual framework Figure 2.1, shows how independent variables influence dependent enrolment in physics which is either high or low enrolment. The teaching learning process acts as the intervening variable. The independent variables are the pedagogical approaches, the availability, adequacy and utilization of both teaching and

learning resources, the teachers' attitude and enrolment in physics. The independent variable will impact on the teaching learning process which in turn affects the enrollment in physics.

2.8 Summary of Literature

The literature review has identified related studies to factors influencing student enrolment in physics. Trumper (2006, Wafula et al (2013); Mekonnen (2014); Munene (2014) Uchenna & Patrick (2015) and Kiptum (2016) among others identified factors such as disparities between boys and girls academic achievement in physics; difficult concepts; inadequate teacher preparation and poor teaching method as major factors affecting student enrolment in physics. Their findings also attributed low enrolment in physics to students' poor performance, a formed opinion on the nature of the subject as a difficulty and having mathematical manipulations which scare off students. For this study teaching methods, teacher attitude and students characteristics was closely investigated to establish their influence on enrolment in Physics. The envisaged determinants will be: pedagogical approaches, availability teaching and learning resources, teachers' attitude towards physics and learner characteristics on enrolment in Physics in public secondary schools in Wajir County.

Kiptum (2016) and Munene (2014) found out that some topics were difficult for teachers to teach and girls tend to shy away from physics, this study will not be confined on disparities on the basis of gender and difficult topics as observed in the reviewed related literature instead an in-depth analysis of learners' characteristics such discipline

level, rate of absenteeism and interest in technological devices to boost understanding of concepts, besides peer pressure, perceptions and attitudes. Ongele (2007) noted that attitude and interest; Onyango (2001) observed that the limited number of Physics teachers and Taale and Antwi (2012) discovered that inadequate exposure to science laboratory work were some of the factors affecting performance in physics.

This study closely established how pedagogy, availability, utilization and adequacy of learning resources, teacher attitude to towards teaching physics and learners as well as learner traits determine enrolment in physics. This study primarily focused on the variables under study and document pertinent information that can help stakeholders in this region to scale up enrolment in physics and also help students to develop awareness for physics and avoid a repulsive approach to it in relation to other subjects.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the methodology that was used in the study. It comprises the following sub-heading; research design, target population, sample size and sampling procedures, research instruments, reliability and validity of the research instruments, data collection procedures and data analysis techniques and ethical considerations.

3.2 Research design

A research design is a plan or blueprint of how the researcher intends to conduct the research (Babbie& Mouton, 2001). The study used descriptive survey research design. According to Kothari (2007) descriptive survey research design is a type of research used to obtain data that can help determine specific characteristics of a group. A descriptive survey involves asking questions (often in the form of a questionnaire) of a large group of individuals either by mail, by telephone or in person. The main advantage of survey research is that it has the potential to provide us with a lot of information obtained from quite a large sample of individuals.

3.3 Target population

Target population is the entire group of persons, events or objects having common observable characteristics (Mugenda and Mugenda 2009). The target population of this study consisted of all 16 public secondary schools in Wajir County. These schools have 16 principals, 32 physics teachers, 1600 learners and six QASO officers, these totals to

1654. These respondents were selected because they have pertinent information, experience, skills and knowledge in determinants to student enrollment in physics at KCSE level. QASO officers were advice and offer guidance to schools, teachers and Ministry in regard with regard to professionalism, teaching and learning resources and ensure quality in education.

3.4 Sample Size and Sampling Procedure

In order to ensure equal probability and representativeness in selection of the respondents which participated in the study, the researcher used stratified random sampling and purposive sampling and sampling procedure will be carried out as described below.

3.4.1 Sample Size

According to Mugenda and Mugenda (2009), 10% of the accessible population is enough for descriptive survey. A total of 1654 formed the target population. The researcher then drew the sample size by use of percentages ranging between 10% and 100% due to disparity in the number of respondent category as tabulated and presented in Table 3.2.

Table 3.2: Sample Framework

Target Category	Target Population	%	Selected Sample Size
Learners	1600	10	160
Physics Teachers	32	100	32
Principals	16	100	16
QASO Officers	6	100	6
Total	1654		214

Table 3.2 provides the distribution of sample size, therefore sample size for this study will be 210.

3.4.2 Sampling Procedure

For this study Stratified random Sampling and purposive sampling was applied. Stratified random Sampling was used to select learners from all sixteen secondary schools in Wajir County. The total number of students was 1600 (Wajir County Education Directors'Office,2016). Using stratified 10% of 1600 was translated to 160 learners drawn from forms 2, 3 and 4. This was critical ensuring equal representation across the stratum in terms of gender, class, school category, location and Sub County.

Purposive sampling procedure was applied to select 100% of the teachers of all 32 teachers teaching physics, 16 secondary school principals and 6 QASO officers representing six sub-counties in Wajir. The purpose of using purposive sampling procedure was because these were the only respondents with pertinent information on determinants of students' enrolment in Physics in Wajir County.

3.5 Research instruments

The research instruments for this study were questionnaires, FDGs, interview schedule and observation checklist.

3.5.1 Questionnaires

Questionnaire is a fast way of obtaining data as compared to others instruments (Mugenda & Mugenda, 2003). Questionnaires gave the researcher comprehensive data on a wide range of factors. The questions were closed-ended items based on the Likert Rating scale of five. The questionnaires were divided into two sections, Section A that comprises of the general information of the respondent and Section B aligned to study objectives. The questionnaires were administered to teachers teaching physics in secondary schools of Wajir County. This tool allowed each respondent to present responses without influence from the researcher.

3.5.2 Focused Group Guide (FDGs)

Focused group discussions were used to gather primary information from learners' group in groups of 8-10 depending on the number of students in Form 2, 3 and 4, as well as gender equity for mixed schools. The information were confined on teaching methods, teachers' attitude towards the subject, teachers' use of teaching and learning resources, discipline, rate of absenteeism, peer pressure and interest among other variables. The learners were presented with an opportunity to express themselves to the research questions with a researcher who does not have information about individual learners.

3.5.3 Interview Schedule

Interview refers to obtaining information by asking people who have experience and knowledge in a subject of concern which the researcher cannot observe directly. The interview Schedule was used to solicit information from the secondary school principals and QASO officers in Wajir County. This allowed researcher to probe further on areas that may generate detailed information on why and how student enrolment in physics is determined.

3.5.4 Observation Checklist

Observation checklist was used by the researcher to get further information on the availability, adequacy, utilization and condition of instructional materials. Observation guide is chosen for this study because it helped to cross-check information elicited from the questionnaires.

3.6 Validity of the instruments

According to Kothari (2004) validity is the degree to which a test measures what it purports to measure. It is the accuracy and meaningfulness and technical soundness on the research. Face and content validity was considered in this study was ascertained by asking members of academic staff to express opinions on the content validity of the items in the questionnaire according to the following points. The clarity and appropriateness of the wording of each items and whether the content of the questionnaire adequately determinants on enrollment in physics at KCSE. Furthermore, the supervisor's expert judgment was highly regarded to make the questionnaire appropriate for use in the field.

The final version of the questionnaires was prepared for test for reliability and validity through a pilot study.

Orodho (2008) states a pilot study is a small scale study of the bigger version which comprises of all the activities that will be done during the real study. Pilot testing of the questionnaire, Focused Group Discussion tool and Observation Schedules was conducted in one school which will not be included in the actual study Sample of fifteen schools. This was done 4 weeks before field work to help to enhance clarity and remove ambiguity from the instruments.

