INSTITUTIONAL FACTORS INFLUENCING STUDENTS' ACHIEVEMENT IN CHEMISTRY CURRICULUM IN TRANS NZOIA COUNTY, KENYA

BY

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

MOI UNIVERSITY

2019

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

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To my husband Joseph, sons Jarell and Jayden, parents Mr and Mrs. Gideon Chirchir, my sister Damaris and Brothers Elisha and Eliazer.

LIST OF ABBREVIATIONS AND ACRONYMS

AAAS-	American Association for the Advancement of Sciences
AAUW-	American Association of University Women
BOG-	Board of governors
CIEM –	Curriculum Instruction and Educational Media
INSET-	In- Service Education and Training
KCSE-	Kenya Certificate of Secondary Education
KIE-	Kenya Institute of Education
KNEC-	The Kenya National Examination Council
MoE -	Ministry of Education
SMASSE-	Strengthening of Mathematics and Science in Secondary Education
SPSS-	Statistical Package for Social Science
UNESCO-	United Nations Educational Scientific and Cultural Organization

ACKNOWLEDGEMENTS

Firstly I would like to give thanks to our Almighty God whose love enabled me to complete this work. I would also like to thank my supervisors Dr. Anne Kisilu and Dr. Makobila whose help, stimulating suggestions and encouragement helped me during my research work. I would also like to express my gratitude to all those who encouraged and inspired me to complete this work like my parents, colleagues and siblings. I am also grateful to my friends who really encouraged me to go ahead with the work and their stimulating sacrifice ranging from advice to time. I would also like to thank the respondents who participated in the study. May God bless all of you abundantly.

ABSTRACT

Students' academic achievements are usually an important aspect in the process of teaching and learning at all levels of the academic ladder. Science education is an important component for technological development in the Kenyan society. In Kenya, there has been poor performance in Chemistry subject by students in secondary schools over the years and this is a major concern for parents, teachers, and educators in the country. The main purpose of this study was to investigate institutional factors that influence students' achievement in Chemistry curriculum in secondary schools in Trans-Nzoia County. The objectives of the study were: to assess the influence of students' perceptions towards Chemistry on their achievement in the subject; to determine the influence of school policies on students' achievement in Chemistry; to assess the influence of availability of resources on students' achievement in Chemistry; to evaluate the influence of gender issues on student's achievement in Chemistry; and to find out the influence of students' career aspirations on achievement in Chemistry in secondary schools in Trans Nzoia county. The study was based on the systems theory by Norbert Weiner. The research design employed for this study was descriptive survey. The study targeted 8316 respondents from 33 secondary schools. This study employed the use of stratified sampling, simple random sampling, census sampling and purposive sampling methods to obtain a sample size of 28 teachers and 825 students of Chemistry. Data was collected using questionnaires for the students and interview schedules for the teachers of Chemistry. Data collected was coded and analyzed using descriptive statistics: percentages and frequencies. Qualitative data from interviews were analyzed thematically. The findings of the study were: that majority (70%) of the students found Chemistry interesting, majority (68%) indicated that every student should learn Chemistry, most (86%) of the students revealed that language used in Chemistry exams is very difficult making exam questions challenging and confusing. majority (66%) of the respondents felt that girls do well in Chemistry compared to boys. Most (95%) of the respondents mentioned that there is presence of school policy regarding Chemistry. Majority (66%) of the respondents were of the opinion that they have adequate Chemistry text books in their schools. Most (70%) were passionate about Chemistry. The study concluded that students' perceptions, students' gender, school policies, and students' career aspirations had an influence in students' achievement in Chemistry curriculum. The study recommended that the language used in Chemistry subject should be made simpler to enhance understanding among the students; that measures should be put in place to encourage boys in Chemistry; that teachers of Chemistry should be sensitized to be supportive and they should encourage students to choose careers linked to Chemistry. The findings of this study inform curriculum developers and implementers on the significance of institutional factors on students' achievement in Chemistry and other related subjects.

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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.0 Overview

This study is about the institutional factors that influence students' achievement in Chemistry curriculum in Trans-Nzoia County. This chapter gives an introduction of the study. It outlines the background, states the problem, gives the theoretical framework, purpose of the study, research objectives, research questions, justification, significance, scope and limitations of the study, assumptions of the study and defines the terms used in the study.

1.1 Background of the problem

Students' academic achievements are usually an important aspect in the process of teaching and learning at all levels of the academic ladder. Teachers would want to see the kind of progress the learners make after undergoing a certain course. The same case applies to the education stakeholders: government, parents and learners too. Academic performance is usually assessed through tests or examinations, which consists of set questions or problems that seek to determine how much an individual understands about the subject area as a result of learning experience (Aikenand, 2010).

The world is dominated by technologies, thus forcing every nation to strive to keep abreast with scientific and technological advances besides integrating it into its education system. Therefore, Science is a fundamental requirement if the world is to be transformed

into a better place to live in, as it plays a key role in a country's education system. Many African countries treat the training of scientific and technological personnel as a top priority. This is due to the recognition of the fact that rapid social and economic development is not easy to achieve in the absence of qualified doctors, engineers, teachers and technicians (Aikenand, 1997).

In 1985, Kenya changed her education system from 7-4-2-3 system where students would do 7 years of primary education, 4 years in secondary level, 2 at high school level and 3 years minimum university level; to her current 8-4-4 system where 8 years are spend at primary level, 4 at secondary and 4 for minimum university education .This change made Science subjects compulsory in all Kenya public schools. The new education policy found many schools ill prepared to start Science classes coupled with extra demand for Science teachers. This new system's high demand for Science facilities and teachers hardly gave room for teachers' professional development on how to implement the new curriculum (KNEC, 2000).

In Kenya students sit for a national examination that is set, moderate and marked centrally. According to the KNEC (2000), students' overall performance in Science subjects has been declining over the years. This presents a need to look into the causes of this decline. The knowledge of Science is indispensable if we are to face the challenges of our times and for the future of our children. Kenya has to play its role in the world dominated by technologies. Indeed technology has the task to improve delivery and learning of Science. In most cases, students who perform well in Sciences perform well too, in other subjects KNEC (2000). This is a clear indication that the understanding of

science is a base of understanding other subject. To achieve these goals in an increasingly globalized world and talk about the industrialization that has been targeted by the year 2030 (Kenya Vision 2030) it calls for strong teamwork and dedication by all those involved. Webuke (2009) asserts that studies have been done on other factors such as teacher factors, availability of facilities in the teaching of science but still the students are not performing well in the subject. Below is a table showing performance in Chemistry for the past four years in Trans Nzoia County and Nationally.

Table 1.1: Performance in Chemistry in Trans Nzoia County/Nationally from 2011-2014

YEAR	**2011**		**2012**		**2013**		**2014**	
	T.C	**N**	**T.C**	**N**	**T.C**	**N**	**T.C**	**N**
Mean score	3.41	3.5	3.632	4.1	3.301	5.12	3.540	4.436
Mean Grade	D-	D	D	D+	D-	C	D	D+

Source: KNEC (2014)

Key: TC; Trans Nzoia County, N: Nationally

From the table, it is evident that the performance of Trans Nzoia County is wanting since it has been below the national performance over the past four years.

Kenya must address herself to the quest for scientific knowledge in order to develop and sustain the necessary technologies to compete effectively in the global scene. Science education has been seen as an important component for technological development in the Kenyan society. Eshiwani (1983) argues that more, formal and intensive Science education at secondary level is necessary in order to prepare the future scientists and technicians. The skills acquired by such people will be useful in areas such as health,

agriculture and industry. Observations made for example, in 2008 are that, out of 249,090 students who did Chemistry, 70% scored D + or less while in 2009 out of 337,404 students who did Chemistry, 65% scored D + and below (KNEC, 2008/9). This indicates that more has to be done, so as to prepare the future scientists and technicians; hence Science education of young Kenyans year after with the hope that the inputs would be equivalent to the outputs if not better. The immediate expected output from the education system is good performance in examinations.

Chemistry is a way of life (KNEC, 2010). It is important in the day-to-day human activities such as food processing, Agriculture, pharmacy, Medicine and industrial processes. The objectives of secondary school Chemistry in Kenya is to (1) produce competent graduates who would apply practical skills acquired to develop their mental faculties and thus improve their society, (2) discover and understand the order of the physical environment, (3) make the learner aware of the effect of scientific knowledge in everyday life through application to the management and (4) conservation of the environment, the utilization of resources and production of goods and to Inculcate in the learner a willingness to co-operate in using scientific knowledge to foster development in the society (KNEC, 2010).

It is important to note that following the poor results in the Chemistry curriculum, these objectives have been partially achieved over the years and yet the country is emphasizing on the achievement of vision 2030 which has economic development as one of its pillars. The research was therefore going to find out learner factors that affect Chemistry which

aided in the achievement of plans of economic development by increasing science and technology courses at the universities and colleges. There has been poor performance in Chemistry subject by students, which is a major concern for parents, teachers, and educators in the country.

The poor performance on Chemistry by the students has been linked to the learner's factors such as their perception and career choices. This is an important aspect that if no studies and solution found it will still influence the students' achievements in Chemistry subject. Trans Nzoia County was selected for the study due to the constant poor performance by the students in Chemistry at KCSE.

There are institutional factors that have been linked to the performance of students when it comes to Chemistry subject. The perception of students has been found to have an impact on the how they perform when it comes to Chemistry subject. Students who have a positive perception towards the subject have been fund to perform better as compared to those who have negative perception. The policies that schools have when it comes to Chemistry subject is important. This is because schools that have a policy that promotes the easy uptake of the subject by the learners. For instance, it has been found that schools that have policies that Chemistry subject is not compulsory do record high performance and this is because only those who are willing to take the subject do it passionately (KNEC, 2010).

School resources also play crucial role when it comes to the performance of students in Chemistry subject. Institutions that have all the resources such as books and laboratories as well as enough Chemistry teachers have been found to record positive performance during Chemistry exams. This has been linked to the fact that the learners have all the requirements needed to fully understand the Chemistry concepts. Gender of the learners has also been linked to the performance of the students in Chemistry subject. It has been found that boys especially within African countries perform better than girls while in western countries the performance tends to favor girls. Career aspirations of the students also are crucial when it comes to their performance. Students who want a career within the Chemistry field tend to perform better as compared to those with different career aspirations (Webuke, 2009). It is against this background that the research problem was identified. The study was an investigation of the institutional factors that influence students' achievement in Chemistry curriculum in Trans-Nzoia County.

1.2 Statement of the problem

In Kenya, there is a nationwide concern that performance in Sciences (Chemistry included) is poor and the trend has been observed for some years. According to Professor Karega Mutahi (2003), who was then permanent secretary, Ministry of Education, the KCSE examination results has portrayed poor performance is Sciences (Jebet & Naserian, 2003). The minister of education also expressed concerns about the poor performance in Sciences through press statements after the KCSE results of the year 2008 were released. The current status of student performance in Chemistry is lower in Trans

Nzoia County as compared to the national performance. This is a major concern regarding what factors contribute to the poor performance (KNEC, 2015).

It is difficult to envision a developing nation being unable to achieve technological advancement with a large manpower base ignorant or unable to handle the same technology, owing to inherent phobia to Sciences. From this, it calls for concerted efforts to direct more efforts on Science education. Commitment in strengthening the teaching of Science by enhancing skills and delivery capabilities are required. This will ensure that the subject is understandable to the learners. Economic development on any nation relies on scientific research and technological advancement. As observed by Eshiwani (1983), more formal and intensive science education at secondary school level is necessary in order to prepare the future scientist and technicians.

In view of the above discussions, student's poor performance in Chemistry could relate to institutional factors. This could be a result of inadequate comprehension of Chemistry concepts in class (KNEC, 2010). The study therefore investigated the institutional factors that influence students' achievement in Chemistry curriculum in Trans-Nzoia County

1.3 Purpose of the study

The purpose of the study was to investigate the institutional factors that influence students' achievement in Chemistry curriculum in Trans-Nzoia County

1.4 Research objectives

The study was guided by the following objectives

1. To assess the influence of students' perceptions towards Chemistry on their achievement in the subject in Trans Nzoia County
2. To determine the influence of school policies on students' achievement in Chemistry in Trans-Nzoia County, Kenya.
3. To assess the influence of availability of resources on students' achievement in Chemistry in Trans-Nzoia County, Kenya.
4. To evaluate the influence of gender issues on student's achievement in Chemistry in school in Trans Nzoia county
5. To find out the influence of the students' career aspirations on achievement in Chemistry in schools in Trans Nzoia county

1.5 Research questions

1. What is the influence of students' perceptions towards Chemistry on their achievement in the subject in Trans Nzoia County?
2. What is the influence of school policies on students' achievement in Chemistry in Trans-Nzoia County, Kenya?
3. What is the influence of availability of resources on students' achievement in Chemistry in Trans-Nzoia County, Kenya?
4. What is the influence of gender issues on student's achievement in Chemistry in school in Trans Nzoia County?
5. How does students' career aspiration influence their achievement in Chemistry in schools in Trans Nzoia County?

1.6 Research Hypothesis

The following hypotheses guided the study;

$H0_1$: There is no significant relationship between student perception and achievement in Chemistry in Trans-Nzoia County.

$H0_2$: There is no significant relationship between school policies and students' achievement in Chemistry in Trans-Nzoia County.

$H0_3$: There is no significant relationship between availability of resources and achievement in Chemistry in Trans-Nzoia County.

$H0_4$: There is no significant relationship between gender issues and students achievement in Chemistry in Tans-Nzoia County.

$H0_5$: There is no significant relationship between students' career aspirations and their achievement in Chemistry in Trans-Nzoia County.

1.7 Justification for the study

Chemistry is one of the three science subjects taught in secondary schools in Kenya. Its performance has been wanting for a very long period of time. Several researches have been done on the factors affecting Chemistry in different districts and interventions have been made like the introduction of SMASSE-(Strengthening of Mathematics and Science in Secondary Education) but the performance doesn't seem to improve as expected. The research therefore sought to assess whether performance in this subject that would help learners develop skills to help Kenya achieve her goal of being industrialized by the year 2030. Institutional factors such as school policies and resources are important when it comes to students' performance in Chemistry since the factors are the immediate

environment of the learner. This study was thus an investigation of the institutional factors affecting students' performance in Chemistry in secondary schools in Trans Nzoia County.