3.7 Reliability of the instruments

This study applied test re-test method to measure the extent to which all parts questionnaire and interview schedule measured the determinants of students' enrollment in physics in Wajir County, Kenya. Test re-test method involved administering the same instrument twice to the same group within a time lapse of two between first and second. The scores of the two tests was correlated using Pearson's Product Moment Correlation coefficient formula as follows:

$$r = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{[N\sum(x)^2 - (\sum x)^2][N\sum(y^2 - (\sum y)^2]}}$$

Key:

$\sum xy$ = sum of cross product of scores of each test

$\sum x^2$ = sum of squared deviation in x

Σy^2 = sum of squared deviation in y

According to Mugenda and Mugenda (2003) a coefficient of 0.70 or more shows that there will be a high reliability of instruments. From the questionnaire the research got a coefficient of 0.86. This was considered a good reliability for the researcher to continue with the study.

3.8 Data Collection Techniques

The researcher sought for introductory letter from the graduate school, UON, then applied for a permit to conduct the research from the National Commission for Science, Technology and Innovation (NACOSTI). This was followed by writing a letter requesting for appointment to access teachers to be involved. The researcher distributed the questionnaires personally to the teachers teaching physics and conducted Focused Group Discussion (FGDs) with students in groups of 8 to 10 learners drawn from form 11-IV depending on student population in the school and gender consideration, Interview the principals and observe the teaching learning resources.

3.9 Data Analysis Techniques

Data analysis techniques deal with the process of coding, data entry and analysis in order to make interpretation possible. Quantitative data drawn from questionnaires and observation schedules was analyzed by the use of descriptive statistics using Statistical Package for Social Sciences (SPSS) version 21.0 and was presented through percentages, means, pie charts, bar graphs and frequency tables. Qualitative data drawn from Focused

Group Discussions (FGDs), was transcribed, coded and categorized into themes in line with study objectives.

3.10 Ethical considerations

The researcher sought permission from the school administration to allow the researcher to conduct the study. The study put into consideration the ethical issues applicable in a research. These include confidentiality of the information gathered from the respondent which was only be used for academic purposes, seeking authority to conduct research and acquire information and sharing of the final report with the parties involved in the study.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

The main objective of the study was to investigate the determinants of student's enrolment in Physics subject in secondary schools in Wajir County, Kenya. The findings of the research are presented based on the four research objectives stated below.

- i. To establish the extent to which teaching methods influence students' enrolment in Physics in Wajir County.
- ii. To examine the availability, utilization and adequacy of teaching and learning resources on students' enrolment in Physics in Wajir County.
- iii. To examine the extent to which teachers' attitude towards Physics influences students enrolment in Physics
- iv. To establish the extent to which learner characteristics influence their enrollment into physic at KCSE

The background data of the respondents is given first, followed by the analysis and discussion of each of the four research objectives.

4.2 Response Rate

As shown in Table 4.1 below, the study targeted 32 teachers and 160 students out of which 30 teachers and 133 students responded and returned their questionnaires contributing to the response rates of 93.6% and 83.1% respectively. This response rates were sufficient and representative and conforms to Mugenda and Mugenda (2003)

stipulation that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. This commendable response rate was due to extra efforts that were made via personal calls and visits to remind the respondent to fill-in and return the questionnaires.

Table 4.3 Response Rate

	Students	Teachers	Percent
Response	133	30	93.6%
Non response	27	2	6.4%
Total	160	32	100%

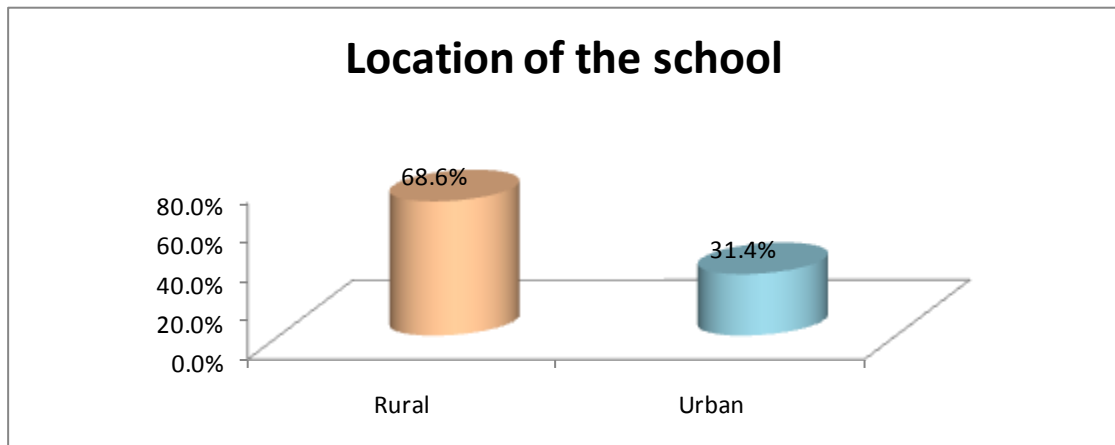
4.3 Demographic Information

The study initially sought to inquire information on various aspects of respondents' background, i.e. the location of the school, gender, type of school, status of school, nature of school, professional qualification and years of service.

4.3.1 Location of the School

The study aimed at finding out the location of the secondary schools in Wajir County, Kenya that is whether rural or urban. The results are as summarized in Figure 4.1.

Figure 4.2: Location of the school

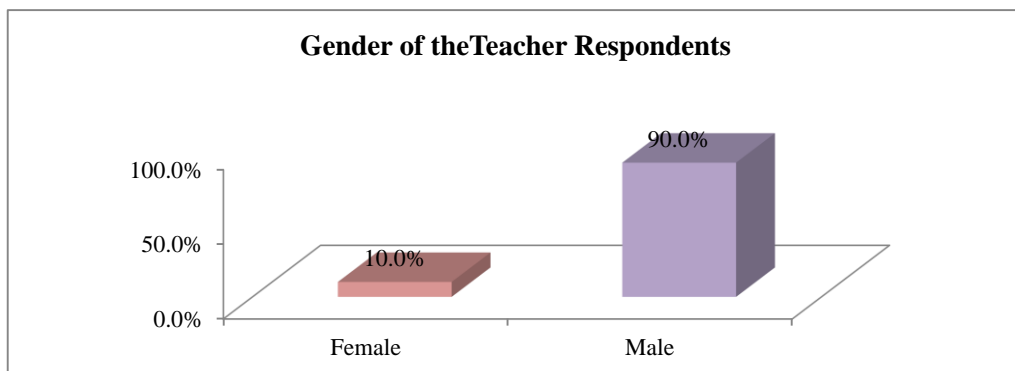


As shown in Figure 4.1 the majority of teacher respondents (68.6%) indicated that the school was rural while 31.4% said it was urban. This implies therefore that many schools in Wajir County are rural schools.

4.3.2 Gender of the Teacher Respondents

The study sought to find out the gender of the teacher respondents and the findings are as shown in Figure 4.2.

Figure 4.3: Gender of the Teacher Respondents

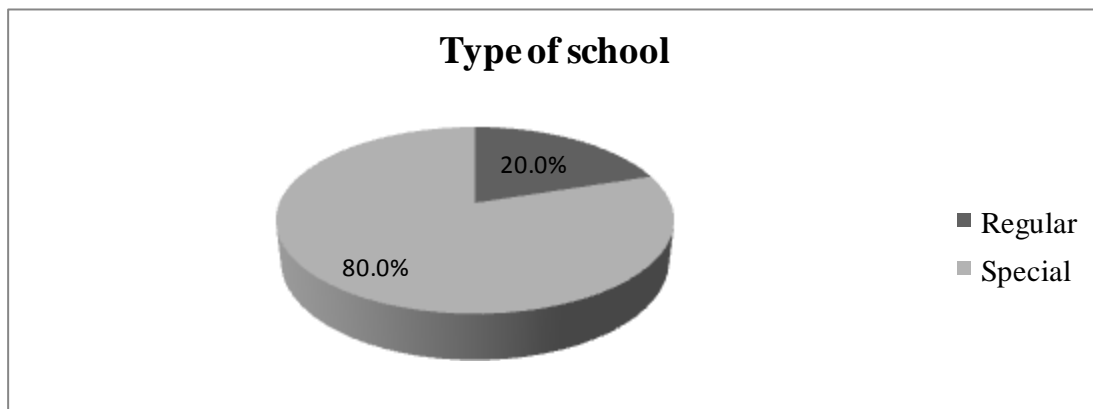


As shown in Figure 4.2 there were more male teachers (90%) than female teachers (10%). This therefore implies that there are more male physics teachers than female teachers in secondary schools in Wajir County.

4.3.3 Type of School

The study sought to establish the type of school in Wajir County. The result is as shown in Figure 4.3.

Figure 4.4: Type of School



From the finding in figure 4.3, majority (80%) were regular schools while the remaining 20% were special schools. This is an indication that majority of secondary schools in Wajir County are regular schools.

4.3.4 Status of the school

The study aimed at clarifying the status of the school in Wajir County. There were three options that is, day, boarding and day & boarding. The findings are summarized in Figure 4.4.

Figure 4.5: Status of the school

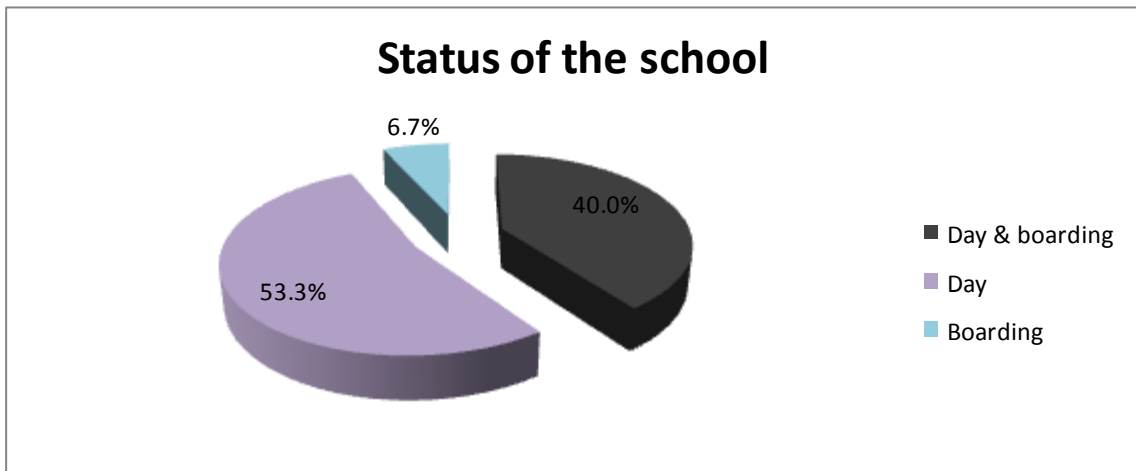


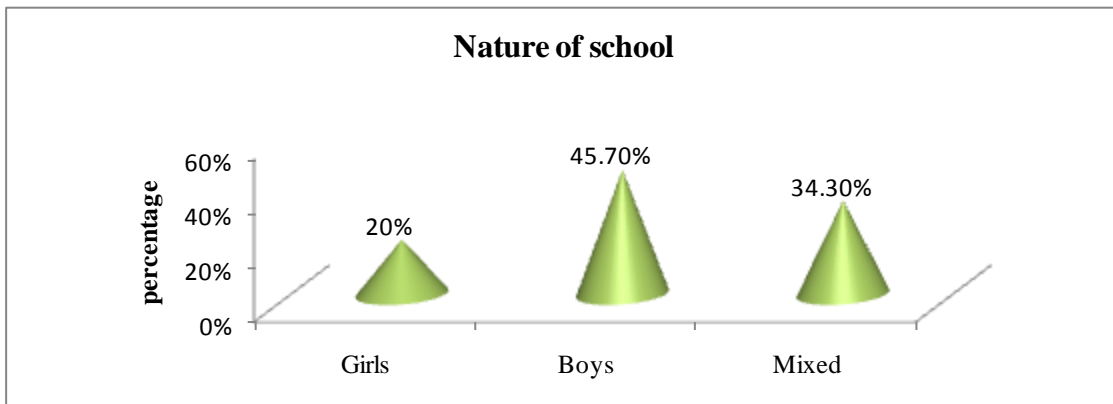
Figure 4.4 shows that majority of schools (53.3%) were day schools followed by 40% day & boarding while the rest (6.7%) were boarding schools.

Majority of student respondents indicated that their schools were mixed (38.3%) followed by 35% boys only while the remaining (26.7%) were girls schools. This shows that more boys participated in the study compared to their female counterparts. This is also an indication that there were more boys in physics classes than girls.

4.3.5 Nature of school

The study sought to establish the nature of school in Wajir County. The result is as shown in Figure 4.5.

Figure 4.6: Nature of school

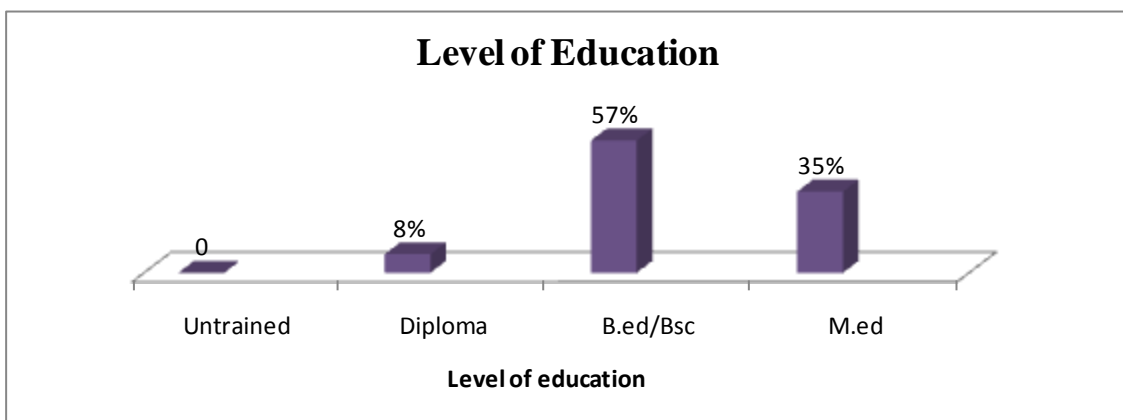


It was established that majority of the schools 45.7% were boys schools, 34.3% mixed schools while 20% were girls schools. This implies therefore there were more boys in secondary schools in Wajir County.