1.8 Significance of the study

The study sought to find out institutional factors that influence students' performance in Chemistry. The findings of the study will aid the stakeholders such as MoE, teachers, parents and students of Chemistry in understanding the institutional factors that influence students' performance in the KCSE examination. Through the findings, the researcher has made recommendations upon whose implementation, teachers and students will be able to improve on effectiveness of the institution thereby improving performance of the subjects in KCSE examination. The study sought to achieve this policy by finding areas that need improvement in the performance of Chemistry as a Science subject, some of which could be found applicable in other science subjects in reference of the school mission of offering academic excellence through research and teaching. The researcher sought to contribute by finding solutions and make recommendations that will enhance the performance of Chemistry as a subject.

1.9 Scope of the Study

The purpose of this study was find out the institutional factors that influence students' performance in Chemistry in secondary schools. The study covered five issues vis a vis objectives in relation to performance in Chemistry that included students perception, gender issues, career aspirations of the students, institutional policies as well as the availability of resources.

The study was based in Trans-Nzoia County. Teachers of Chemistry and form three students were selected as respondents. Form three students were preferred over their juniors in form two and one. This is because they were considered mature and experienced in the learning of Chemistry. They were therefore able to comprehend and articulate the definitive factors that influence their performance in Chemistry. Fourth formers would have been better groups save for their very busy schedule since they were preparing for their KCSE to be done by the end of the year. It is for these reasons that the researcher found them suitable respondents for this study.

1.10 Limitations of the study

The study was limited by the scope and the selected sample. The study was confined to the scope defined above. As such, any other factors that influence performance of students, which are not part of the defined parameters of study, were deemed out of scope. The results were interpreted only within the context of this study; and recommendations made cannot be construed to hold the same weight outside this scope. The study was limited to the performance in Chemistry in Trans-Nzoia County and analyzing data given by the sources. The study also faced time constraints and this was countered through the use of questionnaires as they are easy to administer within a short period of time.

1.11 Assumptions of the study

This study made the assumption that;

The Chemistry examinations are adequate instruments of evaluating students' performance in the subject and performance in Chemistry can be used as a measure of the effectiveness of teaching and learning of Chemistry. It was also assumed that the respondents gave honest, true and accurate responses during data collection.

1.12 Theoretical framework

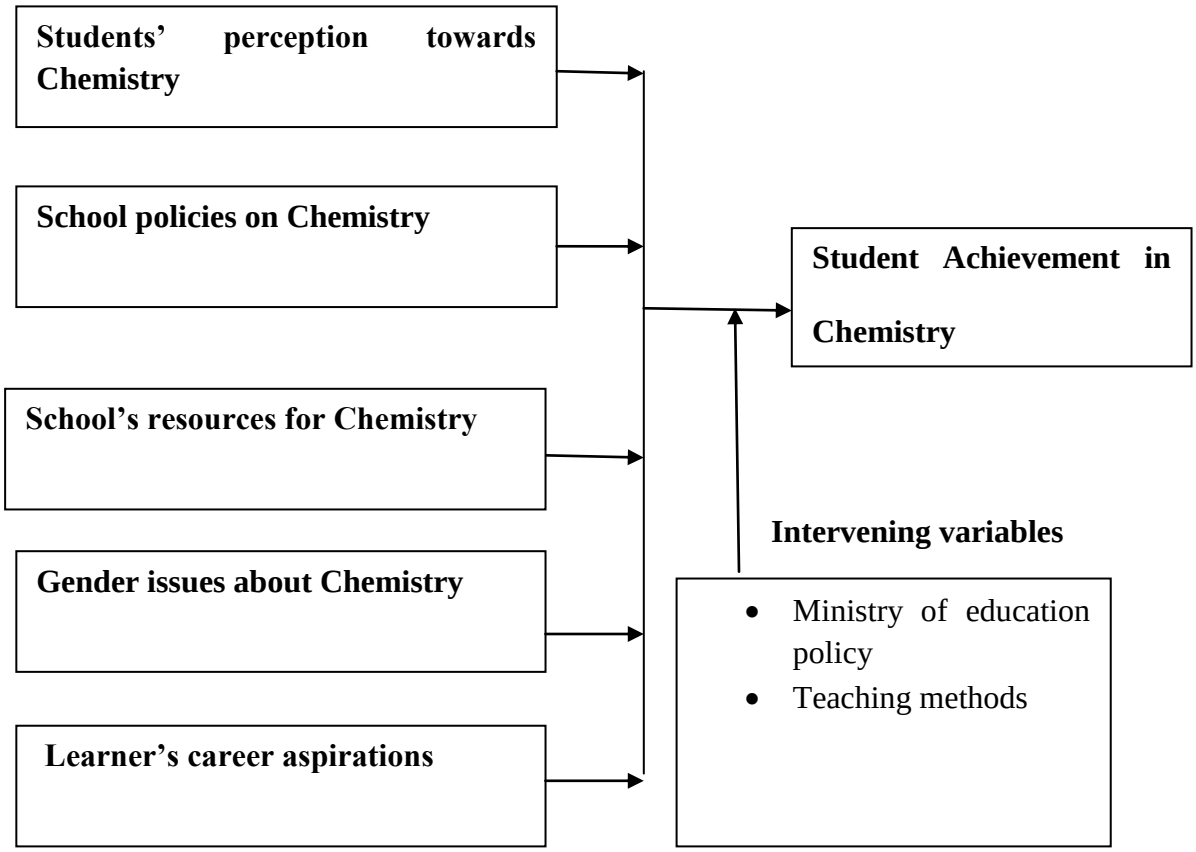
The study was based on the Systems theory by Norbert Weiner (1948). The argument of this theory is that a system consists of various components or sub-systems that must function in harmony for the system to work. If a subsystem fails, the whole system is in jeopardy. As in the systems theory, student's performance can be taken as a system that has objectives and goals to achieve. Achievement of Chemistry performance, therefore calls for cooperation of all the elements in the system. The elements that have to cooperate for a learner to able to perform well in Chemistry are; learners' perception, school policies, available resources, gender issues and career aspirations. From the systems theory, an instructional system is defined as "a series of interrelated and inter-dependent parts defined to accomplish a goal" (Gamble et al: 1984). The learners' conditions, therefore, are key components in this system and in order to make the system effective, the interaction of the exogenous and endogenous variables need to be studied through the process of system synthesis. An effective and efficient learning process is not guaranteed outside the internal and external conditions of the learner (Gagne and Briggs, 1979). The internal conditions of the learner can be referred as the psychological

readiness, which is a precondition for earning to take place. The external conditions can be viewed as particular methods of teaching, use of various instructional media and teachers' characteristics. The theory behind instructional media is rooted in Piagets (1953) theory of cognitive development. This theory was relevant to this study because it operates on the premise that in education, the sub system can be the aims, goals and objectives and performance. Performance in Chemistry by learners consists of systems that must all be at the same level for a positive performance to be realized by the student. Therefore, this study applied this theory in assessing the various components that are involved in the performance of a student in Chemistry.

1.13 Conceptual Framework

Figure 1.1 presents the conceptual framework

Independent variables **Dependent Variable**



1.14 Definition of Operational Terms

Attitude: it refers to react to or against some situation, person or things in a given manner, for example, with love or hate or fear or resentment to a particular degree of intensity .In this study, the attitudes of the students towards the learning of Chemistry will be investigated. In this study it refers to the perception that students have towards Chemistry subject

Career aspirations- is an individual's journey through learning, work and other aspects of life. In this study it refers to the kind of profession that the student would wish to do in future.

Chemistry- is a branch of physical science that studies the composition, structure, properties and change of matter. In this study it refers to subject that is taught in secondary schools

Factors: they are the influence or effects on something. In this study it refers to the elements that affects students' performance in Chemistry subject.

Gender issues: Refers to social-cultural classification of human beings into two basic grouping comprising of women and men on one hand or boys and girls on the other hand. In this study it refers to any influence that is related to gender

Guardian- a person who looks after and is legally responsible for someone who is unable to manage their own affairs, especially an incompetent or disabled person or a child whose parents have died. In this study it refers to the person takingcare of the student.

Learning resources-These are objects, which may be used by students and teachers in isolation or combination usually in an informal manner to facilitate learning. They include messages, people, materials, equipment, techniques and setting. Learning setting can be a classroom. In this study it refers to the tools required by a student to learn like books and laboratory.

Performance-Level of achievement of a student in terminal examinations with respect to attained skills or knowledge as compared to set standards. In this study it refers to the achievement in regard to Chemistry subject.

Secondary school- it refers to the post primary education. In this study it refers to the education attained after primary school.

System-A collection of integrated and related activities that have been designated as being of central interest. In this study it refers to elements that have to be present for a student to perform well in Chemistry.

Perception-refers to the act or faculty of perceiving or apprehending by means of senses of the mind; cognition and understandings in this study it refers to the ability of students to understand concepts in Chemistry

School policy-a definite course of action adopted for the sake of expediency. In this study it refers to the guidelines stipulated by the school on the subjects to be taught.

1.15 Chapter Summary

This chapter outlined the overview, background and statement of the problem; it also dealt with objectives of the study and research questions. The theoretical framework was explained, justification of the study stated, significance of the study mentioned and scope of the study outlined. The limitations, assumptions and variables of the study were also outlined. Operational terms used in the study were defined. The next chapter is a discussion of literature review related to the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter reviewed literature related to the study. This chapter is organized into various sections that cover past literature regarding institutional factor that influences students' achievement in Chemistry. The chapter also covers the summary of the reviewed literature

2.1 Chemistry Subject Instruction in Kenya

Chemistry as a subject in Kenya is introduced to learners at secondary school level. Chemistry is inherently practical subject where scientific concepts, principles and skills are developed through experimental investigation. Also learning of scientific knowledge requires discovery method and more experiential approach through hands-on laboratory procedures. In Kenya, it requires getting the students involved and most of the topics involve a lot of demonstrations and practical but this becomes a challenge when classes are large or when schools lack essential facilities such as laboratories, apparatus and chemicals. Students tend to understand and recall what they see more than what they hear as a result of using laboratory in the teaching of sciences but most schools lack functional laboratory (Oloyede, 2010).

In teaching of Chemistry in Kenya, it should be ensured that pupils develop the ability to analyze and evaluate the role of Chemistry in society. Learners should develop ability to

handle chemical laboratory equipments, plan and carry out experiments, make observations, describe, interpret and explain chemical processes using natural scientific models. Students need to actively construct their own personal awareness and meaning in Chemistry. Chemistry practical are aimed at giving the learners the opportunity to gain meaningful learning, acquire appropriate skills and attitude that enable them contribute to the development of society. Chemistry teaching is supposed to be result oriented and students-centered and can be achieved using appropriate methods and resources in teaching the students. Despite the importance of Chemistry and the efforts made by researchers to enhance performance, students' performance in the subject in national examinations has been poor. The candidature in Chemistry has been on increase over the years (Oloyede, 2010).

2.2 Factors Influencing Performance in Chemistry

Over the years there has been poor perfor5mance among students in science subjects that include Chemistry. Studies have been conducted in this are with an aim of finding out which factors lead to the experienced poor performance. Studies have been varied based on the source of the factors that include both at the learners and at the students point of view.

Studies have been conducted both at the local level in Kenya an d at the international level. The studies have been able to shed some lights on the factors that affects the performance of students in Chemistry. Some of the factors found to

have been influencing learners performance in science subjects which includes gender among others.

2.2.1 Students' Perceptions and Its Influence on Achievement

Jegede (1995, p. 105) defines perception as 'a state of readiness and a tendency to act or react in certain manner when confronted with a certain stimuli. Furthermore, Jebet and Naserian (2003) states that perceptions seem to operate as schemes mental frameworks that help us to interpret and process many kind of information. Moreover, the strongly colour our perceptions thoughts about the issues person, subject or group to which they refer.' From the definition one is made to understand that one's attitude is observed through speeches and behaviour when confronted with problems in Chemistry. It is also when one exhibits readiness to tackle problems in physics with a positive mind. The readiness to respond to stimuli embedded is in ones willingness to learn new concepts in Chemistry. Kelinger (1983) states that "pupils' perception affect the willingness of an individual to take part in certain activities and the way in which they respond to person, objects, or situation." This means that the learner will be ready and willing to learn Chemistry if their perception of it is positive. When perceptions are positive they will not only affect what is being taught but also the effort being employed in the tackling tasks given which would enhance success in life.

Many factors could contribute to student's perception towards studying. Diana (2012) indicated that students' perception and interests could play substantial role among students studying Chemistry. Several studies done in countries such as Brazil have found out those students' positive attitudes to Chemistry correlate highly with their Chemistry

achievement. The study further concluded that there is a positive relationship between attitude of a student and performance in Chemistry especially Chemistry subject (Diana, 2012)

Similarly a study done in Ghana by Clark (1983) found out that that, in general, the attitudes of students towards Chemistry tend to decrease in the order, Biology, Chemistry, Physics and Mathematics. Eshiwani (1983) found that using integrated Chemistry environment activities improved high school students' attitudes toward and awareness about the environment. Eshiwani (1993) conducted a study in schools on performance of students in Chemistry subjects. The study found out that majority of the students who had a positive attitude towards Chemistry subject had indeed passed their exams as compared to those who had a negative attitude towards the subject. The study concluded that attitude of a student had an impact on the performance in Chemistry subjects.

According to Jegede (1995) in a study conducted in Uganda, it was found that more positive attitude of students after exposing them to self-learning strategy when it comes to Chemistry. A number of factors were identified in the study as related to students' attitude to Chemistry. Such factors include; teaching methods, teacher's attitude, influence of parents, gender, age, cognitive styles of pupils, career interest, societal view of Chemistry and scientists, social implications of Chemistry and achievement. Studies have revealed the influence of methods of instruction on students' attitude towards Chemistry.

Studies have also been conducted in Kenya in regard to students' performance in Chemistry subjects. According to study conducted by Jepkoech (2002) in Nakuru county, it was found that majority of the students passed their Chemistry subject due to positive attitude. The study concluded that there was a significant relationship between attitude and good performance in Chemistry subject. Similar study was also conducted in Kericho district by Jebet and Naserian (2003) the study focused on factors that influence student performance in Chemistry subjects within secondary schools in Kericho. The study found out that, 88% of the students mentioned that attitude was a major factor in ensuring that on did well in Chemistry, and results from the teachers also concurred that students attitude is the greatest drive towards performing well in Chemistry subject.

2.2.2 Gender Issues and Its Influence on Achievement

Gender refers to the state of being male or female (typically used with reference to social and cultural differences rather than biological ones). On the other hand gender issues is considered as being socially constructed roles, behaviours, activities, and attributes that a given society considers appropriate for men and women. Gender issues have been highly linked to Chemistry performance among students. There are various policies in Kenya that are related to gender, and this includes having lower entry points for girls than boys when joining universities (Aduda, 2009).

Normally girls are treated differently from boys from an early age by their parents; boys are encouraged by parents to be more adventurous and forceful and are more likely to have hobbies and interests dealing with electrical, mechanical devices and chemicals;

they may be asked to help their father doing technical tasks in the house and garden and use tools such as electric drills, saws and hammers. Girls, by contrast, are more likely to be asked to play with soft toys or to help their mother with housework and not to involve themselves in dangerous activities which could hurt them. Such interests, hobbies and behaviour could be linked to boys' preference for science subjects such as Chemistry. Many experiments in Chemistry involve equipment and tools which are unfamiliar to girls. Boys, therefore, get a better chance to process scientific knowledge in schools (Aduda, 2009).

Within the school environment, gender identities are constructed through informal processes such as peer culture; young people almost inevitably have to respond and conform to the norms of their peer group in order to gain approval and acceptance. Girls are expected to adopt roles, behaviour and identities which allow inclusion and integration with their peers. This impact on their confidence, self-esteem and their engagement in academic subjects (Bude, 1982). How an individual thinks feels and behaves is related to his/her self-esteem. To a certain extent, researchers have found that peers, parents and teachers exert some influence in the enrolment of students in Chemistry classes (Fensham, 1988) though Jegede (1995) contends that home background is not related to pupils‟ interest in Chemistry. Girls tend to be more influenced by their friends than are boys, particularly in single-sex schools (Eshiwani, 1993). It has been suggested by researchers that peer culture tends to be an important factor in determining the behaviour and personality of young people (Jepkoech, 2002). In certain respects, as the influence of the family on boys and girls decreases in the

transition from home to school environment, interaction with peers can be particularly influential in the choice of Chemistry subjects. Gradually, peer culture manifests itself in the stereotyped gender-specific behaviours and attitudes of boys and girls. Being like their own sex generally matters more to the girls than having male roles which may be less valued by their peer group. As noted by Previc (2011) girls are generally more inclined to study biology and less likely to choose Chemistry.

The role played by gender in Chemistry is multifaceted. Many aspects of differences in Chemistry related to gender have been presented over the past decades. Performance difference been postulated to be due, at least in part to attitudinal differences towards Chemistry. Using Chemistry attitudes scale, found several gender differences in high school students attitudes among students in schools in India (Frenshm, 1988). The study found out that in those high school in which the males performed significantly better on Chemistry achievement tests Frenshm, (1988, p. 37) found that males also had higher scores on attitude scales, including confidence in learning Chemistry, Viewing Chemistry as a male domain, attitude towards success in Chemistry, mother's support father's support, and usefulness of Chemistry.

According to study conducted by Jegede (1995) it was found that many girls in secondary schools in Nigeria were performing poorly in sciences which included Chemistry. The study was investigation how gender affects the performance of a student towards Chemistry subjects. Similar study was conducted by Eshiewani (1986) in Egypt, the study was focused in identifying factors that influence students'

performance in Chemistry subjects among high school, the results of the study found out that 88% of the teachers mentioned that gender was one of the factors that affected students' performance. The study concluded that the girl child had a poor performance when it comes to Chemistry as competed to the boy child.

A study on girls and education in Uganda by Laureau (2012) on influence of gender on the performance of the students in Chemistry subjects found out from the surveyed teachers that gender was affecting how students perform in Chemistry, the study accepted the hypothesis that started there is a significant relationship between gender and performance in Chemistry subjects. Same study was also carried among schools in Rwanda, the study aimed to find out how gender affects the performance of students in Chemistry, the targeted 500 Chemistry teachers within the selected schools, the study found out that 90% of teachers mentioned that gender was affecting how students perform in Chemistry subjects within their schools.

In Kenyan schools as study was conducted by Jebet and Naserian, (2003) in Nyamira schools, the study aimed to find out if there was a relationship between gender and performance in Chemistry subjects. The study performed a regression analysis that found out there was a significant relationship between gender of the students and their performance in Chemistry subjects. A study was also conducted in Bomet county by Jepkoech (2002) indicated that 77% of the teachers responded that gender was a great influence on how a student performed in Chemistry.

2.2.3 Policies and their Influence on Achievement in Chemistry

A policy is a course or principle of action adopted or proposed by an organization or individual. School policies are the guidelines that have been put in place in order to govern students such as policies on subject selections. Mackay commission (1981) which introduced 8-4-4 system of education, recommended science subjects to all students. If the school had resources it could offer pure sciences while those schools with inadequate resources could offer Physical sciences and Biological sciences. Therefore the students doing pure sciences could do Physics, Biology and Chemistry, while those doing Physical sciences could do a combination of Chemistry and Physics as physical science paper and Biological sciences. With this a basic science course in all secondary schools was retained as recommended by the report of the National Committee on Educational Objectives and Policies in1976 known as the Gachathi report.

According to Nderitu (2009) another curriculum review was carried out in 2000 by Ministry of Education, Science and Technology and implemented in 2001. The review directed that Physical sciences will no longer be offered in secondary schools but all schools were to offer pure sciences. The three sciences (Biology, Chemistry and Physics) were made optional as long as a candidate pursued at least two of them. This implementation has a lot of disadvantages to those students in schools without resources. This is because they do not perform experiments which they are supposed to do. They don’t even have a laboratories leave alone the apparatus. The students are exposed to the apparatus for the first time during examination. This has led to student doing very poorly

in pure Sciences. In most schools laboratories serve as classrooms for demonstration and doing experiments on the part of the teacher and the students alike.

Mulei (2011) laboratories may serve to demonstrate theoretical ideas in sciences; they may provide a familiarity with the apparatus and may provide training in how to do experiments. Many schools do not even have a laboratory let alone the apparatus. In cases where laboratories are there, the apparatus are too expensive to afford. Hence the laboratories end up being rooms which cannot be used for demonstration on how to do experiments. Method of teaching sciences has also been a big problem because the teachers are trained in the field that they cannot apply their skill effectively due to shortages here and there. They thus end up using unorthodox methods in teaching sciences.

Musvosvi (2013) observed that scientist and science teacher often assume that it's only the technical vocabulary which is special about the language of science. But in practice, it is the vocabulary which is the easiest part of science teaching. If the scientific point of an experiment is fully understood the technical terms will easily be learnt. Before an experiment is carried out, the theoretical part of it should be clearly understood. It is important when one is teaching he makes use of sight and the sense of hearing. A study by second sense of hearing in 1966 published by Educational 44 resources centre (U.O.N) assessed that about 11% from hearing, 83% from sight and we retain 20%of what we hear and 50% of what we hear and see. It is important that visual aids are used when teaching sciences as communication is more effective when seeing and hearing i.e.

teachers of sciences should use a multimedia approach. When teaching sciences many teachers use expository strategy. Such as they give definition, application, and examples and ask students to do problems.

Teachers should change their approach when teaching sciences to the guided discovery approach. Schools have over the years taught sciences that cannot even be demonstrated in the well equipped laboratories in school. Some of this science is not even applicable by the qualified students who did well in the subject at the university level. This has raised the question of the relevance of the sciences curricula or generally the school curricula, the teaching methods and facilities for teaching the science subject on the relevance of the curricula, Ngugi and Nyakweba (2005) noted that Science curricula in our schools have been based on European sciences curricula, which are neither relevant to East Africa problems nor appreciative of the social cultural background of the average East African boy or girl. The science curriculum should be reviewed to make it relevant to our country. Science subjects forms the basis of almost all vocational and industrial training therefore it should have a curriculum that would be relevant to our industrial needs as Kenya is still a country that is growing industrially.

The teaching of science is influenced by ideas about the nature of science and knowledge. Furthermore, teachers' restricted understanding of science may perpetuate the environmentally inappropriate values of modern science. Lack of understanding of the nature and history of science is problematic and this can be compounded by positive ideas thus modern science within a fragmented school curriculum reflects value which are alienated from nature and can perpetuate attitudes which are environmentally

damaging (Nworgu, 2012). A lot of interest has been generated due to poor performance of pure sciences amongst students. In spite of the facts that Communities and the government have invested heavily in science education for students and policies have been put in place to ensure the successful study of science subjects. Due to the poor performance in Mathematics and Sciences at K.C.S.E level, it led to the development of the Strengthening of Mathematics and Sciences in Secondary Education (SMASSE) project as a joint venture between the government of Kenya represented by MoEST and the government of Japan. The core function of the project is to strengthen the teaching of Mathematics and Sciences (Chemistry, Physics and Biology) at secondary level through in-servicing of serving teachers. The aim is to upgrade the capacity of young Kenyans in Mathematics and Sciences. The Kenya government spends over 30% of its annual budget on education. Part of this money is channeled towards improvement of science education (Nworgu, 2012). Despite all this effort by the government the performance of pure sciences in the country has not improved. However as noted in the background to the problem, the existence of institutions with no laboratories and students that would like to pursue arts-related courses and careers. The General Science course was introduced to cater for such learners in both formal and non-formal setting.

The content is favorable to the learners where they can achieve better grades and their overalls mean grade will be raised, throughout the Kenyan learning institutions. The General Science and Mathematics Alternative “B” syllabuses have been developed to provide flexibility in secondary schools Science and Mathematics curricula. The curricula are designed to prepare learners who will pursue further studies in courses that do not

require intensive use of Science and Mathematics competence. General Science is designed for students who do not intend to pursue careers requiring application of advanced scientific competencies. It may be taken by students whose future career is geared towards courses such as journalism, law, political science, teacher of humanities, performing arts economics among others. Students who aspire to pursue careers that require application of advanced scientific competence such as Engineering, Medicine, Pharmacy, Architecture among others, will need to pursue the pure Sciences up to Form Four (Nworgu, 2012).

2.2.4 Availability of Resources and its Influence on Chemistry Performance

Resources means stock or supply of money, materials, staff, and other assets that can be drawn on by a person or organization in order to function effectively. Resources when it comes to studying Chemistry are important. This is because it enable the learners to be able to understand the Chemistry concepts that are being taught as wellas enabling the instructor to effectively teach the subject. Some of the resources that are required in Chemistry includes books, laboratory, laboratory equipment and teachers (Obadara, 2009)

The place of laboratory in science teaching is not a neglected issue. Several studies of the social interactions within which lessons in the laboratory are constituted also exist. Obadara (2009) found significant association between the nature of the Chemistry laboratory classroom environment and the students' learning outcomes. Obadara (2009) uncovered several interesting high school pedagogical experiences that appeared to be linked with varying laboratories for understanding associated with higher student's grade.

Whereas over emphasis on laboratory procedure in high school Chemistry was associated with lower grades in College. These results suggested that high school teacher's pedagogical choice may have a link to future student's performance. Obadara (2009) affirmed that students reporting more instances of repeating laboratory to enhance their understanding earned higher Chemistry grades than their peers who reported few or no instances of repeating laboratory for understanding.

They emphasized therefore that laboratory work holds greater promise in helping to prepare students for higher level studies. Researchers like Obadara (2009) reported inadequate resources materials in science teaching. They further stated that where there are little resources at all, they are not usually in good condition while the few ones that are in good condition are not enough to go round those who need them. This poses a great challenge to government on the need to raise the funding needs of schools where science subjects such as Chemistry are being offered. This is because where the materials are not available in large quantities to meet the demand, effective teaching and learning of science; especially Chemistry which is the queen of the sciences becomes very difficult. In this case, only but the highest creative, resourceful, committed and dedicated teachers can resort to improvisation of scarce resources. Ojo (2012) in his study concluded that to avoid the prospect of a possible negative background, there should be provision of adequate laboratory and equipment, this study therefore probed more into this.

Science deals with the phenomena of nature. These phenomena cannot be studied effectively through abstract or theoretical discussions only. Currently, in all systems of

education, Mathematics and Science teaching is set to involve practical work. Most science students find that actual objects, models, or living specimens make phenomena concrete enough to be understood. According to Okafor (2010), a classroom teacher requires various kinds of teaching resources such as textbooks, apparatus, chemicals, charts, models, motion pictures as well as facilities such as laboratories and others to enhance the effectiveness of his/her instruction.

A resource is any source of information, expertise, supply or support. Resources play an important role in enhancing the teaching /learning process by modifying the teaching and learning situation. The use of the resources involves a broad range of the human senses at the same time in the learning process. This facilitates learning and helps in conveying the intended purpose, every bit of chemical knowledge is a direct result of one or more careful and unbiased experimental observations. Most of these observations are made by using at least one or more of the five senses. Students‟ performance in practical work is determined by proper use of laboratory tools (glassware, and equipments) and the correct execution of procedural techniques (Nderitu, 2009).

According to Ngugi and Macharia (2006) growing bodies of research in the cognitive science suggest that students learn and better retain what they learn when engaged in “authentic” learning tasks. They maintained that in many countries, the school Chemistry curriculum is more laboratory-based, and a large proportion of learning is spent on practical or hands-on experiences. He goes on to say that the practical sessions accord the students an opportunity to manipulate concrete objects, specimens, equipments and chemicals under the guidance of the teacher. There results from this an increased

interaction between students, resources and teachers among many other benefits. This is more so important considering that practical lessons among other factors help learners prepare for the practical examination. Performance in the practical examination is vital since KNEC has a rule that for a candidate to have a good pass in science, Chemistry included, a pass in practical paper is compulsory. The extent to which students access learning resources particularly those that aid in application of chemical concepts in practical lessons goes a long way in determining students‟ overall performance in Chemistry (Nderitu, 2009).

According to Nderitu (2009), most if not all schools have a rule that students are responsible for apparatus under their use. Should any break during use, they are to pay for the broken apparatus. Considering that most of the apparatus used in Chemistry are glass wares most of which are expensive, many students shy away from experiments due to this rule. He therefore recommends a reversal of this rule for meaningful learning and hence performance. Okafor (2010) argues that availability of instructional resources does not necessarily translate into effective teaching and learning of a subject. Adequacy of resources is much more important in achieving the latter. This is because most of the resources play an important role in understanding concepts and imparting skills to the learner. The learner can only adequately acquire these concepts and skills through the actual use of or contact with the resources. This is particularly important in the sciences where the hands-on approach to learning has been demonstrated to play a crucial role in the understanding of concepts and retention of content taught, as well as developing the ability to think scientifically.