4.3.6 Level of education of teacher respondents

The study required the respondents to indicate their professional qualification. The response is indicated in Figure 4.6.

Figure 4.7: Level of Education of teacher respondents

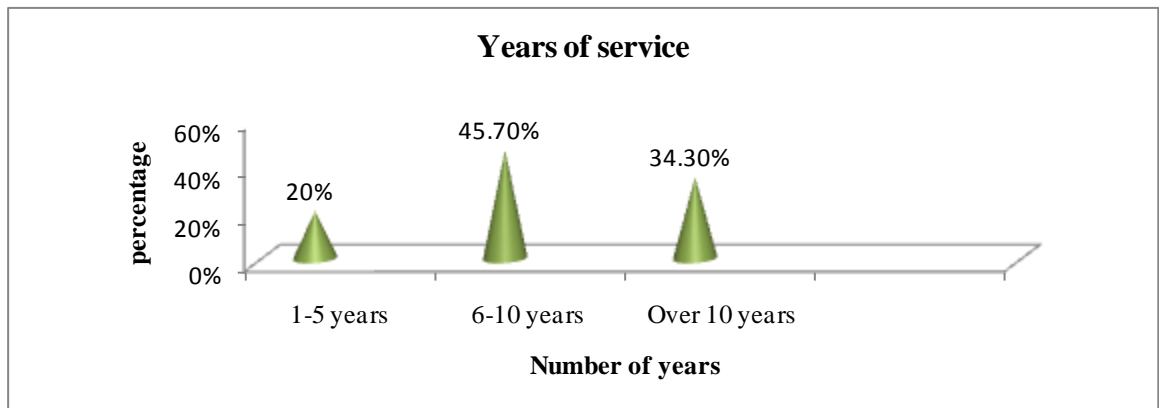


The study established that over half of the teacher respondents (57%) had a Bachelors degree (either B.ed/Bsc). This was followed by 35% of the respondents who had a master of education while another 8% of the respondents had attained a diploma. This indicates that majority of teachers in Wajir County have a Bachelors degree. Heidi et al (2007) notes that students' learning of science directly depends on teachers having adequate knowledge of the subject matter. Teachers with more content knowledge are more likely to teach in ways that help students construct knowledge (Alonzo 2002).

4.3.7 Years of service of teacher respondents

The study further required the respondents to indicate their years of service at secondary schools in Wajir County. The response is summarized in Figure 4.7

Figure 4.8: Years of service of teacher respondents



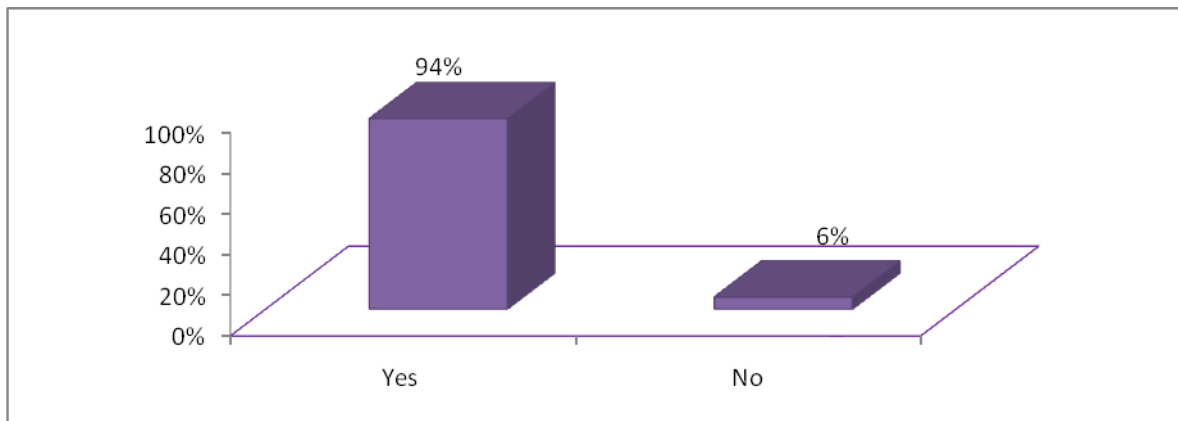
It was established that 45.7% teacher respondents had been in teaching for a period of between 6 to 10 years while 34.3% had taught for over 10 years. The remaining 20% of indicated that they had been in service for a period of between 1-5 years. This shows that majority of the respondents had been in teaching service for a period of between 6 to 10

years. Higher duration in the profession can be used by the study to imply that the teachers are experienced thus deliver better. Anderson, (2002) contends that teachers with long teaching experience in physics have strong instructional skills and are capable of encouraging students to like the subject.

4.3.8 In-service of teacher respondents

The study sought to establish whether teachers were in-service or not. The study findings are as shown in Figure 4.8.

Figure 4.9: In-service of teacher respondents



Majority of the respondents (94%) agreed to be in-service, while only 6% were not. This is to show therefore that majority of the teachers in secondary schools in Wajir County were in-service.

4.3.9 Visit by County Education Standards and Quality Assurance Council

The study further required the respondents to indicate how often they were visited by the director of education. The response is summarized in Table 4.2.

Table 4.4: Visit by County Education Standards and Quality Assurance Council

Quality Assurance Council	Frequency	Percent (%)
Quite often	2	7.1
Once in a while	5	17.9
Where need arises	20	71.4
Never	1	3.6
Total	28	100

From the findings, 71.4% of the respondents indicated that the visit to the school by DESQAC was when need arose, 17.9% said once in a while, 7.1% said quite often while the remaining 3.6% said never. This shows that the visit by CESQAC was not effective.

4.4 Pedagogical Methods and student enrolment in physics

As per the research question one, the study sought find out the extent to which teaching methods influence students' enrolment in Physics in Wajir County. The respondents were supposed to show their extent using a scale of 1-5 where 5= very great extent (VGE), 4= Great Extent (GE) 3= Some Extent (SE) 2= Very Low extent (VLE) and 1= Not At All (NAA).

Table 4.5: Pedagogical Methods

	NAA	VLE	SE	GE	VGE	Mean	Std Dev
Question and answer	8.9	16.7	12.5	19.6	42.3	4.183	0.8537
Lecture method	18.5	11	7.1	44.9	18.5	4.265	0.9691
Role play/Drama	3	9.8	6.8	43.2	37.2	3.823	0.7451
Discussion	11	10.1	5.4	29.5	44	4.521	0.0113
Project method/Research	9.2	3	11.6	35.7	40.5	4.421	0.1421
Educational field trips	8.3	5.1	7.7	33.3	45.5	4.312	0.3267
Group activity method	0.6	4.2	10.7	52.4	32.1	3.967	0.5321
Demonstration	9.5	0.6	8.9	41.7	39.3	3.834	0.6351
Case study method	11.9	45.8	3.9	1.2	37.2	3.732	0.6142
Resource persons	0.6	38.4	46.1	14.9	0	3.651	0.5321
Digital content and devices	10.1	50	4.5	1.8	33.6	2.512	0.6271
Debate	1.8	3	51.5	36.6	7.1	3.561	0.7451
Video	9.8	44	7.7	4.4	36	2.643	0.5621

Based on the study, findings, teacher respondents indicated that their schools to a great extent use discussion (mean=4.521), project method/research (mean=4.421), educational field trips (mean=4.312), lecture method (mean=4.265) and question and answer (mean=4.183). In addition, teachers indicated that their schools to some extent use group activity method (mean=3.967), demonstration (mean=3.834), role play/drama

(mean=3.823), case study method (mean=3.732), resource persons (mean=3.651) and debate (mean=3.561).