2.2.5 Students Career Aspirations and its Influence on Achievement in Chemistry

A career aspiration is a path that you want your career to follow. For example, a big career aspiration for a lot of people is to become part of a management team. Being part of a management team is a big step up because it invests you with more power and greater responsibility (Aikenand, 2010). There are various factors that play an important role when it comes to selection of career aspirations by students. Family plays an important role in career selection, they can have an influence on their child's career development by positively reinforcing or punishing certain behaviors that can encourage or discourage certain interests or abilities. Siblings can be a source of challenge and competition and a basis for comparison of abilities, thus providing a context for identity formation. Role models have been defined as people whose lives and activities influence another person in some way and they influence career aspiration of the learners. It is observed that once children grow up and know other people and other environments then they will find people from multi and different backgrounds and professions whom they identify as their role models. Several researchers have explored the issue of relevance regarding students‟ interest in Chemistry; relevance is interpreted in terms of students‟ views about their interest in and liking for Chemistry and its usefulness either to their life or to their goals (Aikenand, 2010).

Students continue to be inappropriately underrepresented in Chemistry and engineering fields , a model for career choice is proposed to include both the direct and indirect methods that socializes can play in examining career choices .A research was carried out in nine schools in Rhode Island about academic and career choices and the perceived influences on those choices. Parents and teachers were perceived to be the influences on

career choices more often for students choosing careers in engineering and Chemistry than for those not choosing such careers. One of the tasks of high school students is to explore and plan for their post-secondary career option (Kerlinfer, 1983).

According to Aikenand (2010), students career in many African countries are always influenced by their parents. A study conducted in South Africa among students who were taking Chemistry subjects found out that their choice to take Chemistry subjects as a career was influenced by their parents who had decided for them on what they should study in the future. Similar study was conducted in Malawi, the findings of the study indicated that 77% of the respondents mentioned that their career choices influenced their choice of the Chemistry subjects and in another scenario was that teachers also influenced the career choices of the students with some influencing the students to take up the Chemistry career line.

In East Africa studies have been conducted on how career choice influences the performance of the students in Chemistry subjects like Chemistry. A study conducted in Uganda found out that career choice had an impact on the performance of the student in subjects like Chemistry. The study carried out a regression analysis that found that there was a significant relationship between career choices and student performance. In Tanzania a study carried out5 on the relationship between career choice and performance of the students found out that there was a relationship between career choice and performance of the student (Diana, 2012).

In Kenya study have been done to relate the career choice and performance of the students. Study conducted among students in secondary schools in Kiambu, the study targeted students in form four classes. Findings of the study indicated that students who were performing well in class were doing so because they had selected careers which they were passionate about thus influencing their positive attitude towards learning hence having a good performance. Also a study conducted among students in high schools in Nakuru on impact of career choice on performance of the students, the study found that 88% of the students under the study mentioned that career choice influenced their performance (Wabuke, 2009).

2.3 Related Studies

The first related study is a study titled "school factors affecting the choice of Chemistry subjects among girls at secondary level in Mauritius" by Naugah (2011) is related to the current study. The research attempted to identify the factors which influence the choice of Chemistry subjects in Mauritius among girls at the end of the third year of secondary education, the level up to which Chemistry is a compulsory subject. This low uptake of Chemistry subjects by girls beyond the compulsory level is a matter of concern. The study was undertaken in four purposely selected schools in Mauritius, two mixed-sex and two girls' schools. Using mainly a qualitative approach, data were collected through: (i) non-participant observations of 60 Chemistry and 20 non-Chemistry lessons, (ii) 16 semi-structured face-to-face interviews of teachers, and six group interviews with pupils and (iii) 135 questionnaires administered to the parents of the pupils in the classes observed in the four schools. The study employed case study design and data analysis was done using

regression model to show the relationship between the research objectives and the independent variable.

This study is similar to the current study as they both attempt to figure out the choice of Chemistry as a subject among learners. The difference between these two studies is in the study design that has been employed as this related study was a case study design while the current study is a descriptive study design and also the variable that are being used in the two studies are different as the related study looked at general factors while the current study looks at specific learners factors.

The second related study is a study done by Adesoji and Olatunbosun (2012) titled "Student, teacher and school environment factors as determinants of achievement in senior secondary school Chemistry in Oyo state, Nigeria." The study constructed and tested an eight-variable model for providing a causal explanation of achievement of secondary school students in Chemistry in terms of student variables - attitude to learning Chemistry, background knowledge in Integrated Chemistry, teacher variables - attitude to Chemistry teaching, attendance at Chemistry workshop and school environment related variables-class size, laboratory adequacy and school location.

The study adopted an ex-post facto research type the population was made up of 621 senior secondary III Chemistry students and 27Senior Secondary III Chemistry teachers in Oyo State, Nigeria. Four sets of instruments were used; these were Chemistry Achievement Tests (SACS), Teacher. Attitude towards Chemistry Teaching Scale (TATCTS) and Laboratory Adequacy Inventory (LAI). The results revealed that 7.20%

of the total effect on achievement in Chemistry was accounted for by all the seven predictor variables when taken together. It was also revealed that only four variables - school location(X1) laboratory adequacy (X3), teachers' attitude to Chemistry teaching(X5) and teachers' attendance at Chemistry workshop(X4) had direct causal influence and also made significant contributions to the prediction of achievement in Chemistry (X8) (the criterion variable). Recommendations based on the significance of these variables were then highlighted. The similarity of the two studies is based on the fact that their investigations involved Chemistry subject. The difference arises in the variables that are being used by both the studies and the study designs that have been used by both the studies.

The third related study is a study done by Nur (2012) titled "factors that influence secondary school students' performance in Sciences in Banadir region, Somalia." This study intended to find out whether teacher characteristics, teaching methods, use of teaching resources and student attitudes towards sciences affect students' performance in mathematics or not. The study was conducted in Banadir region of Somalia, which has a total of seventy secondary schools with form four-student population of 2500. The study employed a survey research design. Stratified sampling technique was used to select 12 secondary schools for the study.

Three research instruments namely, science teachers' questionnaire (STQ), form four students questionnaire (FFSQ), and classroom observation schedule (COS), were employed. The validity and the reliability of the instruments were enhanced by a pilot study. A reliability coefficient of 0.75 was obtained for this study. Data collected for

objectives (a) to (e) were of descriptive nature; therefore descriptive statistics were used to analyze them. Statistical Package for Social Sciences (SPSS) was used to get descriptive statistics such as, percentages, frequencies and tabulations. The results were presented in frequency tables and charts. The findings were then interpreted to make observations. The observations were discussed correspondingly to the research questions and objectives. The study found that 37.5% of the teachers felt that teaching methods played a major role in students' performance in science. Incidentally, expository approaches of teaching science subjects were used in teaching in Banadir region, leading to students' poor performance. Methods of providing feedback to students were inadequate.

The fourth related study was done by Maguswi (2011) titled 'factors contributing to under achievement of Zambian female students in o-level Chemistry examinations; A case of selected high schools in central province." The study also looked at views held by school administrators, Chemistry teachers and Chemistry students on failure rate and measures them would put in place to improve performance. The study included ten head teachers, ten heads of Chemistry departments and forty teachers of Chemistry from ten selected high schools in Central province. Only schools which offer O-level Chemistry where considered and these are Caritas, Kalonga, Highridge, Kabwe, Stephen Luwisha, Bwacha, Jasmine, St. Paul's, and Mpunde. The study was a descriptive study design which used systematic sampling procedure. Findings of the study revealed that poor performance on Chemistry examinations was due to: Inadequate funding low teacher morale, Heavy teaching loads, Lack of support from school managers, Lack of qualified

staff, Lack of text books equipment and apparatus, Lack of knowledge in e-learning and Lack of parental guidance.

The recommendations of the study included the view that teachers of Chemistry be paid more than other subjects; there should be provision of equipment and apparatus needed for Chemistry lessons and examinations; administrators should fund the C.P.Ds that would equip teachers. Both the teachers and learners must be highly motivated. This study is similar to the current study in terms of the subject under investigation as they both investigate the performance of students in Chemistry subject, there is also similarity on the respondents they both target the students and the Chemistry teachers. The difference between the two studies is the current study is investigating specially learners' factors related to performance in Chemistry while the other study looked at general factors that are nonspecific.

2.4 Chapter Summary

The chapter reviewed literature related to the study. It discussed the factors influencing performance in Chemistry. The next chapter discusses the research methodology and design

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter discusses the research design and methodology; the procedures to be followed in carrying out the study. The chapter described the research design, area of study, study population, sampling procedure to be used research instruments and data collection procedures.

3.1 Research Design

Research design is defined as a plan, structure or strategy of investigating so as to obtain answers to research question or problem (Mugenda & Mugenda, 2003). This study used descriptive survey design. This research design was used as it describes phenomena associated with a subject population or to estimate proportion for the population that have certain characteristics. This design was relevant to this study as it tried find out institutional factors influencing students' achievement in Chemistry in Trans-Nzoia County. Descriptive study design is a method of collecting information by interviewing or administering questionnaires to a sample of individuals (Orodho, 2003). The study was purely quantitative as it relied on primary data.

3.2 Study Area

The study was carried out in Trans Nzoia County. Trans Nzoia County is located between the Nzoia River and Mount Elgon. Trans Nzoia county with its centre at the town of

Kitale which is the capital and largest town of the county, and 380 km North West of Nairobi. The county borders Bungoma to the west, Uasin Gishu and Kakamega to the south, Elgeyo Marakwet to the east, West Pokot to the north and the republic of Uganda to North West. Trans Nzoia covers an area of 2495.5 square kilometers. The study targeted secondary schools that are located within the county. Trans Nzoia County has been selected because of the continuous poor performance in Chemistry subject. The study was narrowed down to investigate Chemistry subject as it has been among the poorly performed subjects in KCSE in Trans Nzoia County.

3.3 Target Population

Mugenda and Mugenda, (2003), define population as an entire group of individuals, events or objects having common observable characteristics. The study targeted 33 secondary schools located in Trans Nzoia. The target population for the study was teachers and students within schools in Trans Nzoia. Therefore, the study targeted a total of 8316 respondents for the study that included Chemistry teachers and form 3 student taking Chemistry subject.

Table 3.1: Target Population

Group	Target population
Chemistry teachers	66
Form 3 students taking Chemistry	8250
Total	8316

Source: Education office Trans Nzoia County (2014)

3.4 Research sample and sampling procedures

The sampling unit of this study was the school. Trans Nzoia County had 33 secondary schools, of which 3 are girls' schools, 2 boys' and 28 are mixed schools. Owing to the

varied nature of the schools, stratified sampling was used. Stratified sampling is a sampling technique in which the population under study is grouped into strata that are homogeneous and mutually exclusive. Its advantage is if the population density varies greatly within a region under study, it ensures that estimates can be made with equal accuracy in different parts of the region and that sub-regions can be made with equal statistical power (Mugenda and Mugenda, 2003).

Assigning the schools respective numbers was done, the required count was picked randomly. This resulted to a total of 20 schools selected for the study. Purposive sampling was used to select one stream in Form three. Simple random sampling was used to pick the stream, where streams were more than one.

Three categories were used for equal representation i.e. girls', boys' and mixed schools. During sampling, 75% of the girls' and 100% boys' schools were used while 50% of the mixed schools were used as shown in table 3.2. All the boys' schools were used because they are only 2, 2 girls' schools were selected from the three and 14 mixed schools were selected from the 28.Simple random sampling was used to select the schools in the girls' and mixed category that were to be used in the study. Simple random sampling is a sampling procedure where the sub-set of a population is selected randomly. The advantage of this technique is that all individuals in the population have a probability of participating in the study (Mugenda and Mugenda, 2003).

The total number of respondents from each category were selected based the Mugenda and Mugenda (2003) formula. The formula indicates that for population of less than 100, 100% of the population is taken to calculate the sample size, for a population of between

100 to 1,000, 30% of the population is taken, for a population of 1,000 – 10,000, 10% of the target population is taken to represent the target population and finally for any target population above 10,000, 1% is taken to calculate the sample size to be employed in the study.

10% of the students population was selected to participate in the study from each category since the population for each category fell between 1,000 – 10,000. This led to the selection of; 180 girls, 220 boys and 425 students from mixed schools. The mixed schools since the number was 425, the researcher divided the population into two which resulted into 212 boys and 212 girls. The extra student was selected through random sampling which resulted in to a boy. The total sample for mixed school was therefore 212 girls and 213 boys.

Purposive sampling is a sampling where the researcher hand-pick subjects on the basis of specific characteristics ensures balance of group sizes when multiple groups are to be selected. Its advantage is that it allows the researcher to select the population to be studied based on his/her judgment in regard to the study. The advantage it has is that the researcher might be biased when selecting the target population (Mugenda and Mugenda, 2003). Purposive sampling was used to select Chemistry teachers to participate in the study where 6 teachers were selected from the girls' school, 8 teachers from the boys school and 14 Chemistry teachers from the mixed schools as indicated in table 3.2. Based on the purposive sampling the number of teachers selected for the study varied based on the student population. The higher the number of students indicated that more teachers were sampled from that category of school.

Table 3.2: Sampled population

Total number of schools	Sample selected	Total numbers teachers	Sample selected	Total number of students	Sample selected
Girls (3)	2	12	6	1800	180
Boys (2)	2	20	8	2200	220
Mixed (28)	14	32	14	4250	425
Total (33)	20	66	28	8250	825

3.5 Data Collection Instruments

The task of data collection begins after a research problem has been defined and research design chalked out. The methods of data collection used in this study included use of questionnaires which will be administered to students and interview schedules which were administered to teachers

3.5.1 Questionnaire

A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents (Orodho, 2003). This method of data collection is quite popular particularly in case of big enquiries. The questionnaire consists of a number of questions printed or typed in a definite order on a form or set of forms. The researcher delivered the questionnaire to respondents (learners), who were expected to read and understand the questions and write down the reply in the space meant for the purpose in the questionnaire itself. The respondents had to answer the questions on their own. The structured questionnaire contained closed and open-ended questions. The researcher collected the questionnaires after 30 minutes of being issued and ensured that they had been filled to ensure 100% return rate.

The main merit of using a questionnaire lies in the fact that it is an economical way of accumulating information in less time, effort and cost. It is also felt, they are time saving hence the respondents would have time to go through each item, (Oso and Onen, 2005). Secondly, it permits group administration that is it covers a large group at the same **t**he responses are gathered in a standardized way, so questionnaires are more objective, certainly more so than interviews. Generally it is relatively quick to collect information using a questionnaire. However in some situations they can take a long time not only to design but also to apply and analyzed (John Milne 2008).

The main demerits of this system can be given as; it is difficult to probe problems like in the case of an interview. There is also a possibility of ambiguous replies or omissions of replies altogether, to certain questions, interpretation of omissions is difficult (Mugenda and Mugenda, 2003). The questionnaire was divided into sections thus; biographical information and research questions based on the background questions as well as questions regarding the objectives of the study. A copy of the questionnaire is in appendix II.

3.5.2 Interview Schedule

Interviews are questions asked orally. There are various forms of interviews; structured, unstructured, semi structured (Mugenda and Mugenda, 2003). The main advantage of using an interview is that it provides in depth data that is not possible to get using a questionnaire provides for flexibility, however, they are expensive and require high level of skills. To save time, the researcher used structured questionnaires (Oso and Onen, 2005). The interview was done on the 20 teachers of Chemistry were selected to

participate in the study. The interview covered issues to do with the questions covered in regard to the research objectives. A copy of the interview schedule is attached as appendix IV.

3.6 Data Collection Procedures

Before administration of the questionnaires, authorization for research was sought from the office of the president. On receiving a permit an official consent was obtained from District Education office and District commissioner in Trans-Nzoia County. The Questionnaires were delivered and administered by the researcher in person to the selected participants. The respondents were given thirty minutes to complete the Questionnaires after which they were collected by the researcher. The interview schedule is in appendix IV.

3.7 Validity and Reliability of the Research Instruments

3.7.1 Validity of the research instrument

Validity is the accuracy and meaningfulness of inferences, based on the research results. It is the degree to which results obtained from analysis of data actually represents the phenomenon under study (Mugenda and Mugenda, 2003). First, Validity was ascertained by the researcher by preparing the research instrument based on the research objectives of the instrument were examined by selected members of the academic staff department of CIEM, school of Education, Moi University upon request. They assessed the relevance of the content used in the questionnaire in relation to the objectives of the study. Feedback provided to the researcher was used to revise and review the questionnaire item to ensure they are sufficient.

3.7.2 Reliability of the research instrument

The reliability of the instrument is the measure of degree to which a research instrument yields consistent results or data after repeated trials. Reliability of the instruments was tested using the Cronbach alpha test. Bless and Higson-Smith (2005) highlight that reliability is "concerned with the consistency of measures", thus, the level of an instrument's reliability is dependent on its ability to produce the same score when used repeatedly. The researcher also used the test re-test method to determine the reliability. The formula that was used was;

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum_{i=1}^{K} \sigma_{Y_i}^2}{\sigma_X^2}\right)$$

The following scale was used to determine how reliable the data sets for each of the variables are;

Table 3.3 Reliability Measures

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

Source: Kombo and Tromp, (2006).

Findings of the reliability revealed as strength of 0.87 which indicated that the variables used were good to be used in conducting the study.

3.8 Pilot Study

A pilot experiment, also called a pilot study, is a small scale preliminary study conducted before the main research in order to check the feasibility or to improve the design of the research. Pilot studies therefore may not be appropriate for case studies. They are frequently carried out before large-scale quantitative research in an attempt to avoid time and money being wasted on an inadequately designed project (Orodho, 2003).

The researcher conducted a pilot study in Kapsoya secondary in Uasin Gishu County in order to test the validity and reliability of the research instruments. The School was selected since it is not part of the study and that had both boys and girls who are targeted by the study. The respondents who participated in the pilot study did not participate in the main study. The research instrument was updated based on the findings of validity and reliability.

3.9 Ethical Issues

Ethics in research is used to mean the norms for conduct that distinguish between acceptable and unacceptable behavior (Orodho, 2003).To ensure that the study complied with the ethical issues pertaining research undertaking, a permission to conduct the research was sought from the respective authorities. A full disclosure of all the activities concerning the study was explained to the authorities and this involved the study intention which is only for learning purposes. A high level of confidentiality and privacy was observed and the findings of the study were only submitted to the University and the county government of Trans Nzoia.

A letter of introduction was obtained from the University to serve as evidence of the purpose of the study. In respect for the informants and in order to protect them from abuse resulting from the data they gave for the research, data was presented in such a way that it did not link to individuals who gave it except by the researcher who might have needed to seek clarification during analysis of data.

3.10 Data analysis procedures

Kothari (2004) refers to data analysis as the systematic organization and synthesis of research data, which will include testing of a research hypothesis using those data. The analysis employed the use of quantitative techniques, which includes descriptive and inferential statistics. Descriptive statistics include frequencies, percentages and means to analyze and summarize the data while in inferential statistics was done using multiple regression analysis.

In its simplest form regression analysis involves finding the best straight line relationship to explain how the variation in an outcome (or dependent) variable, Y, depends on the variation in a predictor (or independent or explanatory) variable, X.

The regression equation was:

$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_{5+e}$

Where:

X = the independent variables - X_1 – Student's perception

X_2 – School policy

X_3- Resources availability

X_4–Gender issues

X_5 – Career aspirations

Y = the dependent variable (Achievement in Chemistry)

b = the unknown parameters; this may be a scalar or a vector.

e = Error margin

3.11 Chapter Summary

This chapter has shed light on the research design, area of study, study population, sampling procedures, research instruments, piloting of the research instruments, reliability and validity of the research instruments and how the data was analyzed.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents the analysis, interpretation and discussion of the findings obtained in this study. The study aimed at assessing the institutional factors influencing students' achievement in Chemistry in Trans-Nzoia County, Kenya. The objectives of the study were:

1. To assess the influence of students' perceptions towards Chemistry on their achievement in the subject in Trans Nzoia County
2. To determine the influence of school policies on students' achievement in Chemistry in Trans-Nzoia County, Kenya.
3. To assess the influence of availability of resources on students' achievement in Chemistry in Trans-Nzoia County, Kenya.
4. To evaluate the influence of gender issues on student's achievement in Chemistry in school in Trans Nzoia county
5. To find out the influence of the students' career aspirations on achievement in Chemistry in schools in Trans Nzoia county

4.2 Background Information

4.2.1 Gender

The researcher sought to find out the gender of the respondents. Findings of the study are presented in Figure 4.1

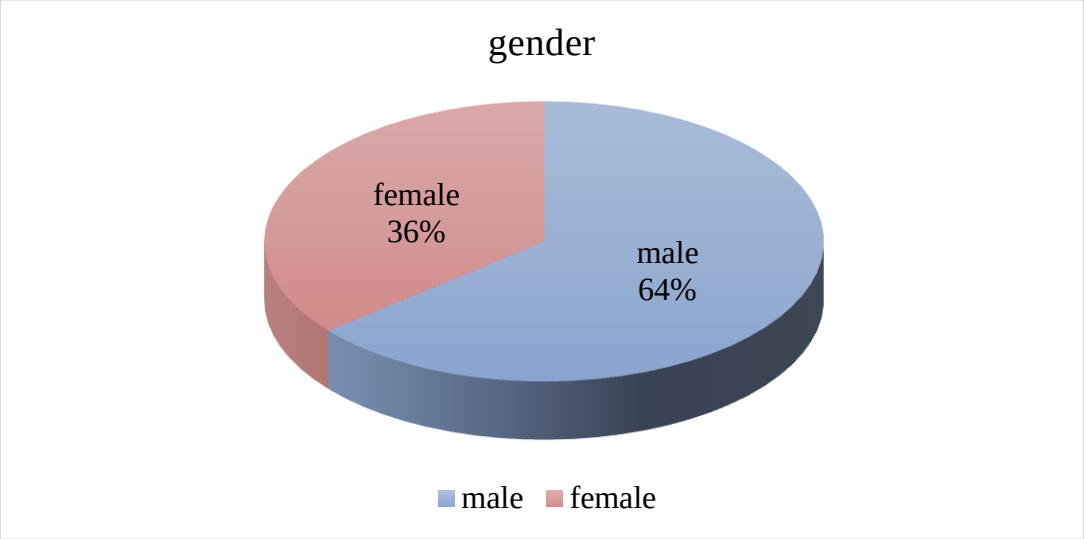


Figure 4.1: Gender

Source: Author's data (2015)

Findings of the study indicate that 64% of the respondents were male while 36% were female. This can be interpreted to mean that majority of the respondents were female.

4.2.2 Age

The researcher sought to find out the age of the respondents. Findings are presented in figure 4.2

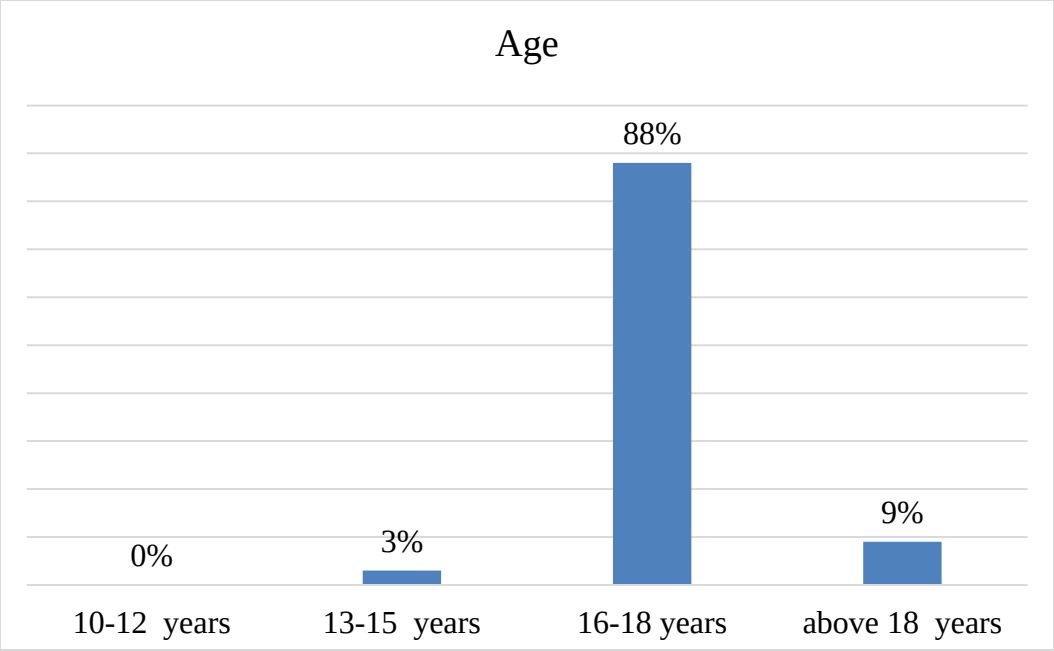


Figure 4.2: Age

Source: Author's data (2015)

The findings of the study indicate that 3% of the respondents were between 13-15 years, 88% were between 16-18 years and 9% were above the age of 18. This can be interpreted to mean that majority of the respondents were between 16-18 years of age.

4.2.3 Student's Achievement in Chemistry

The researcher sought to find out the achievement of the students in Chemistry. Findings of the study are presented in figure 4.3

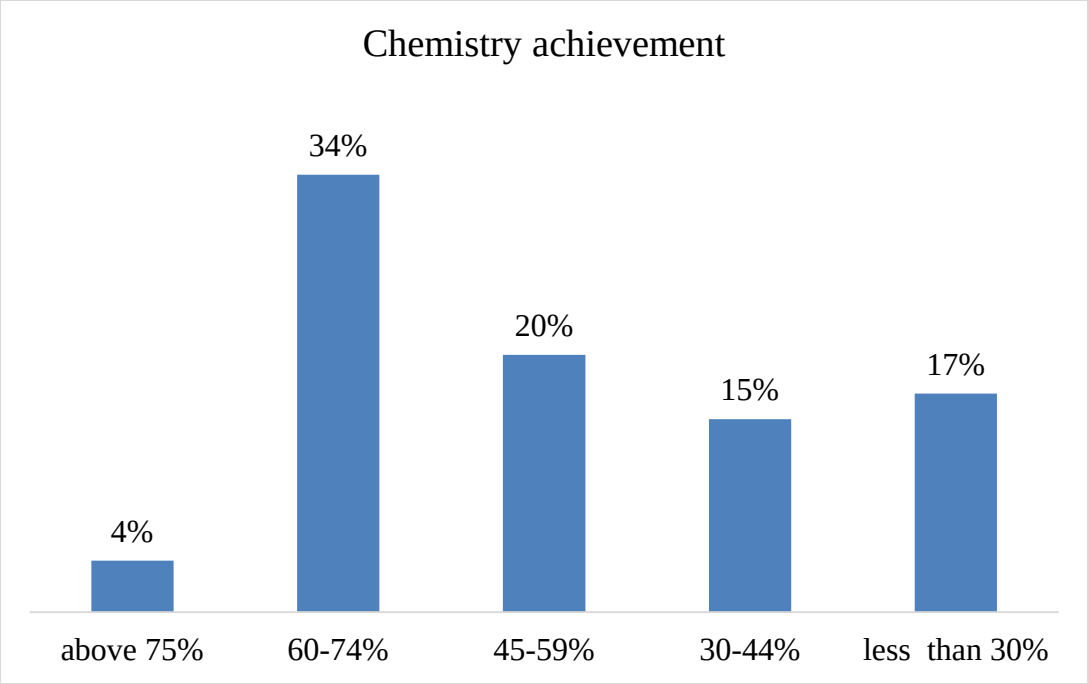


Figure 4.3: Chemistry achievement

Source: Author's data (2015)

Findings of the study reveal that 4% of the students achieved above 75%, 34% of the students revealed that they achieve between 60-74%, 20% achieved between 45-59% , 15% achieved between 30-44% and 17% of the respondents achieved less than 30% in Chemistry.