The teachers further indicated that to a very small extent the school used video (mean=2.643) and digital content and devices (mean=2.512). The findings are in line with Anorue (2004) study which noted that an effective classroom is one in which the teacher uses varied teaching styles for instruction. KIE, (2008) suggest that teachers should determine the best resources for a particular lesson and the resource should be used in the most natural and logical manner known to reinforce a particular learning activity.

Students' respondents indicated that teaching methods had a positive influence on students' enrollment. Through a focuses group discussion the learners indicated that *"different teaching method helps the learners to understand the activities well hence improve their self esteem"*. The findings also concur with Valdés et al., 2005 which recommends on instructional strategies which build on students' strengths, and ensure that all students know the culturally and linguistically appropriate ways of participating in the classroom.

From the interview principals indicated that the teachers were reluctant to make the most lessons practical. One respondent said they used students counted method of teaching. Through an interview the principal indicated that *"learners respond to different teaching methods through active participation during the learning process, high retention and*

development of curiosity and observation skills”. The findings agree with Villegas & Lucas, 2002a who advocates for strategies that engage all students—not just the most advanced—“actively in purposeful, meaningful, collaborative, intellectually rigorous, and language-rich activities”.

4.5 Availability, Utilization and Adequacy and student enrolment in physics

The study required the teacher respondents to rate the adequacy of the given teaching and resources in the school. They were to rate on a scale of 1-5 with 1=Very adequate, 2=Adequate, 3=Inadequate, 4=Very inadequate and 5=Not available. The findings are indicated in table 4.4.

Table 4.6: Availability, Utilization and Adequacy

Learning Resources	Availability (%)		Adequacy (%)		Utilization (%)	
KICD Syllabus	80	20	80	20	100	0
KICD Teachers' Handbook for Physics	80	20	80	20	100	0
Reference books for Physics	50	50	50	50	100	0
Physics Teachers' Guides	40	60	40	60	100	0
Calculator	60	40	60	40	100	0
Physics laboratory	30	70	30	70	100	0
Lab equipment's	20	80	20	80	100	0
E- Materials	10	90	10	90	100	0
Internet	15	85	15	85	100	0
Computers laboratory	25	75	25	75	100	0
Computers	20	80	20	80	100	0
Physics Charts	60	40	60	40	100	0
Classrooms/Desks	80	20	80	20	100	0
Library/textbooks	40	60	40	60	100	0
Improvised materials	30	70	30	70	100	0

Angora (2003) and Munyalo (2006) observed that if any meaning of implementation of a curriculum should take place, there should be ready and continuous supply of teaching learning resources to sustain the student interest in sciences. From the findings shown in table 4.4, the teaching and learning resources were available and adequate were KICD Syllabus (80%), KICD teachers' handbook for physics (80%), classrooms/desks (80%), calculator (80%), physics charts (60%), reference books for physics (50%). Moderately available and adequate resources were physics teachers' guides (40%), physics laboratory (40%), library/textbooks (40%) and improvised materials (30%).

Least available resources were lab equipment's (20%), e-materials, internet (15%), computers laboratory (25%) and computers (20%). According to Taale and Antwi (2012) inadequate exposure to science laboratory work at the secondary school level has been a major cause of students' inability to comprehend, apply scientific knowledge and enroll in the respective subject. The utilization of the available teaching and learning resources was 100% in all the schools.

Majority of principal respondents indicated that at times the teachers improvised instructional materials. They however cited time as one of the limiting factor since the material improvisation required keenness in coming up with them. "Teachers mainly improvise materials for form one students. The rest can understand without use of instructional materials" said one principal. Students respondents said they assisted their teachers come up with instructional material when required to do so.

4.6 Teacher Attitude towards Physics and Students Enrolment in Physics.

As per the research question one, the study sought to examine the extent to which teachers' attitude towards Physics influences students enrolment in Physics. They were to use a scale of 1-5 where at all 1 = Strongly disagree, 2=disagree, 3=undecided, 4=agree and 5=strongly agree.

Table 4.7: Attitude towards physics

	SD	D	U	A	SA	Mean	Std Dev
Physics is boring subject to teach.	11	22.9	13.1	41.7	11.3	2.021	0.6716
Physics syllabus is too wide.	15.2	18.5	22	36.3	8	4.106	0.3099
Physics is full of hard scientific words	11.6	25	38.7	16.7	8	4.063	0.5643
Physics is full of calculations	8.3	17.9	24.4	42	7.4	4.117	0.7011
Some topics are hard to teach	8	22	17	21.7	31.3	3.266	0.4442
Physics is not useful for student future career	12.2	17.9	19.6	13.4	36.9	2.191	0.3955
Physics is for bright students	9.8	17.3	21.4	31.5	19.9	2.287	0.4779
The Physics content takes time to understand.	16.1	28.3	12.8	36.3	6.5	4.031	0.6126
Physics is for boys	8.6	12.8	14.6	41.7	22.3	3.095	0.4653
Physics is not easy for girls	2.4	18.2	11.6	41.1	26.8	2.936	0.7003
I like the teaching Physics	11	22.9	13.1	41.7	11.3	4.010	0.3737
Can't teach Physics without teaching aids and practical	15.2	18.5	22	36.3	8	2.063	0.5039
Physics is not taught practically	11.6	25	38.7	16.7	8	4.123	0.265
I had chosen teaching of Physics as my preferred career	8.3	17.9	24.4	42	7.4	4.089	0.623

According to Raw (2003) teachers attitude leads to appropriate utilization of resources in schools thus reduces dropout rates, maintains learners discipline and makes learners remain motivated for longer periods. As per the study findings, respondents agreed that there is frequent absenteeism among students in physics classes (mean=4.341), they always looking forward to teaching Physics (mean=4.267), Lack of commitment among teachers of Physics (mean=4.235), Physics is not taught practically (mean=4.123), physics is full of calculations (mean=4.117) and physics syllabus is too wide (mean=4.106) and they had chosen teaching of Physics as my preferred career (mean=4.089).

In addition, respondents agreed that physics is full of hard scientific words (mean=4.063), the physics content takes time to understand (mean=4.031), they like the teaching physics (mean=4.010), schools lack physics laboratory (mean=4.025), environment of the school not conducive to learning physics (mean=4.013). According to Kiptum (2016) teachers find most of the topics in physics easy to handle.

Table 4.8: Teachers attitude towards external influencers

	SD	D	U	A	SA	Mean	Std Dev
Environment of the school not conducive to learning Physics	8	22	17	21.7	31.3	4.013	0.563
There is lack of discipline among students	12.2	17.9	19.6	13.4	36.9	2.086	0.856
There is frequent absenteeism among students in Physics classes	9.8	17.3	21.4	31.5	19.9	4.341	0.132
Teachers are incompetent in teaching Physics	16.1	28.3	12.8	36.3	6.5	3.378	0.236
Lack of commitment among teachers of Physics	8.6	12.8	14.6	41.7	22.3	4.235	0.135
I am always looking forward to teaching Physics	2.4	18.2	11.6	41.1	26.8	4.267	0.236
Physics is very difficult to understand	11	22.9	13.1	41.7	11.3	2.356	0.245
Schools lack Physics laboratory	15.2	18.5	22	36.3	8	4.025	0.265

The respondents were undecided whether teachers are incompetent in teaching physics (mean=3.378), some topics are hard to teach (mean=3.266), physics is for boys (mean=3.095) and whether physics is not easy for girls (mean=2.936). The findings are in line with Jayantee (2011) who noted that teachers had positive opinions about girls' ability to do science but stated that lack of infrastructure facilities did not allow them to involve the pupils in practical work as much as they would wish, therefore few students are encouraged to take subjects like physics.

The respondents however disagreed with the opinion that physics is very difficult to understand (mean=2.356), physics is for bright students (mean=2.287), physics is not useful for student future career (mean=2.191), there is lack of discipline among students (mean=2.086), can't teach physics without teaching aids and practical (mean=2.063), physics is boring subject to teach (mean=2.021).

The head teachers through the interviews indicated that the teachers were averagely prepared. They further indicated that they enhanced their preparedness through endorsement of records, supervision, pupils' progress record, encouraging them and providing them with learning materials. The respondents suggested that among other things, teacher preparedness influenced learning and understanding as well as learners confidence.

One of the respondents said *“teacher attitude positively influences the language acquisition of the learners”*. Another respondent indicated that *“teacher attitude improves learners language skills hence pupils enjoy learning”*. Yet another indicated *“when the teacher has positive attitude he/she uses a variety of teaching methods which is key to learning physics and other science subjects”*.

The findings are in line with Vilímec (2006) who found that the way teachers organize their activities and the way they perceive the individual steps connected with the organization of activities may essentially influence the eventual efficiency of the activity and the consequent development of speaking skills.

4.7 Learner Characteristics and students enrollment in physics

The study required the respondents to rate the extent to which learner characteristics influence their enrollment into physics at KCSE. They were to use a scale of 1-5 where at all 1 = strongly disagree, 2=disagree, 3=undecided, 4=agree and 5=strongly agree to show how the following statements influenced enrollment into physics.

Table 4.9: Learners Characteristics

Learner Characteristics	SD	D	U	A	SA	Mean	Std Dev
Personal goals and challenges	10.1	1.8	4.5	50	33.6	4.183	0.5371
Peer pressure	1.8	3	7.1	36.6	51.5	4.265	0.6912
Interest	9.8	2.4	7.7	44	36	3.823	0.4512
Class attendance and participation	0.6	1.8	14.3	32.7	50.6	4.312	0.2676
School performance in national examinations	5.1	1.2	22.6	27.4	43.8	3.967	0.7321
Discipline level of students	3.6	10.7	11.6	29.2	44.9	3.834	0.8351

Waititu (2004) established that the attitude students develop towards a subject is dependent on their experiences in school. Based on the study, findings, Majority of the learners agreed that class attendance and participation (mean=4.312), peer pressure (mean=4.265) and personal goals and challenges (mean=4.183) influenced enrollment of physics in KCSE. This concurs with Rothman (2001), that poor attendance had severe

negative results on student achievement in mathematics and sciences, because learners have fewer hours for instructions and experiments. They further agreed that school performance in national examinations trips (mean=3.967), discipline level of students (mean=3.834) and interest (mean=3.823) influenced enrollment of physics in KCSE. The findings also correspond to Sintayehu (2014) that student' academic problems and lack of interest in pursuing physics arise from personal inadequacies such as low ability; negative self-concept, anxiety, maladjustment, environmental influences such as poor classroom conditions, curricular inadequacies, peer groups and the lack of home support.

From the focus group discussion students identified career goals, poor attitude and the perception that Physics is difficult, past poor performance in junior secondary, lack of interest when studying, poor study habits and gender to influence their enrollment in Physics. One learner stated *"I don't see physics helping me in future, why should I struggle with it now"*. Another students from the same school indicated *"I find physics very difficult, furthermore I am not good at mathematics and physics has a lot of calculations"*. Many respondents especially the girls were of the opinion that one should only study physics if they were good at mathematics.

The principals through an interview guide indicated that they tried encouraging all the students irrespective of gender identity to pursue science subjects. But they indicated that over the years boys had been performing better than girls.

4.8 Students Enrollment

The principal respondents were asked to indicate the students' enrollment in physics in their respective schools. Majority of the principals said that the enrollment was high for boys as compared to girls. "I don't know why many girls fear physics?" asked one male principal. A female principal said "though not many girls enroll in physics, we try and encourage them to take it."

One of the low enrollment especially among the girls was cited as their attitude towards the subject. One female principal said "we don't have many female physics teachers to motivate our girls. They take it from us since we are their role models." Another principal said "generally girls are not good in sciences. What we do in our school is take note of their strong areas and encourage them to pursue them. We cannot force them to take the subject so as to have numbers."

The respondents were asked whether parents/guardians paid fees on time. Many respondents said that parents had difficulties paying schools fees. One said "parents around this area do not pay fees promptly. Sending students home does not help much so we encourage them to seek for bursaries and donations from local NGOs." Another principal from a boys boarding school said "though we have some students with financial problems, that does not affect physics enrollment. We however encourage them to pursue their strong subjects."

The respondents were asked on how to improve enrollment in the school to improve performance of physics. Majority of the students indicated that there was need to have guidance and counseling programs in the school. One student said “we need to have guidance and counseling in the school and also in the villages”

Another said “there should be Civic education to the society on the importance of educating the children because the nature of the society sometimes makes it difficult for some student not to come to school or even drop out of the school”. Yet another said “Educating the community on the importance of attending school and acquiring knowledge”

Other students indicated that there was need for strict rules on the school regarding absenteeism. One student said “Introduction of strict rules and regulation to avoid class absenteeism”. Another student indicated that “Schools should adopt better ways of dealing with students because some students fear punishment and this makes them stay at home and refuse to attend school”

They suggested that there should be provision for bursary funds for needy students who were mainly out of school due to lack of school fees. One student suggested “we need flow in bursary to benefit poor students, to educate the students on career issues”. Another said there should be provision of bursary funds to students to curb truancy due to lack of fees”. “Providing bursaries to poor students”

They also indicated that more resources needed to be provided to their schools. One said “Providing physic revision books while another indicated “Supplying improvised resources to school.”

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The purpose of the study was to establish the determinants of students' enrollment in physics at K.C.S.E in public secondary schools in Wajir county Kenya. The study was guided by the following objectives: to establish the extent to which teaching methods influence students' enrolment in Physics in Wajir County; to examine the availability, utilization and adequacy of teaching and learning resources on students' enrolment in Physics in Wajir County; to examine the extent to which teachers' attitude towards Physics influences students enrolment in Physics and to establish the extent to which learner characteristics influence their enrollment into physic at KCSE. The study used descriptive survey research design. The target population of this study consisted of all 16 public secondary schools in Wajir County. Stratified random Sampling was used to select learners from all sixteen secondary schools in Wajir County. The data was analyzed by the use of descriptive statistics using Statistical Package for Social Sciences (SPSS) version 21.0 and was presented through percentages, means, pie charts, bar graphs and frequency tables. The summary of the findings is as presented in the subsequent sub-sections.

5.2 Summary of the Study

This chapter presents the summary of the findings of the study, conclusions and recommendations. The study was anchored on the following factors as influencers of physics enrollment; teaching methods, availability, utilization and adequacy of teaching

and learning resources, teachers' attitude, learner characteristics. These factors were assumed to affect enrolment in physics among secondary school students in Wajir County.