4.3 Analysis of the Specific Objectives

4.3.1 Students' perceptions and achievement in Chemistry

The researcher sought to find out the student's perceptions and achievement of Chemistry. Findings are presented in table 4.1

Key: Strongly Agree (SA) 1, Agree (A) 2, Undecided (U) 3, Disagree (D) 4, and Strongly Disagree (SD). M-Mean, T- Total

Table 4.1: Students' perception and achievement in Chemistry

Statements		SA 1	A 2	U 3	D 4	SD 5	T	M
I find Chemistry very interesting.	F	228	-	114	-	417	759	3.5
	%	30	-	15	-	55	100%	70%
Every student should learn Chemistry.	F	190	76	76	114	304	759	3.4
	%	25	10	10	15	40	100%	68
The language used in Chemistry exams is very difficult making exam questions challenging and confusing	F	114	-	38	-	607	759	4.3
	%	15	-	5	-	80	100%	86
I want to go on learning Chemistry up to the university	F	76	76	38	266	304	759	3.9
	%	10	10	5	35	40	100%	78
I understand the importance of learning Chemistry	F	190	152	76	76	266	759	3.1
	%	25	20	10	10	35	100%	62
What we learn in Chemistry is relevant to my day to day experiences	F	190	-	76	228	266	759	3.5
	%	25	-	10	30	35	100%	70
I prefer other subjects to Chemistry	F	342	76	114	76	150	759	2.5
	%	45	10	15	10	20	100%	50
Chemistry is my best subject	F	228	-	114	-	417	759	3.5
	%	30	-	15	-	55	100%	70
Chemistry should be made a compulsory subject in the secondary school curriculum.	F	114	38	76	38	493	759	4.0
	%	15	5	10	5	65	100%	80

Source: Author's data (2015)

The findings of the study indicated that 70% noted that they found Chemistry interesting, 68% indicated that every student should learn Chemistry, 86% of the students revealed that language used in Chemistry exams is very difficult making exam questions challenging and confusing, 78% indicated that they want to go on learning

Chemistry up to the university, 62% revealed that they understand the importance of learning Chemistry, 70% revealed that what they learn in Chemistry is relevant to my day to day experiences, 50% of students revealed that they prefer other subjects to Chemistry, 70% of the students revealed that Chemistry is their best subject, 80% of the respondents indicated that Chemistry should be made a compulsory subject in the secondary school curriculum.

The findings of the study concur with that of Diana (2012) that found out that there are many factors could contribute to student's perception towards studying Chemistry such as the language that is used. Students' positive attitudes to Chemistry correlate highly with their Chemistry achievement. The study further indicated that there is a positive relationship between attitude of a student and performance in Chemistry.

4.3.2 The influence of gender issues on achievement in Chemistry

4.3.2.1 Gender Issues and Chemistry Performance

The researcher sought to find out gender issues and Chemistry performance. Findings are presented in Figure 4.4

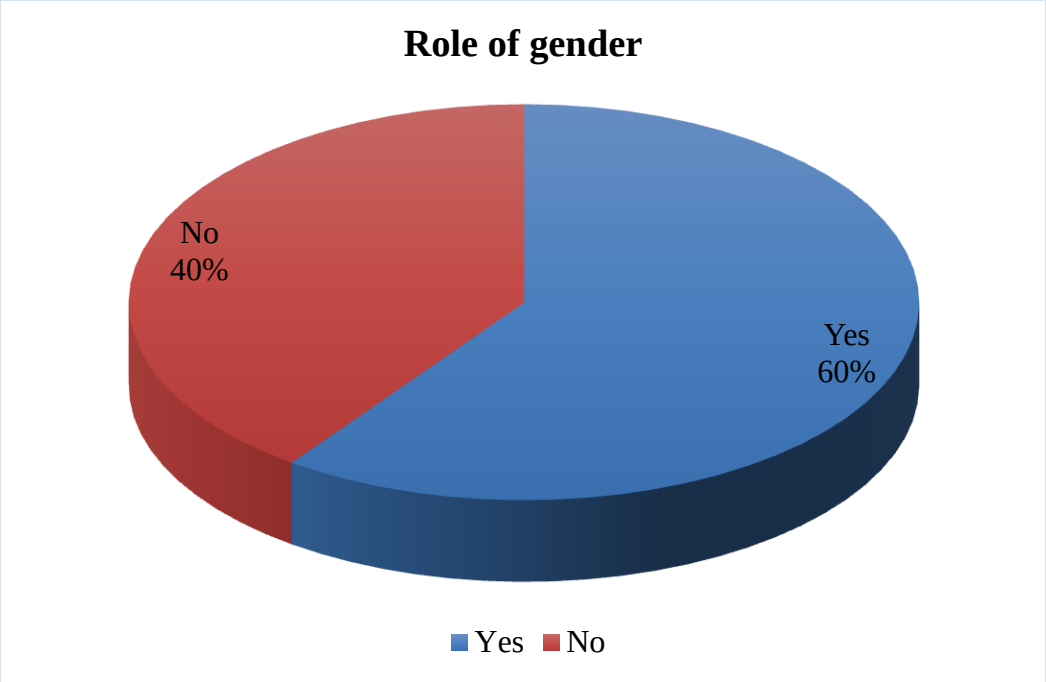


Figure 4.4: Role of gender

Source: Author's data (2015)

The findings of the study reveal that 60% of the respondents indicated that gender plays a role while 40% of the respondents indicated that gender plays no role. From the findings, it can be interpreted that indeed gender has a role to play. The findings of the study contrast the findings of the study that was conducted by Frenshm (1988) that found out according to majority of the students, gender issues play crucial role when it comes to Chemistry performance.

The researcher sought to find out if the role of gender in the performance of Chemistry

4.3.2.2. Influence of Gender on Performance

The researcher sought to find out the influence of gender on performance. Findings are presented in Table 4.1

Key: Strongly Agree (SA) 1, Agree (A) 2, Undecided (U) 3, Disagree (D) 4, and Strongly Disagree (SD). M-Mean, T- Total

Table 4.2: Influence of Gender on Performance

Statements		SA	A	U	D	SD	T	M
Girls do well in Chemistry compared to boys	F	152	114	152	76	267	759	3.3
	%	20	15	20	10	35	100%	66
Boys do well in Chemistry compared to girls	F	267	76	38	114	267	759	3.1
	%	35	10	5	15	35	100%	62
Both boys and girls do well in Chemistry	F	152	76	228	76	228	759	3.2
	%	20	10	30	10	30	100%	64
I perform poorly in Chemistry because it does no relate to my gender	F	152	76	152	76	304		3.4
	%	20	10	20	10	40	100%	64
I perform well in Chemistry because it relates to my gender	F	228	114	114	114	190	759	2.9
	%	30	15	15	15	25	100%	58

Source: Author's data (2015)

The findings of the study indicate that 66% of the respondents felt that girls do well in Chemistry compared to boys, 62% of the respondents mentioned that boys perform better compared girls, 64% indicated that both boys and girls do well in Chemistry, 64% of the respondents indicated that they perform poorly in Chemistry because it does no relate to their gender, 58% of the respondents mentioned that they perform well in Chemistry because it relates to their gender.

From the findings, it can be interpreted that girls tend to perform better in Chemistry than boys. The findings of the study contrast the findings of the study that was conducted by Frenshm (1988) that found out that in those high school in which the males performed significantly better on Chemistry achievement tests found that males also had higher scores on attitude scales, including confidence in learning Chemistry, Viewing Chemistry as a male domain, attitude towards success in Chemistry, mother's support father's support, and usefulness of Chemistry.

4.2.4 School policy and its influence on performance in Chemistry

4.2.4.1 Presence of School Policy

The researcher sought to find out if the school has a school policy regarding Chemistry. Findings are presented in the figure below.

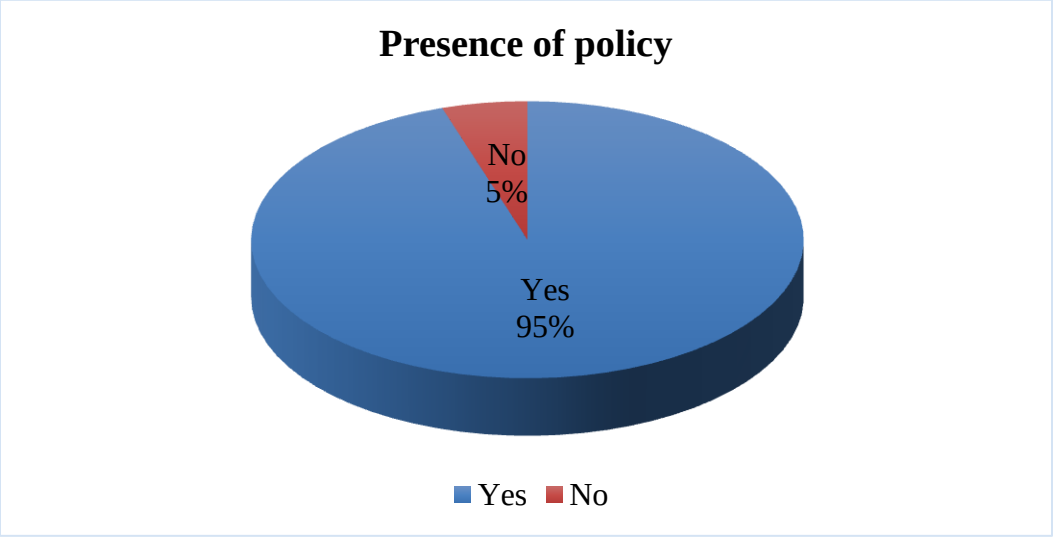


Figure 4.5: Presence of Chemistry policy

Source: Author's data (2015)

The findings of the study reveal that 95% of the respondents mentioned that there is presence of school policy regarding Chemistry while 5% of the respondents mentioned that there is no presence. From the findings it can be interpreted that majority of the school have school policy regarding Chemistry.

4.2.4.2 All about school policy on Chemistry

The researcher sought to find out all about the school policy regarding Chemistry. Findings are presented in Figure 4.6

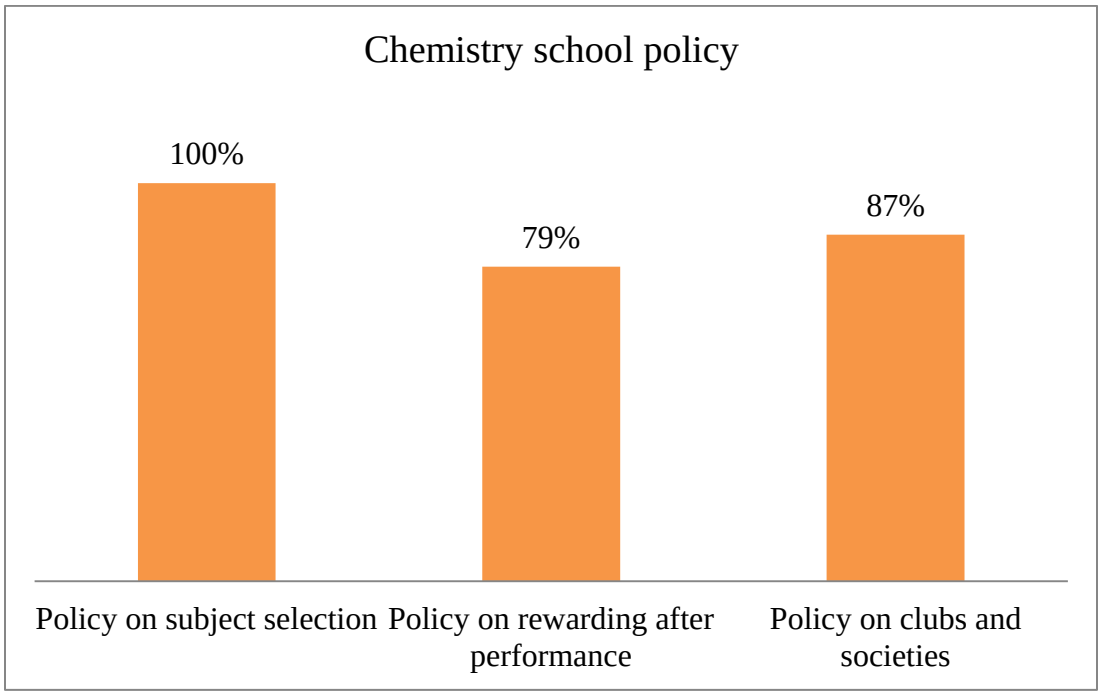


Figure 4.6: Chemistry school policy

The findings of the study indicate that 100% of the respondents mentioned that there is a policy on subject selection. 79% mentioned that there was a policy on rewarding after performance. 87% indicated that there is a policy on clubs and societies.

4.3.4.2 School Policy Overview

The researcher sought to find out the influence of school policy on Chemistry performance. Findings of the study are presented in Table 4.3

Table 4.3: Influence of School Policy on Chemistry Performance

Statement	YES	NO	Total
In my school, Chemistry is a compulsory subject	65% (493)	35%(266)	100%(759)
The school policy on Chemistry does not favour all students	60%(455)	40%(304)	100%
It is difficult to pass Chemistry with the present school policy about the subject	65% (493)	35%(266)	100%(759)

Source: Author's data (2015)

The findings of the study reveal that 65% of the respondents agreed that Chemistry is a compulsory subject while 35% of the respondents mentioned it is not; 60% of the respondents mentioned that the school policy does not favor all students while 40% of the respondents mentioned that it favor all students. From the findings of the study, it can be concluded that Chemistry is compulsory in most of the schools.

The findings of the study agree to that which was conducted by Mackay commission (1981) which introduced 8-4-4 system of education. It recommended science subjects to all students. If the school had resources, it could offer pure sciences while those schools with inadequate resources could offer Physical sciences and Biological sciences. Therefore, the students doing pure sciences could do Physics, Biology and Chemistry, while those doing Physical sciences could do a combination of Chemistry and Physics as physical science paper and Biological sciences.