5.2.1 Pedagogical approach and students enrolment in physics

The study found out that schools in Wajir County mainly used discussion, project method/research, educational field trips, lecture method and question and answer methods. They also used group activity method, demonstration, role play/drama, case study method, resource persons and debate. Findings further show that to a very small extent the school used video and digital content and devices.

Findings showed that teaching methods had a positive influence on students' enrollment and that different teaching method helped the learners to understand the activities well hence improve their self esteem. Learners respond to different teaching methods through active participation during the learning process, high retention and development of curiosity and observation skills.

5.2.2 Availability, Utilization and Adequacy of resources and students enrolment in physics

Schools were found to have several teaching and learning resources. The teachers made use of several of them. The readily available materials were KICD Syllabus, KICD teachers' handbook for physics, classrooms/desks, calculator, physics charts, reference books for physics. Other materials such as physics teachers' guides, physics laboratory,

library/textbooks and improvised materials were moderately available. Findings further indicate that the least available resources were lab equipment's, e-materials, internet, computers laboratory and computers. Findings also indicate that there was full utilization of the resources available in the schools.

5.2.3 Teachers attitude and students enrolment in physics

With regard to the influence of Physics teachers on choice of Physics, the study found most of the teachers were male which could have affected the enrolment of the girls in Physics. The findings showed that there was frequent absenteeism among students in physics classes. Teachers always looked forward to teaching Physics. Physics was not taught practically, was full of calculations and has a wide syllabus. Physics teachers had chosen teaching of Physics as my preferred career.

Findings further indicate that physics is full of hard scientific words, the physics content takes time to understand, schools lack physics laboratory and environment of the school not conducive to learning physics. It is however unclear whether teachers are incompetent in teaching physics, some topics are hard to teach, physics is for boys and whether physics is not easy for girls.

The study also found out that physics was not very difficult understand, physics was not for bright students, physics is useful for student future career, there wasnt lack of discipline among students, teachers could teach physics without teaching aids and practical and physics was not boring subject to teach.

5.2.4 Learner Characteristics and students enrolment in physics

The study findings indicate that class attendance and participation, peer pressure and personal goals and challenges influenced enrollment of physics in KCSE. Additionally, findings show that school performance in national examinations trips, discipline level of students and interest influenced enrollment of physics in KCSE. Thus students career goals, poor attitude and the perception that Physics is difficult, past poor performance in junior secondary, lack of interest when studying, poor study habits and gender influence enrollment in Physics in secondary schools in Wajir County.

5.3 Conclusions

The study concludes that secondary schools mainly use discussion, project method/research, educational field trips, lecture method and question and answer methods as teaching methods. They also use group activity method, demonstration, role play/drama, case study method, resource persons and debate and rarely use video and digital content and devices. The study also concludes that materials available in schools are KICD Syllabus, KICD teachers' handbook for physics, classrooms/desks, calculator, physics charts, reference books for physics.

The study further concludes that there is frequent absenteeism among students in physics classes. Teachers always looked forward to teaching Physics. Physics is not taught practically, is full of calculations and has a wide syllabus. Physics teachers choose teaching of Physics as my preferred career. Physics is full of hard scientific words, the physics content takes time to understand, schools lack physics laboratory and

environment of the school not conducive to learning physics. The study finally concludes that class attendance and participation, peer pressure and personal goals and challenges influenced enrollment of physics in KCSE. School performance in national examinations trips, discipline level of students and interest influenced enrollment of physics in KCSE.

5.4 Recommendations of the Study

From the findings, the study recommends the following in order to increase Physics enrolment in Wajir County;

- i. Teachers should use effective modern teaching methods to improve absorption and retention of learnt materials by the learner. The use of field trips and laboratory work in particular should be encouraged to give the students direct experience with their surrounding and appreciate the importance of physics to the environment.
- ii. Resources assist in visualization and conceptualization of concepts more so in physics. School administrations should establish laboratories which are well equipped with learning materials to facilitate experimental approach by each student during practical lessons to improve performance which will surely encourage Physics take up.
- iii. School administrations should motivate teachers to be more committed in their work by providing housing within the school compound which increases the contact hours with the students therefore cultivate a positive attitude in the students.

- iv. Teachers should encourage and give students the opportunity to develop positive attitude towards Physics as a subject. Physics teachers should make the subject more appealing to the learners since this will consequently lead to a more positive attitude towards the subject. This will make them enjoy the subject thus change their perception that Physics is difficult.

5.5 Suggestions for further research

Further research should therefore be carried out to look into the extent to which these factors affect enrolment and performance.

The study focused on physics at secondary school level. Another study should also be considered in other science subject areas to establish the extent to which these factors affect enrolment and performance in those subjects

This study was carried out in public secondary schools in Wajir County. The researcher therefore recommends that another study be done in the district to evaluate determinants of students enrollment in physics.

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APPENDICES

APPENDIX I: TRANSMITTAL LETTER

UNIVERSITY OF NAIROBI,
P. O. BOX 92 – 00902,
KIKUYU.

THE PRINCIPAL

.....

.....

Dear Sir/Madam,

RE: PERMISSION TO COLLECT DATA IN YOUR SCHOOL

I am a postgraduate student in The University of Nairobi, pursuing degree of Masters in Curriculum Studies.

I am researching on **Determinants of Students Enrolment in Physics at KCSE in Public Secondary Schools: a Case of Wajir County, Kenya** .Your school has been selected to participate in the research.

The information given will be treated with utmost confidentiality; neither you nor your school will be quoted. Kindly respond all the items in the questionnaire as honestly as possible and to the best of your knowledge. Thanks in advance for your cooperation,

Yours sincerely,

Hassan Abdi Omar

E55/67049/2013

APPENDIX 11: INTERVIEW SCHEDULE FOR PRINCIPALS

Instruction: Read to the principal and inform officer interview will be recorded.

This interview schedule seeks to establish Determinants of **Students Enrolment in Physics at KCSE in Public Secondary Schools: a Case of Wajir County, Kenya.**

Kindly give honest responses to facilitate acquisition of pertinent information on enrolment of students in physics. The data that will be collected will be strictly for research purpose only and will be treated with utmost confidentiality.

1. How often officers do from Directorate of Quality Assurance and Standard visited your School to offer professional advice on the KCSE Physics curriculum? How has it been regular or irregular for the last 3 years?
2. Do you think the duration for in serving teachers is sufficient? If No what is your recommendation
3. Which methods are commonly used by teachers in teaching physics?
4. Do you think those methods encourage students to enroll in physics
5. How do you rate the student enrolment in physics in your school?
6. What are the reasons for low or inconsistent enrolment in physics in your school?
7. Do the teachers improvise instructional materials?
8. Do the teachers encourage more to students to take physics up to form level?
9. If the answer for Q 8 is yes, how is it done?
10. What can be done to scale up enrolment in physics in your school?
11. Do the teachers and students make good use of the available learning resources to encourage enrolment in physics?
12. Do parents/guardians ensure fees is paid on time ? Probe the answer...

13. Can absenteeism and indiscipline affect enrolment in physics in your school? Do students have an interest in using digital devices to boost their understanding of physics concepts?
14. Does your school have some of the digital materials for support teaching and learning of physics?
15. State any challenges teachers experience (if any) the teaching/learning process of Physics...
16. Please suggest(s) ways of addressing the challenges

Thank you for your participation

APPENDIX III: INTERVIEW SCHEDULE FOR QASO OFFICER

Instruction: Read to the DQASO officer

This interview schedule seeks to establish Determinants of **Students Enrolment in Physics at KCSE in Public Secondary Schools: a Case of Wajir County, Kenya.**

Kindly give honest responses to facilitate acquisition of pertinent information on enrolment of students in physics. The data that will be collected will be strictly for research purpose only and will be treated with utmost confidentiality.

1. How often do you visit Schools to offer professional advice to teachers?
2. How often do you organize in service training for science teachers? (**probe on duration and frequency of the courses**)
3. Do all schools in this sub county have laboratories for science subjects? Probe further on equipment in laboratory?
4. In your opinion what factors effect enrolment in physics?

END

APPENDIX IV: QUESTIONNAIRE FOR TEACHERS

This questionnaire is aimed at gathering information on school on **of Students Enrolment in Physics at KCSE in Public Secondary Schools: a Case of Wajir County**, The information given will be used for research purpose only and your identity will be confidential. Please respond to all questions items. Don't indicate your name or the name of your school in the questionnaire.

Section A; Background Information

1. Where is the school located

Rural []

Urban []

Peri-Urban[]

2. What is your Gender

Male []

Female []

3. What is type of the school

Regular ()

Special ()

Status of school

Day ()

Boarding ()

Day and Boarding ()

4. What is the Nature of school

Boys ()

Girls ()

Mixed ()

5. What is your Highest level of educational training

Untrained[]

Diploma []

B.Ed. []

BSc []

Med []

Any other specify.....

6. What are your Years of service

Less than 1years ()

1 to 5years ()

5 to 10 years ()

More than 10 years ()

7. Have you attended any in-service/orientation course relevant to Physics

Yes ()

No ()

8. How often do officers from Directorate of Education Standards and Quality

Assurance and Council (ESQAC visit your school

Quite often ()

Once in a while ()

When need arises ()

Never ()

Section B: Pedagogical approaches and students performance in Physics.

To what extent do you use the following teaching and learning methods in developing your lessons?

Please tick (√) in the space provided in the table.

Key: GE (Great Extent) SE (Some Extent) VLE (Very Low extent) and NAA (Not At All)

TEACHING METHOD	GE	SE	VLE	NAA
Question and answer				
Lecture method				
Role play/Drama				
Discussion				
Project metho /Research				
Educational field trips				
Group activity method				
Demonstration				
Case study method				
Resource persons				
Digital content and devices				
Debate				
Video				
Others (specify)				

Section C; Attitudes of Teachers towards Physics

In the statements below about Physics, please tick in the box indicate your opinion					
Key:SA = great extent A = some extent NS= not at all D=disagree SD = Strongly disagree					
	SA	A	NS	D	SD
Physics is boring subject to teach.					
Physics syllabus is too wide.					
Physics is full of hard scientific words					
Physics is full of calculations					
Some topics are hard to teach					
Physics is not useful for student future career					
Physics is for bright students					
The Physics content takes time to understand.					
Physics is for boys					
Physics is not easy for girls					
I like the teaching Physics					
Cant teaching Physics without teaching aids and practical					
Physics is not taught practically					
I had chosen teaching of Physics as my preferred career					
Environment of the school not conducive to learning Physics					
There is lack of discipline among students					
There is frequent absenteeism among students in Physics classes					
Teachers are incompetent in teaching Physics					
Lack of commitment among teachers of Physics					
I am always looking forward to teaching Physics					
Physics is very difficult understand					
Schools lack Physics laboratory					

Thank you for your participation

**APPENDIX V: OBSERVATION CHECKLIST FOR TEACHING AND
LEARNING RESOURCES**

1. The extent to which teaching and learning resources are available, adequate and utilized

Teaching and learning resources	Availability		Adequacy		utilization	
	Yes	No	Yes	No	Yes	No
KICD Syllabus						
KICD Teachers' Handbook for Physics						
Reference books for Physics						
Physics Teachers' Guides						
Calculator						
Physics laboratory						
Lab equipment's						
E- Materials						
Internet						
Computers laboratory						
Computers						
Physics Charts						
Classrooms/Desks						
Library/textbooks						
Availability of improvised materials						

APPENDIX VI: FOCUSED GROUP GUIDE FOR STUDENTS

Instructions before discussion

This purpose of FGDs is to establish **Determinants of Students Enrolment in Physics at KCSE in Public Secondary Schools**: The information gathered will go a long ways in improving enrolment of students in Wajir County. **The conversation will be recorded strictly for academic purposes.**

Part A:Background Information

1. Name of the Sub-County.....
2. Name of your school _____ Class_____
3. Nature of the school (a) Boys only(b)Girls only (c).Mixed((choose any one)
4. Age profile a) 14-17 years b) 18-19 years c) Above 19 years
5. Who pays your fees? a) Parent(s),b)guardian/brother/sister)County government
d)Government Bursary
6. How many miss to attend classes because of lack of fees?.....
7. If your answer in question 7 is yes, how does absenteeism affect class participation, completion of assignments and involvement practical for science subjects?
8. How often are practical in physics conducted by the teacher? **Probe why it's done regularly or not**
9. What is the main cause of few students pursuing physics in your school?

APPENDIX VII: AUTHORIZATION LETTER



UNIVERSITY OF NAIROBI
COLLEGE OF EDUCATION AND EXTERNAL STUDIES
SCHOOL OF EDUCATION
DEPARTMENT OF EDUCATIONAL ADMINISTRATION AND PLANNING

Telegram: "CEES"
Telephone: 020-2701902
dept-edadmin@uonbi.ac.ke

P.O. BOX 30197, NAIROBI
OR P.O. BOX 92 - 00902
KIKUYU

10/7/2017

Our Ref: UON/CEES/SOE/A&P/1/4

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

Subject: HASSAN ABDI OMAR - REG NO. E55/67049/2013

This is to certify that **Hassan Abdi Omar** is a Master of Education student in the Department of Educational Administration and Planning at the University of Nairobi. He has completed his course work and is currently working on his research proposal entitled "**Determinants of Students Enrolment in Physic in Kenya Certificate of Secondary Education in Public Secondary Schools in Kenya: A Case of Wajir County**". His area of specialization is Curriculum Studies.

Any assistance accorded to him will be highly appreciated.

Yours faithfully,

DR. JEREMIAH M. KALAI
CHAIRMAN

DEPARTMENT OF EDUCATIONAL ADMINISTRATION AND PLANNING




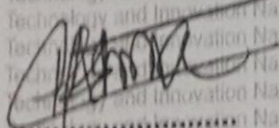
JMK/nd

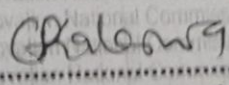
APPENDIX VIII: RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MR. HASSAN ABDI OMAR
of **UNIVERSITY OF NAIROBI, 327-70200**
Wajir, has been permitted to conduct
research in **Wajir County**
on the topic: **DETERMINANTS OF**
STUDENTS ENROLLMENT IN PHYSICS IN
KENYA CERTIFICATE OF SECONDARY
EDUCATION IN PUBLIC SECONDARY
SCHOOLS IN KENYA: A CASE STUDY OF
WAJIR
for the period ending:
18th July, 2018

Permit No : **NACOSTI/P/17/41041/18279**
Date Of Issue : **18th July, 2017**
Fee Received : **Ksh 1000**




Applicant's
Signature


Director General
National Commission for Science,
Technology & Innovation