4.3.5 Influence of School Resources on Chemistry Performance

The researcher sought to find out the influence of school resources on Chemistry performance. Findings are presented in table 4.4

Key: Strongly Agree (SA) 1, Agree (A) 2, Undecided (U) 3, Disagree (D) 4, and Strongly Disagree (SD). M-Mean, T- Total

Table 4.4: Influence of School Resources on Chemistry Performance

Statement		SA	A	U	D	SD	T	M
My school has an up to date laboratory	F	266	76	76	76	266	759	3.0
	%	35	10	10	10	35	100%	60
The time allocated for Chemistry is enough to cover all the topics	F	190	38	76	114	346	759	3.0
	%	25	5	10	15	45	100%	60
My school has a supportive laboratory technician.	F	346	38	38	190	152	759	2.7
	%	45	5	5	25	20	100%	54
We have adequate Chemistry textbooks in my school.	F	190	76	114	76	304	759	3.3
	%	25	10	15	10	40	100%	66
My Chemistry teacher attends all the lessons	F	304	38	76	152	190	759	2.9
	%	40	5	10	20	25	100%	58
My Chemistry teacher explains concepts clearly	F	346	38	76	152	190	759	2.6
	%	45	10	10	10	25	100%	52
We have adequate and supportive Chemistry teaching staff besides our Chemistry teacher.	F	346	190	76	-	152	759	2.3
	%	45	25	10	-	20	100%	46

Source: Author's data (2015)

The findings of the study indicates that 60% of the respondents revealed that their school has an up to date laboratory, 60% of the respondents indicated that the time allocated for Chemistry is enough to cover all the topics, 54% indicated that the school has a supportive laboratory technician, 66% of the respondents were of the opinion that they have an adequate Chemistry text books in my school, 58% of the respondents

mentioned that the Chemistry teacher attends all the lessons, 52% of the respondents mentioned that the Chemistry teacher explains all the concepts clearly and 46% of the respondents further indicated that they have adequate and supportive Chemistry teaching staff besides our Chemistry teacher.

From the findings, it can be interpreted to mean that most of the schools have adequate Chemistry text books. These findings concur to that of Okafor (2010) that found out that a classroom teacher requires various kinds of teaching resources such as textbooks, apparatus, chemicals, charts, models, motion pictures as well as facilities such as laboratories and others to enhance the effectiveness of his/her instruction.

4.3.6 Career Aspiration and Students' Achievement in Chemistry

4.3.6.1 Chemistry Career Aspirations

The researcher sought to find if the respondent wanted to pursue a career related to Chemistry. The findings are presented in Figure 4.7

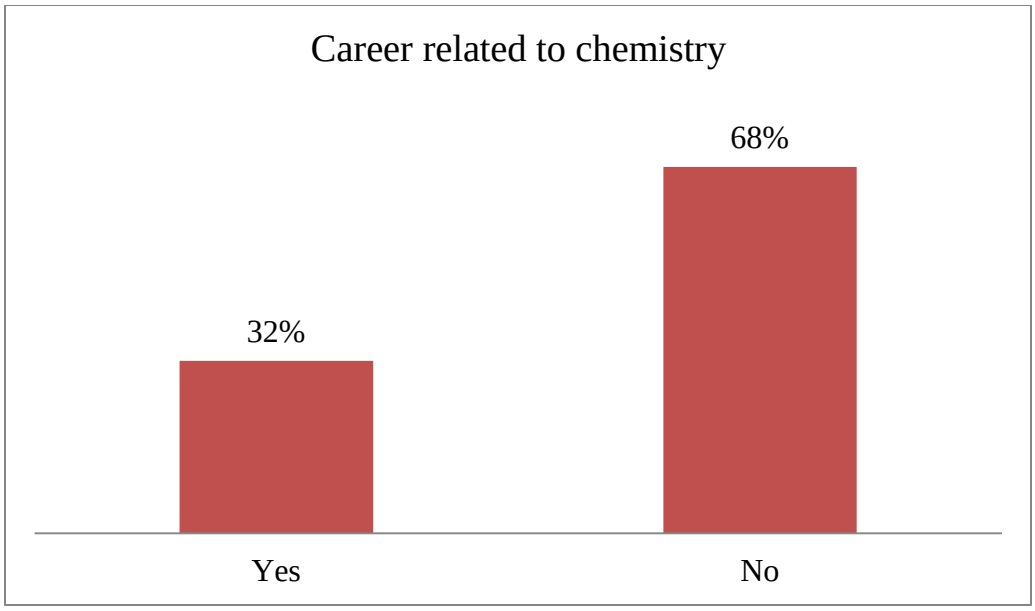


Figure 4.7: Career related to Chemistry

The findings indicate that 32% of the respondents wanted to pursue a career within the field of Chemistry while 68% wanted in other fields. These findings can be interpreted to mean that a majority of the respondents want to pursue career within other fields that are not related to Chemistry.

4.3.6.2 Aspirations among Students who want a Career in Chemistry Field

The researcher sought to find out the influence aspirations among students who want a career in Chemistry field. Findings of the study are presented in Table 4.5.

Key: Strongly Agree (SA) 1, Agree (A) 2, Undecided (U) 3, Disagree (D) 4, and Strongly Disagree (SD). M-Mean, T- Total

Table 4.5: Influence of Career Aspirations on Students' Achievement in Chemistry

Statements		SA	A	U	D	SD	T	M
I would like to pursue a career related to Chemistry after school	F	152	152	114	76	266	759	3.2
	%	20	20	15	10	35	100%	64
Chemistry subject is my personal choice	F	114	-	114	152	228	759	3.9
	%	15	-	15	20	30	100%	74
I am passionate about Chemistry	F	152	76	76	152	304	759	3.5
	%	20	10	10	20	40	100%	70
I understand Chemistry concepts to a great extent	F	228	38	76	-	380	759	3.5
	%	30	5	10	-	50	100%	70
I like my teacher of Chemistry	F	152	152	114	-	342	759	3.3
	%	20	20	15	-	45	100%	66
I can relate the concepts I learn in Chemistry to everyday life	F	152	76	114	114	304	759	3.5
	%	20	10	15	15	40	100%	70

Source: Author's data (2015)

The findings of the study reveal that 64% of the respondents would like to pursue a career related to Chemistry after school, 74% responded that Chemistry subject is their choice, 70% are passionate about Chemistry, 70% mentioned that they understand Chemistry concepts to a great extent, 66% mentioned that they like their Chemistry teacher and 70% of the respondents mentioned that they can relate the concepts they learn in Chemistry to everyday life.

From the findings, it can be interpreted that to most of the respondents, Chemistry was their choice as a subject. These findings concur with that of Diana (2012) that in East Africa, studies that have been conducted on how career choice influences the performance of the students in Chemistry subjects like Chemistry. A study conducted in Uganda found out that career choice had an impact on the performance

of the student in subjects like Chemistry. The study carried out a regression analysis that found that there was a significant relationship between career choices and student performance. In Tanzania a study carried out on the relationship between career choice and performance of the students found out that there was a relationship between career choice and performance of the student (Diana, 2012).

4.3.6.3 Other Career Aspirations among Students

The researcher sought to find out the aspirations among students who do not want a career in Chemistry related field. The findings are presented in Figure 4.8

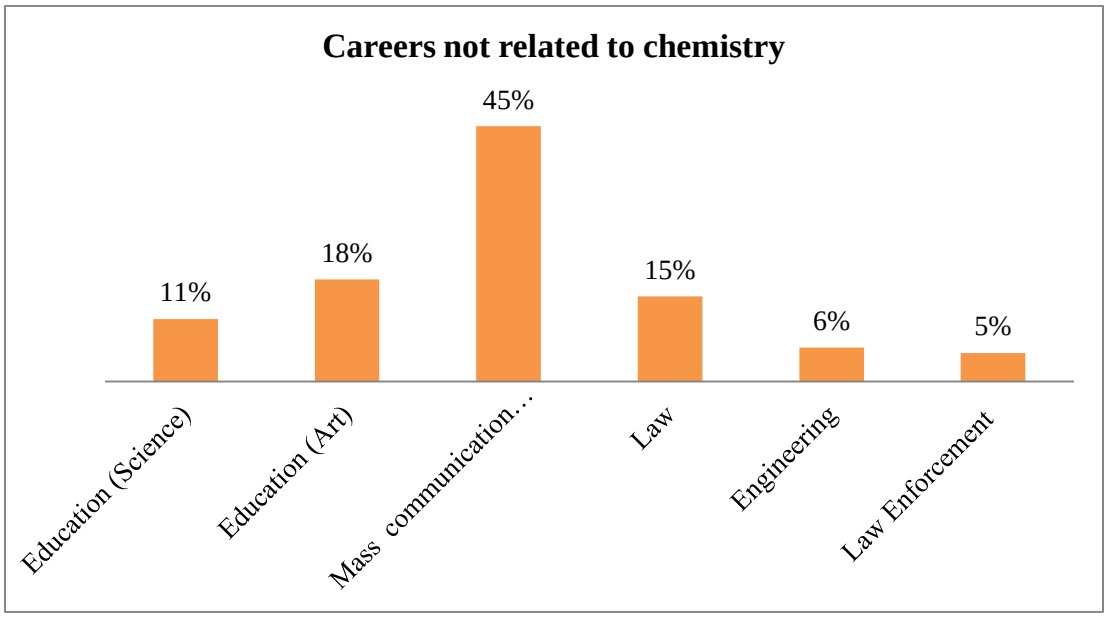


Figure 4.8: Other Career Aspirations

The findings of the study indicate that 11% of the respondents want a career in education science, 18% mentioned Education (Arts), 45% want a career in mass communication and journalism, 15% want a law career, and 6% want to be engineers while 5% want a career in law enforcement.

4.3.6.4 Student's Achievement in Chemistry

The researcher sought to find out the achievement of the students in Chemistry. Findings are presented in table 4.6

Key: Strongly Agree (SA) 1, Agree (A) 2, Undecided (U) 3, Disagree (D) 4, and Strongly Disagree (SD). M-Mean, T- Total

Table 4.6: Student's Achievement in Chemistry

Statements		SA	A	U	D	SD	T	M
I perform better in Chemistry	F	304	152	76	190	38	759	2.6
	%	40	20	10	25	5	100%	52
My performance has been improving	F	304	152	38	76	190	759	2.6
	%	40	20	5	10	25	100%	52
I am satisfied with my current Chemistry achievements	F	304	38	38	114	266	759	3.0
	%	40	5	5	15	35	100%	60
Are you satisfied with your school performance in Chemistry?	F	266	114	38	114	266	759	2.9
	%	35	15	5	15	35	100%	58

Source: Author's data (2015)

The findings of the study indicates that 52% of the respondents perform better in Chemistry, 52% indicated that their performance is improving, 60% of the respondents mentioned that they are satisfied with the their current Chemistry achievements, and 58% of the respondents indicated they are satisfied with the school's performance in Chemistry. From the findings it can be interpreted to mean that majority of the respondents are satisfied with their Chemistry performance. These findings are in agreement with the findings of Eshiwani (1982) that indicated that majority of students in form three are always satisfied with their Chemistry performance.

4.4 Regression Analysis

The study performed regression analysis to analyze the relationship between independent and dependent variables.

Table 4.7: Regression Analysis

Model Summary						
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**		
1	.434[a]	0.588	0.81	0.89995		
a. Predictors: (Constant), student perception, school policies, availability of school resources, student's gender, student's career choice						
ANOVA[b]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	31.876	3	10.625	13.119	.000[a]
	Residual	137.685	170	0.81		
	Total	169.561	173			
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	1.207	0.343		3.516	0.002
	Student perception	0.241	0.089	-0.209	2.713	0.2
	School policies	0.244	0.076	0.244	3.217	0.001
	Availability of resources	0.128	0.083	0.5	1.535	0.003
	Gender issues	0.111	0.898	0.6	1.723	0.001
	Career aspirations	0.123	0.911	0.231	1.823	0.001
a. Dependent Variable: Students achievement						

Source: Author's data (2015)

Student's achievement= 1.207+ 0.2(students perception) +0.001(school policies)-0.003(availability of resources) +0.001(gender issues) +0.001(career aspirations) +0.343(error margin).

4.5 Hypothesis testing using the multiple regressions Model

From the regression model computed in table 4.7 above, the research hypotheses were tested using the significance level of the coefficients; the research aimed to test the hypothesis with an aim of accepting whether there was any effect of students' performance on the variables. The research hypothesis for the study included:

$H0_1$: There is no significant relationship between student perception and achievement in Chemistry in Trans-Nzoia County, Kenya.

The research results accepted the null hypothesis one, which stated that: There is no significant relationship between student perception and achievement in Chemistry in Trans-Nzoia County, Kenya. The results indicated that there was no significant relationship (p=0.2) between student's perception and achievement in Chemistry. This finding is in agreement with the findings of Ojo (2012) that indicated that the perception of the students is not linked tohow they perform in the subject.

$H0_2$: There is no significant relationship between school policies and students' achievement in Chemistry in Trans-Nzoia County, Kenya.

The research results rejected the null hypothesis, which stated that: There is no significant relationship between school policies and students' achievement in Chemistry in Trans-Nzoia County, Kenya. The results indicated that there was a significant relationship (p=0.001) between school policies and achievement in Chemistry. This finding is supported by that of Nderitu, (2009) that indicated that school policies influence that performance of students in Chemistry subject.

$H0_3$: There is no significant relationship between availability of resources and students' achievement in Chemistry in Trans-Nzoia County, Kenya.

The research results rejected the null hypothesis, which stated that: There is no significant relationship between availability of resources and students' achievement in Chemistry in Trans-Nzoia County, Kenya. The results indicated that there was a significant relationship (p=0.003) between availability of school resources and achievement in Chemistry. This finding relates to the findings of Nworgu (2012) that found out most of the students mentioned that their achievement in Chemistry is linked to the availability of resources such as laboratories among others.

$H0_4$: There is no significant relationship between gender issues and students' achievement in Chemistry in Trans-Nzoia County, Kenya.

The research results rejected the null hypothesis, which stated that: There is no significant relationship between gender issues and students' achievement in Chemistry in Trans-Nzoia County, Kenya. The results indicated that there was a significant relationship (p=0.001) between student's gender and achievement in Chemistry. This finding concurs with that of Oduor (2009) that indicated that gender issues influence the performance of a student in Chemistry subject.

$H0_5$: There is no significant relationship between student's career aspirations and students' achievement in Chemistry in Trans-Nzoia County, Kenya.

The research results rejected the null hypothesis, which stated that: There is no significant relationship between student's career aspirations and students' achievement in Chemistry in Trans-Nzoia County, Kenya. The results indicated that there was a significant

relationship (p=0.001) between student's career choice and achievement in Chemistry. The findings concur with that of Nworgu (2012) that found out there exist a strong link between career aspirations and Chemistry achievement among students.

4.6 Data Analysis from Interviews with Teachers of Chemistry

The results from the interview discussion with the teachers regarding the perceptions of the students towards Chemistry and their influence on their achievement in Chemistry in schools in Trans Nzoia County. The discussion revealed that the perception of the students is critical when it comes to their performance in Chemistry. The teachers of Chemistry indicated that the students pass Chemistry based on how they perceive the subject in general. That is the perception based on the complexity or simplicity of the subject.

Regarding the influence of school policies on achievement in Chemistry in Trans-Nzoia County, the discussion with the teachers of Chemistry revealed that there was a consensus among them that school policies are the key determinants on students' performance in Chemistry. Some of the school policies is that Chemistry is a compulsory subject and also that there is a policy that requires students to at least conduct practical activities twice a month.

The interview discussion on the influence of availability of resources on achievement in Chemistry in Trans Nzoia County indicated that availability of the school resources such as Chemistry books and laboratory equipment has played a major in the performance of the students.

Regarding the influence of gender issues on achievement in Chemistry in school in Trans Nzoia County, the interview revealed that most of the teachers of Chemistry had the opinion that gender does not necessarily impacts on the performance of the students. The opinion was that so long as the right environment is provided, students irrespective of their gender will perform better. This is was supported by the teacher since they mentioned that the most important issue is creation of an enabling environment such as availability of resources and proper teaching techniques.

Finally, the interview discussion on how student's career choice influences achievement in Chemistry in schools in Trans Nzoia County. The findings of the study revealed that students who want to pursue a career in Chemistry related field tend to perform better. Hence, the career choice of the students is crucial to their achievements in Chemistry. The interview indicated that that the Chemistry teachers were involved in organizing career talks in order to encourage the students to think of careers in Chemistry related fields. The findings also indicated that the teachers of Chemistry are involved in setting the careers of the students. Some of the ways used in creating aspirations of the students included symposiums, monthly career talks and developing the aspirations that have been selected by the students.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary of the findings, the conclusions and the recommendations of this study.

5.1 Summary of the findings

5.1.1 Students' perceptions and achievement in Chemistry

The findings of the study indicate that more than 70% of the students said that Chemistry interesting, more than 68% indicated that every student should learn Chemistry, most of the students revealed that language used in Chemistry exams is very difficult making exam questions challenging and confusing, 66% indicated that they want to go on learning Chemistry up to the university, 60% revealed that they understand the importance of learning Chemistry, more than 68 % revealed that what they learn in Chemistry is relevant to my day to day experiences, 50% of students revealed that they prefer other subjects to Chemistry, more 66% of the students revealed that Chemistry is their best subject, over two thirds of the respondents indicated that Chemistry should be made a compulsory subject in the secondary school curriculum.

5.1.2 The influence of gender issues on achievement in Chemistry

The findings of the study reveal that over 50% of the respondents indicated that gender plays a role while less 50%of the respondents indicated that gender plays no role. From the findings, it can be interpreted that indeed gender has a role to play. The findings of the study indicate that 66% of the respondents felt that girls do well in Chemistry compared to boys, slightly more than 60%of the respondents mentioned that boys perform better compared girls, slightly more than 50% indicated that both boys and girls do well in Chemistry, almost 69% of the respondents indicated that they perform poorly in Chemistry because it does no relate to their gender, slightly more than 50% of the respondents mentioned that they perform well in Chemistry because it relates to their gender.

5.1.3 School policy and its influence on performance in Chemistry

The findings of the study reveal that two thirds of the respondents mentioned that there is presence of school policy regarding Chemistry while few of the respondents mentioned that there is no presence. From the findings it can be interpreted that majority of the school have school policy regarding Chemistry. The findings of the study indicate that all the respondents mentioned that there is a policy on subject selection. About 70% mentioned that there was a policy on rewarding after performance. More than 66% indicated that there is a policy on clubs and societies. The findings of the study reveal that almost two thirds of the respondents agreed that Chemistry is a compulsory subject while less than two thirds of the respondents mentioned it is not. Slightly more than half of the respondents mentioned that the school policy does not favor all students while less

than half of the respondents mentioned that it favor all students. From the findings of the study, it can be concluded that Chemistry is compulsory in most of the schools.

5.1.4 Influence of School Resources on Chemistry Performance

The findings of the study indicates that slightly more than 50% of the respondents revealed that their school has an up to date laboratory, over half of the respondents indicated that the time allocated for Chemistry is enough to cover all the topics, slightly more than 50%indicated that the school has a supportive laboratory technician, two thirds of the respondents were of the opinion that they have an adequate Chemistry text books in my school, slightly more than half of the respondents mentioned that the Chemistry teacher attends all the lessons, slightly more than half of the respondents mentioned that the Chemistry teacher explains all the concepts clearly and less than half of the respondents further indicated that they have adequate and supportive Chemistry teaching staff besides our Chemistry teacher.

5.1.5 Career Aspiration and Students' Achievement in Chemistry

The findings indicate that 33% of the respondents wanted to pursue a career within the field of Chemistry while more than 66% wanted in other fields. These findings can be interpreted to mean that a majority of the respondents want to pursue career within other fields that are not related to Chemistry.

The findings of the study reveal that two thirds of the respondents would like to pursue a career related to Chemistry after school, more than 70% responded that Chemistry subject is their choice, 60% are passionate about Chemistry, more than 70% mentioned

that they understand Chemistry concepts to a great extent, 66% mentioned that they like their Chemistry teacher and 70% of the respondents mentioned that they can relate the concepts they learn in Chemistry to everyday life. The findings of the study indicate that few of the respondents want a career in education science, few mentioned Education (Arts), 50% the students want a career in mass communication and journalism, few want a law career, and few want to be engineers while another few want a career in law enforcement.

5.1.6 Student's Achievement in Chemistry

The findings of the study indicates that slightly more than half of the respondents perform better in Chemistry, 52% indicated that their performance is improving, more than half of the respondents mentioned that they are satisfied with the their current Chemistry achievements, and slightly more than 50% of the respondents indicated they are satisfied with the school's performance in Chemistry

5.2 Conclusions

Based on the findings of the study, the following conclusions were arrived at:

i. Chemistry is interesting to the students and that every student should learn Chemistry. However, the language used in Chemistry exams is very difficult making exam questions challenging and confusing.

ii. Gender plays a role in Chemistry achievement and girls do well in Chemistry compared to boys. In addition there is poor achievement in Chemistry among the students due to the fact that the subject does not relate to the gender of the learners.

iii. There is presence of a policy regarding Chemistry in most of the schools and it involves the selection of Chemistry as a subject. Additionally, Chemistry is compulsory in most schools as a policy that does not favor all the students.

iv. There is presence of up to date laboratory in most schools, there is presence of adequate Chemistry text books and that teachers do attend most of the Chemistry lessons.

v. Career aspiration relating to Chemistry is not liked by majority of the students. Other career aspirations that most of the students want to pursue includes Deduction (arts and mass communication and journalism.

5.3 Recommendations

Based on the findings of the study, the following recommendations have been made;

i. The language used in Chemistry subject should be made simpler to enhance understanding among the students.

ii. Measures should be put in place to ensure that boys perform better in Chemistry as compared to girls such as encouraging them.

iii. Making Chemistry compulsory should be reviewed as a policy in order to favor al students. It should be made optional

iv. Teachers of Chemistry should ensure that they explain every concept and also they should be supportive.

v. More should be done to encourage the students to tike careers in Chemistry. This includes teaching them on the positive aspects of Chemistry career.

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APPENDICES

APPENDIX I: Introduction Letter

LETTER TO SCHOOL PRINCIPAL

JULIANA CHIRCHIR
P.O BOX 4357
KITALE

TO THE PRINCIPAL
……
……

Dear sir/madam

RE: REQUEST TO CARRY OUT RESEARCH IN YOUR SCHOOL

I am a student in Moi University pursuing a Master's degree course in curriculum development. As part of my requirement, I am undertaking a research study on*" INSTITUTIONAL FACTORS INFLUENCING STUDENTS' ACHIEVEMENT IN THE CHEMISTRY CURRICULUM IN TRANS NZOIA COUNTY, KENYA"* .The purpose of this letter is to seek permission to collect data in your school. If allowed, I promise to abide by the school rules and regulations. Attached are copies of questionnaires, research abstract and research permit

Thank you.

Yours sincerely,
……

JULIANA CHIRCHIR

APPENDIX II: Students' Questionnaire

Dear respondent.

I am a student of Moi University taking a Master of Philosophy Degree in Curriculum Instruction and Education media. I am undertaking a research study on *INSTITUTIONAL FACTORS INFLUENCING STUDENTS' ACHIEVEMENT IN THE CHEMISTRY CURRICULUM IN TRANS NZOIA COUNTY, KENYA"*. In order to collect relevant data, I have designed this questionnaire, which I am requesting you to complete. Be assured that the information you provide will be treated with due CONFIDENTIALITY. The questionnaire has been field-tested and takes only a few minutes to complete. Please respond to ALL questions as truthfully as you can. Do not write your name or admission number anywhere on this questionnaire.

Thank you.

Yours sincerely,

JULIANA CHIRCHIR.

SECTION A: Biographical information

1. What is your age?

   10-12 Yrs [ ] 13-15 Yrs [ ] 16-18 Yrs [ ] Above 18 Yrs [ ]

2. What is your gender?

Male [ ] Female [ ]

Student's achievement in Chemistry

What was your performance in the last Chemistry end of term exam? [Tick one].

Above 75% [ ] 60- 74% [ ] 45 – 59% [ ] 30 – 44% [ ] Less than 30% [ ]

Section B: Students' perception and achievement in Chemistry

Please use the key below to indicate your feeling and opinion by ticking (√) Strongly Agree (SA) 1, Agree (A) 2, Undecided (U) 3, Disagree (D) 4, and Strongly Disagree (SD).

Statements	**SA1**	**A2**	**U3**	**D4**	**SD5**
I find Chemistry very interesting.					
Every student should learn Chemistry.					
The language used in Chemistry exams is very difficult making exam questions challenging and confusing					
I want to go on learning Chemistry up to the university					
I understand the importance of learning Chemistry					
What we learn in Chemistry is relevant to my day to day experiences					
I prefer other subjects to Chemistry					
Chemistry is my best subject					
Chemistry should be made a compulsory subject in the secondary school curriculum.					

Section C: the influence of gender issues on achievement in Chemistry

Do you think gender has role to play in Chemistry performance?

Yes [ ] No [ ]

Please respond to the following statements about the influence of gender on achievement in Chemistry

Please use the key below to indicate your feeling and opinion by ticking (√) Strongly Agree (SA) 1, Agree (A) 2, Undecided (U) 3, Disagree (D) 4, and Strongly Disagree (SD).

Statements	**SA**	**A**	**U**	**D**	**SD**
Girls do well in Chemistry compared to boys					
Boys do well in Chemistry compared to girls					
Both boys and girls do well in Chemistry					
I perform poorly in Chemistry because it does no relate to my gender					
I perform well in Chemistry because it relates to my gender					

Section D: the School policy and its influence on performance in Chemistry

Is there a school policy regarding selection of Chemistry? Yes [ ] No [ ]

If yes, respond to what the school policy is all about?

Policy on subject selection [ ]

Policy on rewarding after performance [ ]

Policy on clubs and societies [ ]

Any other?.....

……

……

Answer the following in regard to Chemistry subject policies

Statement	**YES**	**NO**
In my school, Chemistry is a compulsory subject		
In my school, Chemistry is an optional subject		
The school policy on Chemistry does not favour all students		
It is difficult to pass Chemistry with the present school policy about the subject		

Section E: the influence of School resources on performance in Chemistry

Please respond to the following statements about the school resources of Chemistry subject

Please use the key below to indicate your feeling and opinion by ticking (√) Strongly Agree (SA) 1, Agree (A) 2, Undecided (U) 3, Disagree (D) 4, and Strongly Disagree (SD).

Statement	SA	A	U	D	SD
My school has an up to date laboratory					
The time allocated for Chemistry is enough to cover all the topics					
My school has a supportive laboratory technician.					
We have adequate Chemistry text books in my school.					
My Chemistry teacher attends all the lessons					
My Chemistry teacher explains concepts clearly					
We have adequate and supportive Chemistry teaching staff besides our Chemistry teacher.					

Section F: the influence of career aspirations on students' achievement in Chemistry

Do you wish to pursue a career in Chemistry after your secondary education?

Yes [ ] No [ ]

If yes, please respond to the following statements about career choice in Chemistry.

Statements	SA	A	U	D	SD
I would like to pursue a career related to Chemistry after school					
Chemistry subject is my personal choice					
I am passionate about Chemistry					
I understand Chemistry concepts to a great extent					
I like my teacher of Chemistry					
I can relate the concepts I learn in Chemistry to everyday life					

If no, could you pick from the following list a career of your choice?

Education (science) [ ]

Education (Art) [ ]

Mass communication and Journalism [ ]

Medicine [ ]

Law [ ]

Engineering [ ]

Others?.....

.....

Section G: Student's Achievement in Chemistry.

Statements	SA	A	U	D	SD
I perform better in Chemistry					
My performance has been improving					
I am satisfied with my current Chemistry achievements					
Are you satisfied with your school performance in Chemistry?					

APPENDIX III: TEACHERS' INTERVIEW

Dear respondent.

I am a student of Moi University taking **a** Master of Philosophy Degree in Curriculum Instruction and Education media. I am undertaking a research study on *"School factors Influencing Students achievement in Chemistry in Trans Nzoia County"*. In order to collect relevant data, I have designed this interview which I am requesting you to give honest answers. Be assured that the information you provide will be treated with due CONFIDENTIALITY.

Thank you.

Yours sincerely,
……

JULIANA CHIRCHIR.

APPENDIX IV: Interview Schedule

1. What are the perceptions of the students towards Chemistry and their influence on their achievement in Chemistry in schools in Trans Nzoia County?

   ……

   ……

2. What is the influence of school policies on achievement in Chemistry in Trans-Nzoia County, Kenya?

   ……

   ……

3. What is the influence of availability of school resources on achievement in Chemistry in Trans Nzoia County, Kenya?

……

……

4. What is the influence of student's gender on achievement in Chemistry in school in Trans Nzoia County?

   ……

   ……

5. How does student's career choice influence achievement in Chemistry in schools in Trans Nzoia County?